NAFTILOS'
NAUTICAL TABLES

ΠΙΝΑΚΕΣ ΚΑΙ ΥΠΟΛΟΓΙΣΜΟΙ ΝΑΥΤΙΛΙΑΣ

ΕΚΔΟΣΙΣ ΟΓΔΟΗ

Συγγραφεύς Ν. Χ. ΚΡΟΝΤΗΡΗΣ

Εκδοσις Γ. ΔΕΜΕΡΟΥΤΗΣ ΠΛΟΙΑΡΧΟΣ Ε.Ν.
Σπ. Ζερβού 21 - Τηλ. 4813940 - Ν. ΦΑΛΗΡΟΝ
ΠΕΙΡΑΙΕΥΣ
1982

Logarithms of Trigonometric Functions

0° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 179° ↓	
0	∞		∞	∞		∞	10. 00000	0.	10. 00000	60
1	6. 46373	30103	13 53627	6. 46373	30103	13. 53627	. 00000	0	. 00000	59
2	. 76476	17609	. 23524	. 76476	17609	. 23524	. 00000	0	. 00000	58
3	6. 94085	12494	13. 05915	6. 94085	12494	13. 05915	. 00000	0	. 00000	57
4	7. 06579	9691	12. 93421	7. 06579	9691	12. 93421	. 00000	0	. 00000	56
5	7. 16270	7918	12. 83730	7. 16270	7918	12. 83730	10. 00000	0	10. 00000	55
6	. 24188	6694	. 75812	. 24188	6694	. 75812	. 00000	0	. 00000	54
7	. 30882	5800	. 69118	. 30882	5800	. 69118	. 00000	0	. 00000	53
8	. 36682	5115	. 63318	. 36682	5115	. 63318	. 00000	0	. 00000	52
9	. 41797	4576	. 58203	. 41797	4576	. 58203	. 00000	0	. 00000	51
10	7. 46373	4139	12. 53627	7. 46373	4139	12. 53627	10. 00000	0	10. 00000	50
11	. 50512	3779	. 49488	. 50512	3779	. 49488	. 00000	0	. 00000	49
12	. 54291	3476	. 45709	. 54291	3476	. 45709	. 00000	0	. 00000	48
13	. 57767	3218	. 42233	. 57767	3219	. 42233	. 00000	0	. 00000	47
14	. 60985	2997	. 39015	. 60986	2996	. 39014	. 00000	0	. 00000	46
15	7. 63982	2802	12. 36018	7. 63982	2803	12. 36018	10. 00000	0	10. 00000	45
16	. 66784	2633	. 33216	. 66785	2633	. 33215	. 00000	1	10. 00000	44
17	. 69417	2483	. 30583	. 69418	2482	. 30582	. 00001	0	9. 99999	43
18	. 71900	2348	. 28100	. 71900	2348	. 28100	. 00001	0	. 99999	42
19	. 74248	2227	. 25752	. 74248	2228	. 25752	. 00001	0	. 99999	41
20	7. 76475	2119	12. 23525	7. 76476	2119	12. 23524	10. 00001	0	9. 99999	40
21	. 78594	2021	. 21406	. 78595	2020	. 21405	. 00001	0	. 99999	39
22	. 80615	1930	. 19385	. 80615	1931	. 19385	. 00001	0	. 99999	38
23	. 82545	1848	. 17455	. 82546	1848	. 17454	. 00001	0	. 99999	37
24	. 84393	1773	. 15607	. 84394	1773	. 15606	. 00001	0	. 99999	36
25	7. 86166	1704	12. 13834	7. 86167	1704	12. 13833	10. 00001	0	9. 99999	35
26	. 87870	1639	. 12130	. 87871	1639	. 12129	. 00001	0	. 99999	34
27	. 89509	1579	. 10491	. 89510	1579	. 10490	. 00001	0	. 99999	33
28	. 91088	1524	. 08912	. 91089	1524	. 08911	. 00001	1	. 99999	32
29	. 92612	1472	. 07388	. 92613	1473	. 07387	. 00002	0	. 99998	31
30	7. 94084	1424	12. 05916	7. 94086	1424	12. 05914	10. 00002	0	9. 99998	30
31	. 95508	1379	. 04492	. 95610	1379	. 04490	. 00002	0	. 99998	29
32	. 96887	1336	. 03113	. 96889	1336	. 03111	. 00002	0	. 99998	28
33	. 98223	1297	. 01777	. 98225	1297	. 01775	. 00002	0	. 99998	27
34	7. 99520	1259	12. 00480	7. 99522	1259	12. 00478	. 00002	0	. 99998	26
35	8. 00779	1223	11. 99221	8. 00781	1223	11. 99219	10. 00002	0	9. 99998	25
36	. 02002	1190	. 97998	. 02004	1190	. 97996	. 00002	1	. 99998	24
37	. 03192	1158	. 96808	. 03194	1159	. 96806	. 00003	0	. 99997	23
38	. 04350	1128	. 95650	. 04353	1128	. 95647	. 00003	0	. 99997	22
39	. 05478	1100	. 94522	. 05481	1100	. 94519	. 00003	0	. 99997	21
40	8. 06578	1072	11. 93422	8. 06581	1072	11. 93419	10. 00003	0	9. 99997	20
41	. 07650	1046	. 92350	. 07653	1047	. 92347	. 00003	0	. 99997	19
42	. 08696	1022	. 91304	. 08700	1022	. 91300	. 00003	0	. 99997	18
43	. 09718	999	. 90282	. 09722	998	. 90278	. 00003	1	. 99997	17
44	. 10717	976	. 89283	. 10720	976	. 89280	. 00004	0	. 99996	16
45	8. 11693	954	11. 88307	8. 11696	955	11. 88304	10. 00004	0	9. 99996	15
46	. 12647	934	. 87353	. 12651	934	. 87349	. 00004	0	. 99996	14
47	. 13581	914	. 86419	. 13585	915	. 86415	. 00004	0	. 99996	13
48	. 14495	896	. 85505	. 14500	895	. 85500	. 00004	0	. 99996	12
49	. 15391	877	. 84609	. 15395	878	. 84605	. 00004	1	. 99996	11
50	8. 16268	860	11. 83732	8. 16273	860	11. 83727	10. 00005	0	9. 99995	10
51	. 17128	843	. 82872	. 17133	843	. 82867	. 00005	0	. 99995	9
52	. 17971	827	. 82029	. 17976	828	. 82024	. 00005	0	. 99995	8
53	. 18798	812	. 81202	. 18804	812	. 81196	. 00005	0	. 99995	7
54	. 19610	797	. 80390	. 19616	797	. 80384	. 00005	1	. 99995	6
55	8. 20407	782	11. 79593	8. 20413	782	11. 79587	10. 00006	0	9. 99994	5
56	. 21189	769	. 78811	. 21195	769	. 78805	. 00006	0	. 99994	4
57	. 21958	755	. 78042	. 21964	756	. 78036	. 00006	0	. 99994	3
58	. 22713	743	. 77287	. 22720	742	. 77280	. 00006	0	. 99994	2
59	. 23456	730	. 76544	. 23462	730	. 76538	. 00006	1	. 99994	1
60	8. 24186		11. 75814	8. 24192		11. 75808	10. 00007		9. 99993	0
↑ 90° →	cos	Diff. 1′	sec	csc	Diff. 1′	tan	cot	Diff. 1′	sin	← 89° ↑

1°→ ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	←178° ↓
′										′
0	8. 24186	717	11. 75814	8. 24192	718	11. 75808	10. 00007	0	9. 99993	60
1	. 24903	706	. 75097	. 24910	706	. 75090	. 00007	0	. 99993	59
2	. 25609	695	. 74391	. 25616	696	. 74384	. 00007	0	. 99993	58
3	. 26304	684	. 73696	. 26312	684	. 73688	. 00007	1	. 99993	57
4	. 26988	673	. 73012	. 26996	673	. 73004	. 00008	0	. 99992	56
5	8. 27661	663	11. 72339	8. 27669	663	11. 72331	10. 00008	0	9. 99992	55
6	. 28324	653	. 71676	. 28332	654	. 71668	. 00008	0	. 99992	54
7	. 28977	644	. 71023	. 28986	643	. 71014	. 00008	0	. 99992	53
8	. 29621	634	. 70379	. 29629	634	. 70371	. 00008	1	. 99992	52
9	. 30255	624	. 69745	. 30263	625	. 69737	. 00009	0	. 99991	51
10	8. 30879	616	11. 69121	8. 30888	617	11. 69112	10. 00009	0	9. 99991	50
11	. 31495	608	. 68505	. 31505	607	. 68495	. 00009	1	. 99991	49
12	. 32103	599	. 67897	. 32112	599	. 67888	. 00010	0	. 99990	48
13	. 32702	590	. 67298	. 32711	591	. 67289	. 00010	0	. 99990	47
14	. 33292	583	. 66708	. 33302	584	. 66698	. 00010	0	. 99990	46
15	8. 33875	575	11. 66125	8. 33886	575	11. 66114	10. 00010	1	9. 99990	45
16	. 34450	568	. 65550	. 34461	568	. 65539	. 00011	0	. 99989	44
17	. 35018	560	. 64982	. 35029	561	. 64971	. 00011	0	. 99989	43
18	. 35578	553	. 64422	. 35590	553	. 64410	. 00011	0	. 99989	42
19	. 36131	547	. 63869	. 36143	546	. 63857	. 00011	1	. 99989	41
20	8. 36678	539	11. 63322	8. 36689	540	11. 63311	10. 00012	0	9. 99988	40
21	. 37217	533	. 62783	. 37229	533	. 62771	. 00012	0	. 99988	39
22	. 37750	526	. 62250	. 37762	527	. 62238	. 00012	1	. 99988	38
23	. 38276	520	. 61724	. 38289	520	. 61711	. 00013	0	. 99987	37
24	. 38796	514	. 61204	. 38809	514	. 61191	. 00013	0	. 99987	36
25	8. 39310	508	11. 60690	8. 39323	509	11. 60677	10. 00013	1	9. 99987	35
26	. 39818	502	. 60182	. 39832	502	. 60168	. 00014	0	. 99986	34
27	. 40320	496	. 59680	. 40334	496	. 59666	. 00014	0	. 99986	33
28	. 40816	491	. 59184	. 40830	491	. 59170	. 00014	0	. 99986	32
29	. 41307	485	. 58693	. 41321	486	. 58679	. 00015	1	. 99985	31
30	8. 41792	480	11. 58208	8. 41807	480	11. 58193	10. 00015	0	9. 99985	30
31	. 42272	474	. 57728	. 42287	475	. 57713	. 00015	0	. 99985	29
32	. 42746	470	. 57254	. 42762	470	. 57238	. 00016	1	. 99984	28
33	. 43216	464	. 56784	. 43232	464	. 56768	. 00016	0	. 99984	27
34	. 43680	459	. 56320	. 43696	460	. 56304	. 00016	0	. 99984	26
35	8. 44139	455	11. 55861	8. 44156	455	11. 55844	10. 00017	1	9. 99983	25
36	. 44594	450	. 55406	. 44611	450	. 55389	. 00017	0	. 99983	24
37	. 45044	445	. 54956	. 45061	446	. 54939	. 00017	0	. 99983	23
38	. 45489	441	. 54511	. 45507	441	. 54493	. 00018	1	. 99982	22
39	. 45930	436	. 54070	. 45948	437	. 54052	. 00018	0	. 99982	21
40	8. 46366	433	11. 53634	8. 46385	432	11. 53615	10. 00018	0	9. 99982	20
41	. 46799	427	. 53201	. 46817	428	. 53183	. 00019	1	. 99981	19
42	. 47226	424	. 52774	. 47245	424	. 52755	. 00019	0	. 99981	18
43	. 47650	419	. 52350	. 47669	420	. 52331	. 00019	0	. 99981	17
44	. 48069	416	. 51931	. 48089	416	. 51911	. 00020	1	. 99980	16
45	8. 48485	411	11. 51515	8. 48505	412	11. 51495	10. 00020	0	9. 99980	15
46	. 48896	408	. 51104	. 48917	408	. 51083	. 00021	1	. 99979	14
47	. 49304	404	. 50696	. 49325	404	. 50675	. 00021	0	. 99979	13
48	. 49708	400	. 50292	. 49729	401	. 50271	. 00021	0	. 99979	12
49	. 50108	396	. 49892	. 50130	397	. 49870	. 00022	1	. 99978	11
50	8. 50504	393	11. 49496	8. 50527	393	11. 49473	10. 00022	0	9. 99978	10
51	. 50897	390	. 49103	. 50920	390	. 49080	. 00023	1	. 99977	9
52	. 51287	386	. 48713	. 51310	386	. 48690	. 00023	0	. 99977	8
53	. 51673	382	. 48327	. 51696	383	. 48304	. 00023	0	. 99977	7
54	. 52055	379	. 47945	. 52079	380	. 47921	. 00024	1	. 99976	6
55	8. 52434	376	11. 47566	8. 52459	376	11. 47541	10. 00024	0	9. 99976	5
56	. 52810	373	. 47190	. 52835	373	. 47165	. 00025	1	. 99975	4
57	. 53183	369	. 46817	. 53208	370	. 46792	. 00025	0	. 99975	3
58	. 53552	367	. 46448	. 53578	367	. 46422	. 00026	1	. 99974	2
59	. 53919	363	. 46081	. 53945	363	. 46055	. 00026	0	. 99974	1
60	8. 54282		11. 45718	8. 54308		11. 45692	10. 00026	0	9. 99974	0
↑ 91°→	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ←88°

Logarithms of Trigonometric Functions

2° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 177° ↓	
0	8. 54282	360	11. 45718	8. 54308	361	11. 45692	10. 00026	1	9. 99974	60
1	. 54642	357	. 45358	. 54669	358	. 45331	. 00027	0	. 99973	59
2	. 54999	355	. 45001	. 55027	355	. 44973	. 00027	1	. 99973	58
3	. 55354	351	. 44646	. 55382	352	. 44618	. 00028	0	. 99972	57
4	. 55705	349	. 44295	. 55734	349	. 44266	. 00028	1	. 99972	56
5	8. 56054	346	11. 43946	8. 56083	346	11. 43917	10. 00029	0	9. 99971	55
6	. 56400	343	. 43600	. 56429	344	. 43571	. 00029	1	. 99971	54
7	. 56743	341	. 43257	. 56773	341	. 43227	. 00030	0	. 99970	53
8	. 57084	337	. 42916	. 57114	338	. 42886	. 00030	1	. 99970	52
9	. 57421	336	. 42579	. 57452	336	. 42548	. 00031	0	. 99969	51
10	8. 57757	332	11. 42243	8. 57788	333	11. 42212	10. 00031	1	9. 99969	50
11	. 58089	330	. 41911	. 58121	330	. 41879	. 00032	0	. 99968	49
12	. 58419	328	. 41581	. 58451	328	. 41549	. 00032	1	. 99968	48
13	. 58747	325	. 41253	. 58779	326	. 41221	. 00033	0	. 99967	47
14	. 59072	323	. 40928	. 59105	323	. 40895	. 00033	0	. 99967	46
15	8. 59395	320	11. 40605	8. 59428	321	11. 40572	10. 00033	1	9. 99967	45
16	. 59715	318	. 40285	. 59749	319	. 40251	. 00034	0	. 99966	44
17	. 60033	316	. 39967	. 60068	316	. 39932	. 00034	1	. 99966	43
18	. 60349	313	. 39651	. 60384	314	. 39616	. 00035	1	. 99965	42
19	. 60662	311	. 39338	. 60698	311	. 39302	. 00036	0	. 99964	41
20	8. 60973	309	11. 39027	8. 61009	310	11. 38991	10. 00036	1	9. 99964	40
21	. 61282	307	. 38718	. 61319	307	. 38681	. 00037	0	. 99963	39
22	. 61589	305	. 38411	. 61626	305	. 38374	. 00037	1	. 99963	38
23	. 61894	302	. 38106	. 61931	303	. 38069	. 00038	0	. 99962	37
24	. 62196	301	. 37804	. 62234	301	. 37766	. 00038	1	. 99962	36
25	8. 62497	298	11. 37503	8. 62535	299	11. 37465	10. 00039	0	9. 99961	35
26	. 62795	296	. 37205	. 62834	297	. 37166	. 00039	1	. 99961	34
27	. 63091	294	. 36909	. 63131	295	. 36869	. 00040	0	. 99960	33
28	. 63385	293	. 36615	. 63426	292	. 36574	. 00040	1	. 99960	32
29	. 63678	290	. 36322	. 63718	291	. 36282	. 00041	0	. 99959	31
30	8. 63968	288	11. 36032	8. 64009	289	11. 35991	10. 00041	1	9. 99959	30
31	. 64256	287	. 35744	. 64298	287	. 35702	. 00042	0	. 99958	29
32	. 64543	284	. 35457	. 64585	285	. 35415	. 00042	1	. 99958	28
33	. 64827	283	. 35173	. 64870	284	. 35130	. 00043	1	. 99957	27
34	. 65110	281	. 34890	. 65154	281	. 34846	. 00044	0	. 99956	26
35	8. 65391	279	11. 34609	8. 65435	280	11. 34565	10. 00044	1	9. 99956	25
36	. 65670	277	. 34330	. 65715	278	. 34285	. 00045	0	. 99955	24
37	. 65947	276	. 34053	. 65993	276	. 34007	. 00045	1	. 99955	23
38	. 66223	274	. 33777	. 66269	274	. 33731	. 00046	0	. 99954	22
39	. 66497	272	. 33503	. 66543	273	. 33457	. 00046	1	. 99954	21
40	8. 66769	270	11. 33231	8. 66816	271	11. 33184	10. 00047	1	9. 99953	20
41	. 67039	269	. 32961	. 67087	269	. 32913	. 00048	0	. 99952	19
42	. 67308	267	. 32692	. 67356	268	. 32644	. 00048	1	. 99952	18
43	. 67575	266	. 32425	. 67624	266	. 32376	. 00049	0	. 99951	17
44	. 67841	263	. 32159	. 67890	264	. 32110	. 00049	1	. 99951	16
45	8. 68104	263	11. 31896	8. 68154	263	11. 31846	10. 00050	1	9. 99950	15
46	. 68367	260	. 31633	. 68417	261	. 31583	. 00051	0	. 99949	14
47	. 68627	259	. 31373	. 68678	260	. 31322	. 00051	1	. 99949	13
48	. 68886	258	. 31114	. 68938	258	. 31062	. 00052	0	. 99948	12
49	. 69144	256	. 30856	. 69196	257	. 30804	. 00052	1	. 99948	11
50	8. 69400	254	11. 30600	8. 69453	255	11. 30547	10. 00053	1	9. 99947	10
51	. 69654	253	. 30346	. 69708	254	. 30292	. 00054	0	. 99946	9
52	. 69907	252	. 30093	. 69962	252	. 30038	. 00054	1	. 99946	8
53	. 70159	250	. 29841	. 70214	251	. 29786	. 00055	1	. 99945	7
54	. 70409	249	. 29591	. 70465	249	. 29535	. 00056	0	. 99944	6
55	8. 70658	247	11. 29342	8. 70714	248	11. 29286	10. 00056	1	9. 99944	5
56	. 70905	246	. 29095	. 70962	246	. 29038	. 00057	1	. 99943	4
57	. 71151	244	. 28849	. 71208	245	. 28792	. 00058	0	. 99942	3
58	. 71395	243	. 28605	. 71453	244	. 28547	. 00058	1	. 99942	2
59	. 71638	242	. 28362	. 71697	243	. 28303	. 00059	1	. 99941	1
60	8. 71880		11. 28120	8. 71940		11. 28060	10. 00060		9. 99940	0
↑ 92° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin ↑	← 87°

3°→ ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	←176° ↓
′										′
0	8. 71880	240	11. 28120	8. 71940	241	11. 28060	10. 00060	0	9. 99940	60
1	. 72120	239	. 27880	. 72181	239	. 27819	. 00060	1	. 99940	59
2	. 72359	238	. 27641	. 72420	239	. 27580	. 00061	1	. 99939	58
3	. 72597	237	. 27403	. 72659	237	. 27341	. 00062	0	. 99938	57
4	. 72834	235	. 27166	. 72896	236	. 27104	. 00062	1	. 99938	56
5	8. 73069	234	11. 26931	8. 73132	234	11. 26868	10. 00063	1	9. 99937	55
6	. 73303	232	. 26697	. 73366	234	. 26634	. 00064	0	. 99936	54
7	. 73535	232	. 26465	. 73600	232	. 26400	. 00064	1	. 99936	53
8	. 73767	230	. 26233	. 73832	231	. 26168	. 00065	1	. 99935	52
9	. 73997	229	. 26003	. 74063	229	. 25937	. 00066	0	. 99934	51
10	8. 74226	228	11. 25774	8. 74292	229	11. 25708	10. 00066	1	9. 99934	50
11	. 74454	226	. 25546	. 74521	227	. 25479	. 00067	1	. 99933	49
12	. 74680	226	. 25320	. 74748	226	. 25252	. 00068	0	. 99932	48
13	. 74906	224	. 25094	. 74974	225	. 25026	. 00068	1	. 99932	47
14	. 75130	223	. 24870	. 75199	224	. 24801	. 00069	1	. 99931	46
15	8. 75353	222	11. 24647	8. 75423	222	11. 24577	10. 00070	1	9. 99930	45
16	. 75575	220	. 24425	. 75645	222	. 24355	. 00071	0	. 99929	44
17	. 75795	220	. 24205	. 75867	220	. 24133	. 00071	1	. 99929	43
18	. 76015	219	. 23985	. 76087	219	. 23913	. 00072	1	. 99928	42
19	. 76234	217	. 23766	. 76306	219	. 23694	. 00073	1	. 99927	41
20	8. 76451	216	11. 23549	8. 76525	217	11. 23475	10. 00074	0	9. 99926	40
21	. 76667	216	. 23333	. 76742	216	. 23258	. 00074	1	. 99926	39
22	. 76883	214	. 23117	. 76958	215	. 23042	. 00075	1	. 99925	38
23	. 77097	213	. 22903	. 77173	214	. 22827	. 00076	1	. 99924	37
24	. 77310	212	. 22690	. 77387	213	. 22613	. 00077	1	. 99923	36
25	8. 77522	211	11. 22478	8. 77600	211	11. 22400	10. 00077	0	9. 99923	35
26	. 77733	210	. 22267	. 77811	211	. 22189	. 00078	1	. 99922	34
27	. 77943	209	. 22057	. 78022	210	. 21978	. 00079	1	. 99921	33
28	. 78152	208	. 21848	. 78232	209	. 21768	. 00080	1	. 99920	32
29	. 78360	208	. 21640	. 78441	208	. 21559	. 00080	0	. 99920	31
30	8. 78568	206	11. 21432	8. 78649	206	11. 21351	10. 00081	1	9. 99919	30
31	. 78774	205	. 21226	. 78855	206	. 21145	. 00082	1	. 99918	29
32	. 78979	204	. 21021	. 79061	205	. 20939	. 00083	0	. 99917	28
33	. 79183	203	. 20817	. 79266	204	. 20734	. 00083	1	. 99917	27
34	. 79386	202	. 20614	. 79470	203	. 20530	. 00084	1	. 99916	26
35	8. 79588	201	11. 20412	8. 79673	202	11. 20327	10. 00085	1	9. 99915	25
36	. 79789	201	. 20211	. 79875	201	. 20125	. 00086	1	. 99914	24
37	. 79990	199	. 20010	. 80076	201	. 19924	. 00087	0	. 99913	23
38	. 80189	199	. 19811	. 80277	199	. 19723	. 00087	1	. 99913	22
39	. 80388	197	. 19612	. 80476	198	. 19524	. 00088	1	. 99912	21
40	8. 80585	197	11. 19415	8. 80674	198	11. 19326	10. 00089	1	9. 99911	20
41	. 80782	196	. 19218	. 80872	196	. 19128	. 00090	1	. 99910	19
42	. 80978	195	. 19022	. 81068	196	. 18932	. 00091	0	. 99909	18
43	. 81173	194	. 18827	. 81264	195	. 18736	. 00091	1	. 99909	17
44	. 81367	193	. 18633	. 81459	194	. 18541	. 00092	1	. 99908	16
45	8. 81560	192	11. 18440	8. 81653	193	11. 18347	10. 00093	1	9. 99907	15
46	. 81752	192	. 18248	. 81846	192	. 18154	. 00094	1	. 99906	14
47	. 81944	190	. 18056	. 82038	192	. 17962	. 00095	1	. 99905	13
48	. 82134	190	. 17866	. 82230	190	. 17770	. 00096	0	. 99904	12
49	. 82324	189	. 17676	. 82420	190	. 17580	. 00096	1	. 99904	11
50	8. 82513	188	11. 17487	8. 82610	189	11. 17390	10. 00097	1	9. 99903	10
51	. 82701	187	. 17299	. 82799	188	. 17201	. 00098	1	. 99902	9
52	. 82888	187	. 17112	. 82987	188	. 17013	. 00099	1	. 99901	8
53	. 83075	186	. 16925	. 83175	186	. 16825	. 00100	1	. 99900	7
54	. 83261	185	. 16739	. 83361	186	. 16639	. 00101	1	. 99899	6
55	8. 83446	184	11. 16554	8. 83547	185	11. 16453	10. 00102	0	9. 99898	5
56	. 83630	183	. 16370	. 83732	184	. 16268	. 00102	1	. 99898	4
57	. 83813	183	. 16187	. 83916	184	. 16084	. 00103	1	. 99897	3
58	. 83996	181	. 16004	. 84100	182	. 15900	. 00104	1	. 99896	2
59	. 84177	181	. 15823	. 84282	182	. 15718	. 00105	1	. 99895	1
60	8. 84358		11. 15642	8. 84464		11. 15536	10. 00106		9. 99894	0
↑ 93°→	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ←86°

4°→ ↓ ′	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	←175° ↓
0	8. 84358	181	11. 15642	8. 84464	182	11. 15536	10. 00106	1	9. 99894	60
1	. 84539	179	. 15461	. 84646	180	. 15354	. 00107	1	. 99893	59
2	. 84718	179	. 15282	. 84826	180	. 15174	. 00108	1	. 99892	58
3	. 84897	178	. 15103	. 85006	179	. 14994	. 00109	0	. 99891	57
4	. 85075	177	. 14925	. 85185	178	. 14815	. 00109	1	. 99891	56
5	8. 85252	177	11. 14748	8. 85363	177	11. 14637	10. 00110	1	9. 99890	55
6	. 85429	176	. 14571	. 85540	177	. 14460	. 00111	1	. 99889	54
7	. 85605	175	. 14395	. 85717	176	. 14283	. 00112	1	. 99888	53
8	. 85780	175	. 14220	. 85893	176	. 14107	. 00113	1	. 99887	52
9	. 85955	173	. 14045	. 86069	174	. 13931	. 00114	1	. 99886	51
10	8. 86128	173	11. 13872	8. 86243	174	11. 13757	10. 00115	1	9. 99885	50
11	. 86301	173	. 13699	. 86417	174	. 13583	. 00116	1	. 99884	49
12	. 86474	171	. 13526	. 86591	172	. 13409	. 00117	1	. 99883	48
13	. 86645	171	. 13355	. 86763	172	. 13237	. 00118	1	. 99882	47
14	. 86816	171	. 13184	. 86935	171	. 13065	. 00119	1	. 99881	46
15	8. 86987	169	11. 13013	8. 87106	171	11. 12894	10. 00120	1	9. 99880	45
16	. 87156	169	. 12844	. 87277	170	. 12723	. 00121	0	. 99879	44
17	. 87325	169	. 12675	. 87447	169	. 12553	. 00121	1	. 99879	43
18	. 87494	167	. 12506	. 87616	169	. 12384	. 00122	1	. 99878	42
19	. 87661	168	. 12339	. 87785	168	. 12215	. 00123	1	. 99877	41
20	8. 87829	166	11. 12171	8. 87953	167	11. 12047	10. 00124	1	9. 99876	40
21	. 87995	166	. 12005	. 88120	167	. 11880	. 00125	1	. 99875	39
22	. 88161	165	. 11839	. 88287	166	. 11713	. 00126	1	. 99874	38
23	. 88326	164	. 11674	. 88453	165	. 11547	. 00127	1	. 99873	37
24	. 88490	164	. 11510	. 88618	165	. 11382	. 00128	1	. 99872	36
25	8. 88654	163	11. 11346	8. 88783	165	11. 11217	10. 00129	1	9. 99871	35
26	. 88817	163	. 11183	. 88948	163	. 11052	. 00130	1	. 99870	34
27	. 88980	162	. 11020	. 89111	163	. 10889	. 00131	1	. 99869	33
28	. 89142	162	. 10858	. 89274	163	. 10726	. 00132	1	. 99868	32
29	. 89304	160	. 10696	. 89437	161	. 10563	. 00133	1	. 99867	31
30	8. 89464	161	11. 10536	8. 89598	162	11. 10402	10. 00134	1	9. 99866	30
31	. 89625	159	. 10375	. 89760	160	. 10240	. 00135	1	. 99865	29
32	. 89784	159	. 10216	. 89920	160	. 10080	. 00136	1	. 99864	28
33	. 89943	159	. 10057	. 90080	160	. 09920	. 00137	1	. 99863	27
34	. 90102	158	. 09898	. 90240	159	. 09760	. 00138	1	. 99862	26
35	8. 90260	157	11. 09740	8. 90399	158	11. 09601	10. 00139	1	9. 99861	25
36	. 90417	157	. 09583	. 90557	158	. 09443	. 00140	1	. 99860	24
37	. 90574	156	. 09426	. 90715	157	. 09285	. 00141	1	. 99859	23
38	. 90730	155	. 09270	. 90872	157	. 09128	. 00142	1	. 99858	22
39	. 90885	155	. 09115	. 91029	156	. 08971	. 00143	1	. 99857	21
40	8. 91040	155	11. 08960	8. 91185	155	11. 08815	10. 00144	1	9. 99856	20
41	. 91195	154	. 08805	. 91340	155	. 08660	. 00145	1	. 99855	19
42	. 91349	153	. 08651	. 91495	155	. 08505	. 00146	1	. 99854	18
43	. 91502	153	. 08498	. 91650	153	. 08350	. 00147	1	. 99853	17
44	. 91655	152	. 08345	. 91803	154	. 08197	. 00148	1	. 99852	16
45	8. 91807	152	11. 08193	8. 91957	153	11. 08043	10. 00149	1	9. 99851	15
46	. 91959	151	. 08041	. 92110	152	. 07890	. 00150	2	. 99850	14
47	. 92110	151	. 07890	. 92262	152	. 07738	. 00152	1	. 99848	13
48	. 92261	150	. 07739	. 92414	151	. 07586	. 00153	1	. 99847	12
49	. 92411	150	. 07589	. 92565	151	. 07435	. 00154	1	. 99846	11
50	8. 92561	149	11. 07439	8. 92716	150	11. 07284	10. 00155	1	9. 99845	10
51	. 92710	149	. 07290	. 92866	150	. 07134	. 00156	1	. 99844	9
52	. 92859	148	. 07141	. 93016	149	. 06984	. 00157	1	. 99843	8
53	. 93007	147	. 06993	. 93165	148	. 06835	. 00158	1	. 99842	7
54	. 93154	147	. 06846	. 93313	149	. 06687	. 00159	1	. 99841	6
55	8. 93301	147	11. 06699	8. 93462	147	11. 06538	10. 00160	1	9. 99840	5
56	. 93448	146	. 06552	. 93609	147	. 06391	. 00161	1	. 99839	4
57	. 93594	146	. 06406	. 93756	147	. 06244	. 00162	1	. 99838	3
58	. 93740	145	. 06260	. 93903	146	. 06097	. 00163	1	. 99837	2
59	. 93885	145	. 06115	. 94049	146	. 05951	. 00164	2	. 99836	1
60	8. 94030		11. 05970	8. 94195		11. 05805	10. 00166		9. 99834	0
↑ 94°→	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ←85°

5° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 174° ↓
0	8. 94030	144	11. 05970	8. 94195	145	11. 05805	10. 00166	1	9. 99834	60
1	. 94174	143	. 05826	. 94340	145	. 05660	. 00167	1	. 99833	59
2	. 94317	144	. 05683	. 94485	145	. 05515	. 00168	1	. 99832	58
3	. 94461	142	. 05539	. 94630	143	. 05370	. 00169	1	. 99831	57
4	. 94603	143	. 05397	. 94773	144	. 05227	. 00170	1	. 99830	56
5	8. 94746	141	11. 05254	8. 94917	143	11. 05083	10. 00171	1	9. 99829	55
6	. 94887	142	. 05113	. 95060	142	. 04940	. 00172	1	. 99828	54
7	. 95029	141	. 04971	. 95202	142	. 04798	. 00173	2	. 99827	53
8	. 95170	140	. 04830	. 95344	142	. 04656	. 00175	1	. 99825	52
9	. 95310	140	. 04690	. 95486	141	. 04514	. 00176	1	. 99824	51
10	8. 95450	139	11. 04550	8. 95627	140	11. 04373	10. 00177	1	9. 99823	50
11	. 95589	139	. 04411	. 95767	141	. 04233	. 00178	1	. 99822	49
12	. 95728	139	. 04272	. 95908	139	. 04092	. 00179	1	. 99821	48
13	. 95867	138	. 04133	. 96047	140	. 03953	. 00180	1	. 99820	47
14	. 96005	138	. 03995	. 96187	138	. 03813	. 00181	2	. 99819	46
15	8. 96143	137	11. 03857	8. 96325	139	11. 03675	10. 00183	1	9. 99817	45
16	. 96280	137	. 03720	. 96464	138	. 03536	. 00184	1	. 99816	44
17	. 96417	136	. 03583	. 96602	137	. 03398	. 00185	1	. 99815	43
18	. 96553	136	. 03447	. 96739	138	. 03261	. 00186	1	. 99814	42
19	. 96689	136	. 03311	. 96877	136	. 03123	. 00187	1	. 99813	41
20	8. 96825	135	11. 03175	8. 97013	137	11. 02987	10. 00188	2	9. 99812	40
21	. 96960	135	. 03040	. 97150	135	. 02850	. 00190	1	. 99810	39
22	. 97095	134	. 02905	. 97285	136	. 02715	. 00191	1	. 99809	38
23	. 97229	134	. 02771	. 97421	135	. 02579	. 00192	1	. 99808	37
24	. 97363	133	. 02637	. 97556	135	. 02444	. 00193	1	. 99807	36
25	8. 97496	133	11. 02504	8. 97691	134	11. 02309	10. 00194	2	9. 99806	35
26	. 97629	133	. 02371	. 97825	134	. 02175	. 00196	1	. 99804	34
27	. 97762	132	. 02238	. 97959	133	. 02041	. 00197	1	. 99803	33
28	. 97894	132	. 02106	. 98092	133	. 01908	. 00198	1	. 99802	32
29	. 98026	131	. 01974	. 98225	133	. 01775	. 00199	1	. 99801	31
30	8. 98157	131	11. 01843	8. 98358	132	11. 01642	10. 00200	2	9. 99800	30
31	. 98288	131	. 01712	. 98490	132	. 01510	. 00202	1	. 99798	29
32	. 98419	130	. 01581	. 98622	131	. 01378	. 00203	1	. 99797	28
33	. 98549	130	. 01451	. 98753	131	. 01247	. 00204	1	. 99796	27
34	. 98679	129	. 01321	. 98884	131	. 01116	. 00205	2	. 99795	26
35	8. 98808	129	11. 01192	8. 99015	130	11. 00985	10. 00207	1	9. 99793	25
36	. 98937	129	. 01063	. 99145	130	. 00855	. 00208	1	. 99792	24
37	. 99066	128	. 00934	. 99275	130	. 00725	. 00209	1	. 99791	23
38	. 99194	128	. 00806	. 99405	129	. 00595	. 00210	2	. 99790	22
39	. 99322	128	. 00678	. 99534	128	. 00466	. 00212	1	. 99788	21
40	8. 99450	127	11. 00550	8. 99662	129	11. 00338	10. 00213	1	9. 99787	20
41	. 99577	127	. 00423	. 99791	128	. 00209	. 00214	1	. 99786	19
42	. 99704	126	. 00296	8. 99919	127	11. 00081	. 00215	2	. 99785	18
43	. 99830	126	. 00170	9. 00046	128	10. 99954	. 00217	1	. 99783	17
44	8. 99956	126	11. 00044	. 00174	127	. 99826	. 00218	1	. 99782	16
45	9. 00082	125	10. 99918	9. 00301	126	10. 99699	10. 00219	1	9. 99781	15
46	. 00207	125	. 99793	. 00427	126	. 99573	. 00220	2	. 99780	14
47	. 00332	124	. 99668	. 00553	126	. 99447	. 00222	1	. 99778	13
48	. 00456	125	. 99544	. 00679	126	. 99321	. 00223	1	. 99777	12
49	. 00581	123	. 99419	. 00805	125	. 99195	. 00224	1	. 99776	11
50	9. 00704	124	10. 99296	9. 00930	125	10. 99070	10. 00225	2	9. 99775	10
51	. 00828	123	. 99172	. 01055	124	. 98945	. 00227	1	. 99773	9
52	. 00951	122	. 99049	. 01179	124	. 98821	. 00228	1	. 99772	8
53	. 01074	122	. 98926	. 01303	124	. 98697	. 00229	2	. 99771	7
54	. 01196	122	. 98804	. 01427	123	. 98573	. 00231	1	. 99769	6
55	9. 01318	122	10. 98682	9. 01550	123	10. 98450	10. 00232	1	9. 99768	5
56	. 01440	121	. 98560	. 01673	123	. 98327	. 00233	2	. 99767	4
57	. 01561	121	. 98439	. 01796	122	. 98204	. 00235	1	. 99765	3
58	. 01682	121	. 98318	. 01918	122	. 98082	. 00236	1	. 99764	2
59	. 01803	120	. 98197	. 02040	122	. 97960	. 00237	2	. 99763	1
60	9. 01923		10. 98077	9. 02162		10. 97838	10. 00239		9. 99761	0
↑ 95° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 84°

6°→	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	←173° ↓
0	9. 01923	120	10. 98077	9. 02162	121	10. 97838	10. 00239	1	9. 99761	60
1	. 02043	120	. 97957	. 02283	121	. 97717	. 00240	1	. 99760	59
2	. 02163	120	. 97837	. 02404	121	. 97596	. 00241	2	. 99759	58
3	. 02283	119	. 97717	. 02525	120	. 97475	. 00243	1	. 99757	57
4	. 02402	118	. 97598	. 02645	121	. 97355	. 00244	1	. 99756	56
5	9. 02520	119	10. 97480	9. 02766	119	10. 97234	10. 00245	2	9. 99755	55
6	. 02639	118	. 97361	. 02885	120	. 97115	. 00247	1	. 99753	54
7	. 02757	117	. 97243	. 03005	119	. 96995	. 00248	1	. 99752	53
8	. 02874	118	. 97126	. 03124	118	. 96876	. 00249	2	. 99751	52
9	. 02992	117	. 97008	. 03242	119	. 96758	. 00251	1	. 99749	51
10	9. 03109	117	10. 96891	9. 03361	118	10. 96639	10. 00252	1	9. 99748	50
11	. 03226	116	. 96774	. 03479	118	. 96521	. 00253	2	. 99747	49
12	. 03342	116	. 96658	. 03597	117	. 96403	. 00255	1	. 99745	48
13	. 03458	116	. 96542	. 03714	118	. 96286	. 00256	2	. 99744	47
14	. 03574	116	. 96426	. 03832	116	. 96168	. 00258	1	. 99742	46
15	9. 03690	115	10. 96310	9. 03948	117	10. 96052	10. 00259	1	9. 99741	45
16	. 03805	115	. 96195	. 04065	116	. 95935	. 00260	2	. 99740	44
17	. 03920	114	. 96080	. 04181	116	. 95819	. 00262	1	. 99738	43
18	. 04034	115	. 95966	. 04297	116	. 95703	. 00263	1	. 99737	42
19	. 04149	113	. 95851	. 04413	115	. 95587	. 00264	2	. 99736	41
20	9. 04262	114	10. 95738	9. 04528	115	10. 95472	10. 00266	1	9. 99734	40
21	. 04376	114	. 95624	. 04643	115	. 95357	. 00267	2	. 99733	39
22	. 04490	113	. 95510	. 04758	115	. 95242	. 00269	1	. 99731	38
23	. 04603	112	. 95397	. 04873	114	. 95127	. 00270	2	. 99730	37
24	. 04715	113	. 95285	. 04987	114	. 95013	. 00272	1	. 99728	36
25	9. 04828	112	10. 95172	9. 05101	113	10. 94899	10. 00273	1	9. 99727	35
26	. 04940	112	. 95060	. 05214	114	. 94786	. 00274	2	. 99726	34
27	. 05052	112	. 94948	. 05328	113	. 94672	. 00276	1	. 99724	33
28	. 05164	111	. 94836	. 05441	112	. 94559	. 00277	2	. 99723	32
29	. 05275	111	. 94725	. 05553	113	. 94447	. 00279	1	. 99721	31
30	9. 05386	111	10. 94614	9. 05666	112	10. 94334	10. 00280	2	9. 99720	30
31	. 05497	110	. 94503	. 05778	112	. 94222	. 00282	1	. 99718	29
32	. 05607	110	. 94393	. 05890	112	. 94110	. 00283	1	. 99717	28
33	. 05717	110	. 94283	. 06002	111	. 93998	. 00284	2	. 99716	27
34	. 05827	110	. 94173	. 06113	111	. 93887	. 00286	1	. 99714	26
35	9. 05937	109	10. 94063	9. 06224	111	10. 93776	10. 00287	2	9. 99713	25
36	. 06046	109	. 93954	. 06335	110	. 93665	. 00289	1	. 99711	24
37	. 06155	109	. 93845	. 06445	111	. 93555	. 00290	2	. 99710	23
38	. 06264	108	. 93736	. 06556	110	. 93444	. 00292	1	. 99708	22
39	. 06372	109	. 93628	. 06666	109	. 93334	. 00293	2	. 99707	21
40	9. 06481	108	10. 93519	9. 06775	110	10. 93225	10. 00295	1	9. 99705	20
41	. 06589	107	. 93411	. 06885	109	. 93115	. 00296	2	. 99704	19
42	. 06696	108	. 93304	. 06994	109	. 93006	. 00298	1	. 99702	18
43	. 06804	107	. 93196	. 07103	108	. 92897	. 00299	2	. 99701	17
44	. 06911	107	. 93089	. 07211	109	. 92789	. 00301	1	. 99699	16
45	9. 07018	106	10. 92982	9. 07320	108	10. 92680	10. 00302	2	9. 99698	15
46	. 07124	107	. 92876	. 07428	108	. 92572	. 00304	1	. 99696	14
47	. 07231	106	. 92769	. 07536	107	. 92464	. 00305	2	. 99695	13
48	. 07337	105	. 92663	. 07643	108	. 92357	. 00307	1	. 99693	12
49	. 07442	106	. 92558	. 07751	107	. 92249	. 00308	2	. 99692	11
50	9. 07548	105	10. 92452	9. 07858	106	10. 92142	10. 00310	1	9. 99690	10
51	. 07653	105	. 92347	. 07964	107	. 92036	. 00311	2	. 99689	9
52	. 07758	105	. 92242	. 08071	106	. 91929	. 00313	1	. 99687	8
53	. 07863	105	. 92137	. 08177	106	. 91823	. 00314	2	. 99686	7
54	. 07968	104	. 92032	. 08283	106	. 91717	. 00316	1	. 99684	6
55	9. 08072	104	10. 91928	9. 08389	106	10. 91611	10. 00317	2	9. 99683	5
56	. 08176	104	. 91824	. 08495	105	. 91505	. 00319	1	. 99681	4
57	. 08280	103	. 91720	. 08600	105	. 91400	. 00320	2	. 99680	3
58	. 08383	103	. 91617	. 08705	105	. 91295	. 00322	1	. 99678	2
59	. 08486	103	. 91514	. 08810	104	. 91190	. 00323	2	. 99677	1
60	9. 08589		10. 91411	9. 08914		10. 91086	10. 00325		9. 99675	0
↑ 96°→	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ←83°

7°→ ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	←172° ↓
0	9. 08589	103	10. 91411	9. 08914	105	10. 91086	10. 00325	1	9. 99675	60
1	. 08692	103	. 91308	. 09019	104	. 90981	. 00326	2	. 99674	59
2	. 08795	102	. 91205	. 09123	104	. 90877	. 00328	2	. 99672	58
3	. 08897	102	. 91103	. 09227	103	. 90773	. 00330	1	. 99670	57
4	. 08999	102	. 91001	. 09330	104	. 90670	. 00331	2	. 99669	56
5	9. 09101	101	10. 90899	9. 09434	103	10. 90566	10. 00333	1	9. 99667	55
6	. 09202	102	. 90798	. 09537	103	. 90463	. 00334	2	. 99666	54
7	. 09304	101	. 90696	. 09640	102	. 90360	. 00336	1	. 99664	53
8	. 09405	101	. 90595	. 09742	103	. 90258	. 00337	2	. 99663	52
9	. 09506	100	. 90494	. 09845	102	. 90155	. 00339	2	. 99661	51
10	9. 09606	101	10. 90394	9. 09947	102	10. 90053	10. 00341	1	9. 99659	50
11	. 09707	100	. 90293	. 10049	101	. 89951	. 00342	2	. 99658	49
12	. 09807	100	. 90193	. 10150	102	. 89850	. 00344	1	. 99656	48
13	. 09907	99	. 90093	. 10252	101	. 89748	. 00345	2	. 99655	47
14	. 10006	100	. 89994	. 10353	101	. 89647	. 00347	2	. 99653	46
15	9. 10106	99	10. 89894	9. 10454	101	10. 89546	10. 00349	1	9. 99651	45
16	. 10205	99	. 89795	. 10555	101	. 89445	. 00350	2	. 99650	44
17	. 10304	98	. 89696	. 10656	100	. 89344	. 00352	1	. 99648	43
18	. 10402	99	. 89598	. 10756	100	. 89244	. 00353	2	. 99647	42
19	. 10501	98	. 89499	. 10856	100	. 89144	. 00355	2	. 99645	41
20	9. 10599	98	10. 89401	9. 10956	100	10. 89044	10. 00357	1	9. 99643	40
21	. 10697	98	. 89303	. 11056	99	. 88944	. 00358	2	. 99642	39
22	. 10795	98	. 89205	. 11155	99	. 88845	. 00360	2	. 99640	38
23	. 10893	97	. 89107	. 11254	99	. 88746	. 00362	1	. 99638	37
24	. 10990	97	. 89010	. 11353	99	. 88647	. 00363	2	. 99637	36
25	9. 11087	97	10. 88913	9. 11452	99	10. 88548	10. 00365	2	9. 99635	35
26	. 11184	97	. 88816	. 11551	98	. 88449	. 00367	1	. 99633	34
27	. 11281	96	. 88719	. 11649	98	. 88351	. 00368	2	. 99632	33
28	. 11377	97	. 88623	. 11747	98	. 88253	. 00370	1	. 99630	32
29	. 11474	96	. 88526	. 11845	98	. 88155	. 00371	2	. 99629	31
30	9. 11570	96	10. 88430	9. 11943	97	10. 88057	10. 00373	2	9. 99627	30
31	. 11666	95	. 88334	. 12040	98	. 87960	. 00375	1	. 99625	29
32	. 11761	96	. 88239	. 12138	97	. 87862	. 00376	2	. 99624	28
33	. 11857	95	. 88143	. 12235	97	. 87765	. 00378	2	. 99622	27
34	. 11952	95	. 88048	. 12332	96	. 87668	. 00380	2	. 99620	26
35	9. 12047	95	10. 87953	9. 12428	97	10. 87572	10. 00382	1	9. 99618	25
36	. 12142	94	. 87858	. 12525	96	. 87475	. 00383	2	. 99617	24
37	. 12236	95	. 87764	. 12621	96	. 87379	. 00385	2	. 99615	23
38	. 12331	94	. 87669	. 12717	96	. 87283	. 00387	1	. 99613	22
39	. 12425	94	. 87575	. 12813	96	. 87187	. 00388	2	. 99612	21
40	9. 12519	93	10. 87481	9. 12909	95	10. 87091	10. 00390	2	9. 99610	20
41	. 12612	94	. 87388	. 13004	95	. 86996	. 00392	1	. 99608	19
42	. 12706	93	. 87294	. 13099	95	. 86901	. 00393	2	. 99607	18
43	. 12799	93	. 87201	. 13194	95	. 86806	. 00395	2	. 99605	17
44	. 12892	93	. 87108	. 13289	95	. 86711	. 00397	2	. 99603	16
45	9. 12985	93	10. 87015	9. 13384	94	10. 86616	10. 00399	1	9. 99601	15
46	. 13078	93	. 86922	. 13478	95	. 86522	. 00400	2	. 99600	14
47	. 13171	92	. 86829	. 13573	94	. 86427	. 00402	2	. 99598	13
48	. 13263	92	. 86737	. 13667	94	. 86333	. 00404	1	. 99596	12
49	. 13355	92	. 86645	. 13761	93	. 86239	. 00405	2	. 99595	11
50	9. 13447	92	10. 86553	9. 13854	94	10. 86146	10. 00407	2	9. 99593	10
51	. 13539	91	. 86461	. 13948	93	. 86052	. 00409	2	. 99591	9
52	. 13630	92	. 86370	. 14041	93	. 85959	. 00411	1	. 99589	8
53	. 13722	91	. 86278	. 14134	93	. 85866	. 00412	2	. 99588	7
54	. 13813	91	. 86187	. 14227	93	. 85773	. 00414	2	. 99586	6
55	9. 13904	90	10. 86096	9. 14320	92	10. 85680	10. 00416	2	9. 99584	5
56	. 13994	91	. 86006	. 14412	92	. 85588	. 00418	1	. 99582	4
57	. 14085	90	. 85915	. 14504	93	. 85496	. 00419	2	. 99581	3
58	. 14175	91	. 85825	. 14597	91	. 85403	. 00421	2	. 99579	2
59	. 14266	90	. 85734	. 14688	92	. 85312	. 00423	2	. 99577	1
60	9. 14356		10. 85644	9. 14780		10. 85220	10. 00425		9. 99575	0
97°→ ↑	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	←82° ↑

Logarithms of Trigonometric Functions

8° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 171° ↓
′										′
0	9. 14356	89	10. 85644	9. 14780	92	10. 85220	10. 00425	1	9. 99575	60
1	. 14445	90	. 85555	. 14872	91	. 85128	. 00426	2	. 99574	59
2	. 14535	89	. 85465	. 14963	91	. 85037	. 00428	2	. 99572	58
3	. 14624	90	. 85376	. 15054	91	. 84946	. 00430	2	. 99570	57
4	. 14714	89	. 85286	. 15145	91	. 84855	. 00432	2	. 99568	56
5	9. 14803	88	10. 85197	9. 15236	91	10. 84764	10. 00434	1	9. 99566	55
6	. 14891	89	. 85109	. 15327	90	. 84673	. 00435	2	. 99565	54
7	. 14980	89	. 85020	. 15417	91	. 84583	. 00437	2	. 99563	53
8	. 15069	88	. 84931	. 15508	90	. 84492	. 00439	2	. 99561	52
9	. 15157	88	. 84843	. 15598	90	. 84402	. 00441	2	. 99559	51
10	9. 15245	88	10. 84755	9. 15688	89	10. 84312	10. 00443	1	9. 99557	50
11	. 15333	88	. 84667	. 15777	90	84223	. 00444	2	. 99556	49
12	. 15421	87	. 84579	. 15867	89	. 84133	. 00446	2	. 99554	48
13	. 15508	88	. 84492	. 15956	90	. 84044	. 00448	2	. 99552	47
14	. 15596	87	. 84404	. 16046	89	. 83954	. 00450	2	. 99550	46
15	9. 15683	87	10. 84317	9. 16135	89	10. 83865	10. 00452	2	9. 99548	45
16	. 15770	87	. 84230	. 16224	88	. 83776	. 00454	1	. 99546	44
17	. 15857	87	. 84143	. 16312	89	. 83688	. 00455	2	. 99545	43
18	. 15944	86	. 84056	. 16401	88	. 83599	. 00457	2	. 99543	42
19	. 16030	86	. 83970	. 16489	88	. 83511	. 00459	2	. 99541	41
20	9. 16116	87	10. 83884	9. 16577	88	10. 83423	10. 00461	2	9. 99539	40
21	. 16203	86	. 83797	. 16665	88	. 83335	. 00463	2	. 99537	39
22	. 16289	85	. 83711	. 16753	88	. 83247	. 00465	2	. 99535	38
23	. 16374	86	. 83626	. 16841	87	. 83159	. 00467	1	. 99533	37
24	. 16460	85	. 83540	. 16928	88	. 83072	. 00468	2	. 99532	36
25	9. 16545	86	10. 83455	9. 17016	87	10. 82984	10. 00470	2	9. 99530	35
26	. 16631	85	. 83369	. 17103	87	. 82897	. 00472	2	. 99528	34
27	. 16716	85	. 83284	. 17190	87	. 82810	. 00474	2	. 99526	33
28	. 16801	85	. 83199	. 17277	86	. 82723	. 00476	2	. 99524	32
29	. 16886	84	. 83114	. 17363	87	. 82637	. 00478	2	. 99522	31
30	9. 16970	85	10. 83030	9. 17450	86	10. 82550	10. 00480	2	9. 99520	30
31	. 17055	84	. 82945	. 17536	86	. 82464	. 00482	1	. 99518	29
32	. 17139	84	. 82861	. 17622	86	. 82378	. 00483	2	. 99517	28
33	. 17223	84	. 82777	. 17708	86	. 82292	. 00485	2	. 99515	27
34	. 17307	84	. 82693	. 17794	86	. 82206	. 00487	2	. 99513	26
35	9. 17391	83	10. 82609	9. 17880	85	10. 82120	10. 00489	2	9. 99511	25
36	. 17474	84	. 82526	. 17965	86	. 82035	. 00491	2	. 99509	24
37	. 17558	83	. 82442	. 18051	85	. 81949	. 00493	2	. 99507	23
38	. 17641	83	. 82359	. 18136	85	. 81864	. 00495	2	. 99505	22
39	. 17724	83	. 82276	. 18221	85	. 81779	. 00497	2	. 99503	21
40	9. 17807	83	10. 82193	9. 18306	85	10. 81694	10. 00499	2	9. 99501	20
41	. 17890	83	. 82110	. 18391	84	. 81609	. 00501	2	. 99499	19
42	. 17973	82	. 82027	. 18475	85	. 81525	. 00503	2	. 99497	18
43	. 18055	82	. 81945	. 18560	84	. 81440	. 00505	1	. 99495	17
44	. 18137	83	. 81863	. 18644	84	. 81356	. 00506	2	. 99494	16
45	9. 18220	82	10. 81780	9. 18728	84	10. 81272	10. 00508	2	9. 99492	15
46	. 18302	81	. 81698	. 18812	84	. 81188	. 00510	2	. 99490	14
47	. 18383	82	. 81617	. 18896	83	. 81104	. 00512	2	. 99488	13
48	. 18465	82	. 81535	. 18979	84	. 81021	. 00514	2	. 99486	12
49	. 18547	81	. 81453	. 19063	83	. 80937	. 00516	2	. 99484	11
50	9. 18628	81	10. 81372	9. 19146	83	10. 80854	10. 00518	2	9. 99482	10
51	. 18709	81	. 81291	. 19229	83	. 80771	. 00520	2	. 99480	9
52	. 18790	81	. 81210	. 19312	83	. 80688	. 00522	2	. 99478	8
53	. 18871	81	. 81129	. 19395	83	. 80605	. 00524	2	. 99476	7
54	. 18952	81	. 81048	. 19478	83	. 80522	. 00526	2	. 99474	6
55	9. 19033	80	10. 80967	9. 19561	82	10. 80439	10. 00528	2	9. 99472	5
56	. 19113	80	. 80887	. 19643	82	. 80357	. 00530	2	. 99470	4
57	. 19193	80	. 80807	. 19725	82	. 80275	. 00532	2	. 99468	3
58	. 19273	80	. 80727	. 19807	82	. 80193	. 00534	2	. 99466	2
59	. 19353	80	. 80647	. 19889	82	. 80111	. 00536	2	. 99464	1
60	9. 19433		10. 80567	9. 19971		10. 80029	10. 00538		9. 99462	0
↑ 98° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 81°

9°→ ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	←170° ↓
0	9. 19433	80	10. 80567	9. 19971	82	10. 80029	10. 00538	2	9. 99462	60
1	. 19513	79	. 80487	. 20053	81	. 79947	. 00540	2	. 99460	59
2	. 19592	80	. 80408	. 20134	82	. 79866	. 00542	2	. 99458	58
3	. 19672	79	. 80328	. 20216	81	. 79784	. 00544	2	. 99456	57
4	. 19751	79	. 80249	. 20297	81	. 79703	. 00546	2	. 99454	56
5	9. 19830	79	10. 80170	9. 20378	81	10. 79622	10. 00548	2	9. 99452	55
6	. 19909	79	. 80091	. 20459	81	. 79541	. 00550	2	. 99450	54
7	. 19988	79	. 80012	. 20540	81	. 79460	. 00552	2	. 99448	53
8	. 20067	78	. 79933	. 20621	80	. 79379	. 00554	2	. 99446	52
9	. 20145	78	. 79855	. 20701	81	. 79299	. 00556	2	. 99444	51
10	9. 20223	79	10. 79777	9. 20782	80	10. 79218	10. 00558	2	9. 99442	50
11	. 20302	78	. 79698	. 20862	80	. 79138	. 00560	2	. 99440	49
12	. 20380	78	. 79620	. 20942	80	. 79058	. 00562	2	. 99438	48
13	. 20458	77	. 79542	. 21022	80	. 78978	. 00564	2	. 99436	47
14	. 20535	78	. 79465	. 21102	80	. 78898	. 00566	2	. 99434	46
15	9. 20613	78	10. 79387	9. 21182	79	10. 78818	10. 00568	3	9. 99432	45
16	. 20691	77	. 79309	. 21261	80	. 78739	. 00571	2	. 99429	44
17	. 20768	77	. 79232	. 21341	79	. 78659	. 00573	2	. 99427	43
18	. 20845	77	. 79155	. 21420	79	. 78580	. 00575	2	. 99425	42
19	. 20922	77	. 79078	. 21499	79	. 78501	. 00577	2	. 99423	41
20	9. 20999	77	10. 79001	9. 21578	79	10. 78422	10. 00579	2	9. 99421	40
21	. 21076	77	. 78924	. 21657	79	. 78343	. 00581	2	. 99419	39
22	. 21153	77	. 78847	. 21736	78	. 78264	. 00583	2	. 99417	38
23	. 21229	76	. 78771	. 21814	79	. 78186	. 00585	2	. 99415	37
24	. 21306	77	. 78694	. 21893	78	. 78107	. 00587	2	. 99413	36
25	9. 21382	76	10. 78618	9. 21971	78	10. 78029	10. 00589	2	9. 99411	35
26	. 21458	76	. 78542	. 22049	78	. 77951	. 00591	2	. 99409	34
27	. 21534	76	. 78466	. 22127	78	. 77873	. 00593	2	. 99407	33
28	. 21610	76	. 78390	. 22205	78	. 77795	. 00596	3	. 99404	32
29	. 21685	75	. 78315	. 22283	78	. 77717	. 00598	2	. 99402	31
30	9. 21761	76	10. 78239	9. 22361	77	10. 77639	10. 00600	2	9. 99400	30
31	. 21836	75	. 78164	. 22438	78	. 77562	. 00602	2	. 99398	29
32	. 21912	76	. 78088	. 22516	77	. 77484	. 00604	2	. 99396	28
33	. 21987	75	. 78013	. 22593	77	. 77407	. 00606	2	. 99394	27
34	. 22062	75	. 77938	. 22670	77	. 77330	. 00608	2	. 99392	26
35	9. 22137	74	10. 77863	9. 22747	77	10. 77253	10. 00610	2	9. 99390	25
36	. 22211	75	. 77789	. 22824	77	. 77176	. 00612	3	. 99388	24
37	. 22286	75	. 77714	. 22901	76	. 77099	. 00615	2	. 99385	23
38	. 22361	74	. 77639	. 22977	77	. 77023	. 00617	2	. 99383	22
39	. 22435	74	. 77565	. 23054	76	. 76946	. 00619	2	. 99381	21
40	9. 22509	74	10. 77491	9. 23130	76	10. 76870	10. 00621	2	9. 99379	20
41	. 22583	74	. 77417	. 23206	77	. 76794	. 00623	2	. 99377	19
42	. 22657	74	. 77343	. 23283	76	. 76717	. 00625	3	. 99375	18
43	. 22731	74	. 77269	. 23359	76	. 76641	. 00628	2	. 99372	17
44	. 22805	74	. 77195	. 23435	75	. 76565	. 00630	2	. 99370	16
45	9. 22878	73	10. 77122	9. 23510	76	10. 76490	10. 00632	2	9. 99368	15
46	. 22952	74	. 77048	. 23586	75	. 76414	. 00634	2	. 99366	14
47	. 23025	73	. 76975	. 23661	76	. 76339	. 00636	2	. 99364	13
48	. 23098	73	. 76902	. 23737	75	. 76263	. 00638	3	. 99362	12
49	. 23171	73	. 76829	. 23812	75	. 76188	. 00641	2	. 99359	11
50	9. 23244	73	10. 76756	9. 23887	75	10. 76113	10. 00643	2	9. 99357	10
51	. 23317	73	. 76683	. 23962	75	. 76038	. 00645	2	. 99355	9
52	. 23390	73	. 76610	. 24037	75	. 75963	. 00647	2	. 99353	8
53	. 23462	72	. 76538	. 24112	74	. 75888	. 00649	2	. 99351	7
54	. 23535	73	. 76465	. 24186	75	. 75814	. 00652	3	. 99348	6
55	9. 23607	72	10. 76393	9. 24261	74	10. 75739	10. 00654	2	9. 99346	5
56	. 23679	72	. 76321	. 24335	75	. 75665	. 00656	2	. 99344	4
57	. 23752	73	. 76248	. 24410	74	. 75590	. 00658	2	. 99342	3
58	. 23823	71	. 76177	. 24484	74	. 75516	. 00660	2	. 99340	2
59	. 23895	72	. 76105	. 24558	74	. 75442	. 00663	3	. 99337	1
60	9. 23967	72	10. 76033	9. 24632		10. 75368	10. 00665	2	9. 99335	0
↑ 99°→	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ←80°

Logarithms of Trigonometric Functions

10° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 169° ↓
0	9. 23967	72	10. 76033	9. 24632	74	10. 75368	10. 00665	2	9. 99335	60
1	. 24039	71	. 75961	. 24706	73	. 75294	. 00667	2	. 99333	59
2	. 24110	71	. 75890	. 24779	74	. 75221	. 00669	3	. 99331	58
3	. 24181	72	. 75819	. 24853	73	. 75147	. 00672	2	. 99328	57
4	. 24253	71	. 75747	. 24926	74	. 75074	. 00674	2	. 99326	56
5	9. 24324	71	10. 75676	9. 25000	73	10. 75000	10. 00676	2	9. 99324	55
6	. 24395	71	. 75605	. 25073	73	. 74927	. 00678	3	. 99322	54
7	. 24466	70	. 75534	. 25146	73	. 74854	. 00681	2	. 99319	53
8	. 24536	71	. 75464	. 25219	73	. 74781	. 00683	2	. 99317	52
9	. 24607	70	. 75393	. 25292	73	. 74708	. 00685	2	. 99315	51
10	9. 24677	71	10. 75323	9. 25365	72	10. 74635	10. 00687	3	9. 99313	50
11	. 24748	70	. 75252	. 25437	73	. 74563	. 00690	2	. 99310	49
12	. 24818	70	. 75182	. 25510	72	. 74490	. 00692	2	. 99308	48
13	. 24888	70	. 75112	. 25582	73	. 74418	. 00694	2	. 99306	47
14	. 24958	70	. 75042	. 25655	72	. 74345	. 00696	3	. 99304	46
15	9. 25028	70	10. 74972	9. 25727	72	10. 74273	10. 00699	2	9. 99301	45
16	. 25098	70	. 74902	. 25799	72	. 74201	. 00701	2	. 99299	44
17	. 25168	69	. 74832	. 25871	72	. 74129	. 00703	3	. 99297	43
18	. 25237	70	. 74763	. 25943	72	. 74057	. 00706	2	. 99294	42
19	. 25307	69	. 74693	. 26015	71	. 73985	. 00708	2	. 99292	41
20	9. 25376	69	10. 74624	9. 26086	72	10. 73914	10. 00710	2	9. 99290	40
21	. 25445	69	. 74555	. 26158	71	. 73842	. 00712	3	. 99288	39
22	. 25514	69	. 74486	. 26229	72	. 73771	. 00715	2	. 99285	38
23	. 25583	69	. 74417	. 26301	71	. 73699	. 00717	2	. 99283	37
24	. 25652	69	. 74348	. 26372	71	. 73628	. 00719	3	. 99281	36
25	9. 25721	69	10. 74279	9. 26443	71	10. 73557	10. 00722	2	9. 99278	35
26	. 25790	68	. 74210	. 26514	71	. 73486	. 00724	2	. 99276	34
27	. 25858	69	. 74142	. 26585	70	. 73415	. 00726	3	. 99274	33
28	. 25927	68	. 74073	. 26655	71	. 73345	. 00729	2	. 99271	32
29	. 25995	68	. 74005	. 26726	71	. 73274	. 00731	2	. 99269	31
30	9. 26063	68	10. 73937	9. 26797	70	10. 73203	10. 00733	3	9. 99267	30
31	. 26131	68	. 73869	. 26867	70	. 73133	. 00736	2	. 99264	29
32	. 26199	68	. 73801	. 26937	71	. 73063	. 00738	2	. 99262	28
33	. 26267	68	. 73733	. 27008	70	. 72992	. 00740	3	. 99260	27
34	. 26335	68	. 73665	. 27078	70	. 72922	. 00743	2	. 99257	26
35	9. 26403	67	10. 73597	9. 27148	70	10. 72852	10. 00745	3	9. 99255	25
36	. 26470	68	. 73530	. 27218	70	. 72782	. 00748	2	. 99252	24
37	. 26538	67	. 73462	. 27288	69	. 72712	. 00750	2	. 99250	23
38	. 26605	67	. 73395	. 27357	70	. 72643	. 00752	3	. 99248	22
39	. 26672	67	. 73328	. 27427	69	. 72573	. 00755	2	. 99245	21
40	9. 26739	67	10. 73261	9. 27496	70	10. 72504	10. 00757	2	9. 99243	20
41	. 26806	67	. 73194	. 27566	69	. 72434	. 00759	3	. 99241	19
42	. 26873	67	. 73127	. 27635	69	. 72365	. 00762	2	. 99238	18
43	. 26940	67	. 73060	. 27704	69	. 72296	. 00764	3	. 99236	17
44	. 27007	66	. 72993	. 27773	69	. 72227	. 00767	2	. 99233	16
45	9. 27073	67	10. 72927	9. 27842	69	10. 72158	10. 00769	2	9. 99231	15
46	. 27140	66	. 72860	. 27911	69	. 72089	. 00771	3	. 99229	14
47	. 27206	67	. 72794	. 27980	69	. 72020	. 00774	2	. 99226	13
48	. 27273	66	. 72727	. 28049	68	. 71951	. 00776	3	. 99224	12
49	. 27339	66	. 72661	. 28117	69	. 71883	. 00779	2	. 99221	11
50	9. 27405	66	10. 72595	9. 28186	68	10. 71814	10. 00781	2	9. 99219	10
51	. 27471	66	. 72529	. 28254	69	. 71746	. 00783	3	. 99217	9
52	. 27537	65	. 72463	. 28323	68	. 71677	. 00786	2	. 99214	8
53	. 27602	66	. 72398	. 28391	68	. 71609	. 00788	3	. 99212	7
54	. 27668	66	. 72332	. 28459	68	. 71541	. 00791	2	. 99209	6
55	9. 27734	65	10. 72266	9. 28527	68	10. 71473	10. 00793	3	9. 99207	5
56	. 27799	65	. 72201	. 28595	67	. 71405	. 00796	2	. 99204	4
57	. 27864	66	. 72136	. 28662	68	. 71338	. 00798	2	. 99202	3
58	. 27930	65	. 72070	. 28730	68	. 71270	. 00800	3	. 99200	2
59	. 27995	65	. 72005	. 28798	67	. 71202	. 00803	2	. 99197	1
60	9. 28060		10. 71940	9. 28865		10. 71135	10. 00805		9. 99195	0
↑ 100° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 79°

11° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 168° ↓
′										′
0	9. 28060	65	10. 71940	9. 28865	68	10. 71135	10. 00805	3	9. 99195	60
1	. 28125	65	. 71875	. 28933	67	. 71067	. 00808	2	. 99192	59
2	. 28190	64	. 71810	. 29000	67	. 71000	. 00810	3	. 99190	58
3	. 28254	65	. 71746	. 29067	67	. 70933	. 00813	2	. 99187	57
4	. 28319	65	. 71681	. 29134	67	. 70866	. 00815	3	. 99185	56
5	9. 28384	64	10. 71616	9. 29201	67	10. 70799	10. 00818	2	9. 99182	55
6	. 28448	64	. 71552	. 29268	67	. 70732	. 00820	3	. 99180	54
7	. 28512	65	. 71488	. 29335	67	. 70665	. 00823	2	. 99177	53
8	. 28577	64	. 71423	. 29402	66	. 70598	. 00825	3	. 99175	52
9	. 28641	64	. 71359	. 29468	67	. 70532	. 00828	2	. 99172	51
10	9. 28705	64	10. 71295	9. 29535	66	10. 70465	10. 00830	3	9. 99170	50
11	. 28769	64	. 71231	. 29601	67	. 70399	. 00833	2	. 99167	49
12	. 28833	63	. 71167	. 29668	66	. 70332	. 00835	3	. 99165	48
13	. 28896	64	. 71104	. 29734	66	. 70266	. 00838	2	. 99162	47
14	. 28960	64	. 71040	. 29800	66	. 70200	. 00840	3	. 99160	46
15	9. 29024	63	10. 70976	9. 29866	66	10. 70134	10. 00843	2	9. 99157	45
16	. 29087	63	. 70913	. 29932	66	. 70068	. 00845	3	. 99155	44
17	. 29150	64	. 70850	. 29998	66	. 70002	. 00848	2	. 99152	43
18	. 29214	63	. 70786	. 30064	66	. 69936	. 00850	3	. 99150	42
19	. 29277	63	. 70723	. 30130	65	. 69870	. 00853	2	. 99147	41
20	9. 29340	63	10. 70660	9. 30195	66	10. 69805	10. 00855	3	9. 99145	40
21	. 29403	63	. 70597	. 30261	65	. 69739	. 00858	2	. 99142	39
22	. 29466	63	. 70534	. 30326	65	. 69674	. 00860	3	. 99140	38
23	. 29529	62	. 70471	. 30391	66	. 69609	. 00863	2	. 99137	37
24	. 29591	63	. 70409	. 30457	65	. 69543	. 00865	3	. 99135	36
25	9. 29654	62	10. 70346	9. 30522	65	10. 69478	10. 00868	2	9. 99132	35
26	. 29716	63	. 70284	. 30587	65	. 69413	. 00870	3	. 99130	34
27	. 29779	62	. 70221	. 30652	65	. 69348	. 00873	3	. 99127	33
28	. 29841	62	. 70159	. 30717	65	. 69283	. 00876	2	. 99124	32
29	. 29903	63	. 70097	. 30782	64	. 69218	. 00878	3	. 99122	31
30	9. 29966	62	10. 70034	9. 30846	65	10. 69154	10. 00881	2	9. 99119	30
31	. 30028	62	. 69972	. 30911	64	. 69089	. 00883	3	. 99117	29
32	. 30090	61	. 69910	. 30975	65	. 69025	. 00886	2	. 99114	28
33	. 30151	62	. 69849	. 31040	64	. 68960	. 00888	3	. 99112	27
34	. 30213	62	. 69787	. 31104	64	. 68896	. 00891	3	. 99109	26
35	9. 30275	61	10. 69725	9. 31168	65	10. 68832	10. 00894	2	9. 99106	25
36	. 30336	62	. 69664	. 31233	64	. 68767	. 00896	3	. 99104	24
37	. 30398	61	. 69602	. 31297	64	. 68703	. 00899	2	. 99101	23
38	. 30459	62	. 69541	. 31361	64	. 68639	. 00901	3	. 99099	22
39	. 30521	61	. 69479	. 31425	64	. 68575	. 00904	3	. 99096	21
40	9. 30582	61	10. 69418	9. 31489	63	10. 68511	10. 00907	2	9. 99093	20
41	. 30643	61	. 69357	. 31552	64	. 68448	. 00909	3	. 99091	19
42	. 30704	61	. 69296	. 31616	63	. 68384	. 00912	2	. 99088	18
43	. 30765	61	. 69235	. 31679	64	. 68321	. 00914	3	. 99086	17
44	. 30826	61	. 69174	. 31743	63	. 68257	. 00917	3	. 99083	16
45	9. 30887	60	10. 69113	9. 31806	64	10. 68194	10. 00920	2	9. 99080	15
46	. 30947	61	. 69053	. 31870	63	. 68130	. 00922	3	. 99078	14
47	. 31008	60	. 68992	. 31933	63	. 68067	. 00925	3	. 99075	13
48	. 31068	61	. 68932	. 31996	63	. 68004	. 00928	2	. 99072	12
49	. 31129	60	. 68871	. 32059	63	. 67941	. 00930	3	. 99070	11
50	9. 31189	61	10. 68811	9. 32122	63	10. 67878	10. 00933	3	9. 99067	10
51	. 31250	60	. 68750	. 32185	63	. 67815	. 00936	2	. 99064	9
52	. 31310	60	. 68690	. 32248	63	. 67752	. 00938	3	. 99062	8
53	. 31370	60	. 68630	. 32311	62	. 67689	. 00941	3	. 99059	7
54	. 31430	60	. 68570	. 32373	63	. 67627	. 00944	2	. 99056	6
55	9. 31490	59	10. 68510	9. 32436	62	10. 67564	10. 00946	3	9. 99054	5
56	. 31549	60	. 68451	. 32498	63	. 67502	. 00949	3	. 99051	4
57	. 31609	60	. 68391	. 32561	62	. 67439	. 00952	2	. 99048	3
58	. 31669	59	. 68331	. 32623	62	. 67377	. 00954	3	. 99046	2
59	. 31728	60	. 68272	. 32685	62	. 67315	. 00957	3	. 99043	1
60	9. 31788		10. 68212	9. 32747		10. 67253	10. 00960		9. 99040	0
↑ 101° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 78°

12° 20′

Logarithms of Trigonometric Functions

12° → ′	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 167° ↓ ′
0	9. 31788		10. 68212	9. 32747		10. 67253	10. 00960		9. 99040 60
1	. 31847	59	. 68153	. 32810	63	. 67190	. 00962	2	. 99038 59
2	. 31907	60	. 68093	. 32872	62	. 67128	. 00965	3	. 99035 58
3	. 31966	59	. 68034	. 32933	61	. 67067	. 00968	3	. 99032 57
4	. 32025	59	. 67975	. 32995	62	. 67005	. 00970	2	. 99030 56
5	9. 32084	59	10. 67916	9. 33057	62	10. 66943	10. 00973	3	9. 99027 55
6	. 32143	59	. 67857	. 33119	61	. 66881	. 00976	3	. 99024 54
7	. 32202	59	. 67798	. 33180	62	. 66820	. 00978	2	. 99022 53
8	. 32261	58	. 67739	. 33242	61	. 66758	. 00981	3	. 99019 52
9	. 32319	59	. 67681	. 33303	62	. 66697	. 00984	3	. 99016 51
10	9. 32378	59	10. 67622	9. 33365	61	10. 66635	10. 00987	3	9. 99013 50
11	. 32437	58	. 67563	. 33426	61	. 66574	. 00989	2	. 99011 49
12	. 32495	58	. 67505	. 33487	61	. 66513	. 00992	3	. 99008 48
13	. 32553	59	. 67447	. 33548	61	. 66452	. 00995	3	. 99005 47
14	. 32612	58	. 67388	. 33609	61	. 66391	. 00998	3	. 99002 46
15	9. 32670	58	10. 67330	9. 33670	61	10. 66330	10. 01000	2	9. 99000 45
16	. 32728	58	. 67272	. 33731	61	. 66269	. 01003	3	. 98997 44
17	. 32786	58	. 67214	. 33792	61	. 66208	. 01006	3	. 98994 43
18	. 32844	58	. 67156	. 33853	60	. 66147	. 01009	3	. 98991 42
19	. 32902	58	. 67098	. 33913	61	. 66087	. 01011	2	. 98989 41
20	9. 32960	58	10. 67040	9. 33974	60	10. 66026	10. 01014	3	9. 98986 40
21	. 33018	57	. 66982	. 34034	61	. 65966	. 01017	3	. 98983 39
22	. 33075	58	. 66925	. 34095	60	. 65905	. 01020	3	. 98980 38
23	. 33133	57	. 66867	. 34155	60	. 65845	. 01022	2	. 98978 37
24	. 33190	58	. 66810	. 34215	61	. 65785	. 01025	3	. 98975 36
25	9. 33248	57	10. 66752	9. 34276	60	10. 65724	10. 01028	3	9. 98972 35
26	. 33305	57	. 66695	. 34336	60	. 65664	. 01031	3	. 98969 34
27	. 33362	58	. 66638	. 34396	60	. 65604	. 01033	2	. 98967 33
28	. 33420	57	. 66580	. 34456	60	. 65544	. 01036	3	. 98964 32
29	. 33477	57	. 66523	. 34516	60	. 65484	. 01039	3	. 98961 31
30	9. 33534	57	10. 66466	9. 34576	59	10. 65424	10. 01042	3	9. 98958 30
31	. 33591	56	. 66409	. 34635	60	. 65365	. 01045	3	. 98955 29
32	. 33647	57	. 66353	. 34695	60	. 65305	. 01047	2	. 98953 28
33	. 33704	57	. 66296	. 34755	59	. 65245	. 01050	3	. 98950 27
34	. 33761	57	. 66239	. 34814	60	. 65186	. 01053	3	. 98947 26
35	9. 33818	56	10. 66182	9. 34874	59	10. 65126	10. 01056	3	9. 98944 25
36	. 33874	57	. 66126	. 34933	59	. 65067	. 01059	3	. 98941 24
37	. 33931	56	. 66069	. 34992	59	. 65008	. 01062	3	. 98938 23
38	. 33987	56	. 66013	. 35051	60	. 64949	. 01064	2	. 98936 22
39	. 34043	57	. 65957	. 35111	59	. 64889	. 01067	3	. 98933 21
40	9. 34100	56	10. 65900	9. 35170	59	10. 64830	10. 01070	3	9. 98930 20
41	. 34156	56	. 65844	. 35229	59	. 64771	. 01073	3	. 98927 19
42	. 34212	56	. 65788	. 35288	59	. 64712	. 01076	3	. 98924 18
43	. 34268	56	. 65732	. 35347	58	. 64653	. 01079	2	. 98921 17
44	. 34324	56	. 65676	. 35405	59	. 64595	. 01081	3	. 98919 16
45	9. 34380	56	10. 65620	9. 35464	59	10. 64536	10. 01084	3	9. 98916 15
46	. 34436	55	. 65564	. 35523	58	. 64477	. 01087	3	. 98913 14
47	. 34491	56	. 65509	. 35581	59	. 64419	. 01090	3	. 98910 13
48	. 34547	55	. 65453	. 35640	58	. 64360	. 01093	3	. 98907 12
49	. 34602	56	. 65398	. 35698	59	. 64302	. 01096	3	. 98904 11
50	9. 34658	55	10. 65342	9. 35757	58	10. 64243	10. 01099	3	9. 98901 10
51	. 34713	56	. 65287	. 35815	58	. 64185	. 01102	2	. 98898 9
52	. 34769	55	. 65231	. 35873	58	. 64127	. 01104	3	. 98896 8
53	. 34824	55	. 65176	. 35931	58	. 64069	. 01107	3	. 98893 7
54	. 34879	55	. 65121	. 35989	58	. 64011	. 01110	3	. 98890 6
55	9. 34934	55	10. 65066	9. 36047	58	10. 63953	10. 01113	3	9. 98887 5
56	. 34989	55	. 65011	. 36105	58	. 63895	. 01116	3	. 98884 4
57	. 35044	55	. 64956	. 36163	58	. 63837	. 01119	3	. 98881 3
58	. 35099	55	. 64901	. 36221	58	. 63779	. 01122	3	. 98878 2
59	. 35154	55	. 64846	. 36279	58	. 63721	. 01125	3	. 98875 1
60	9. 35209	55	10. 64791	9. 36336	57	10. 63664	10. 01128	3	9. 98872 0
↑ 102° → ′	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin ← 77° ↑ ′

13° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 166° ↓	
′										′
0	9. 35209	54	10. 64791	9. 36336	58	10. 63664	10. 01128	3	9. 98872	60
1	. 35263	55	. 64737	. 36394	58	. 63606	. 01131	2	. 98869	59
2	. 35318	55	. 64682	. 36452	57	. 63548	. 01133	3	. 98867	58
3	. 35373	54	. 64627	. 36509	57	. 63491	. 01136	3	. 98864	57
4	. 35427	54	. 64573	. 36566	58	. 63434	. 01139	3	. 98861	56
5	9. 35481	55	10. 64519	9. 36624	57	10. 63376	10. 01142	3	9. 98858	55
6	. 35536	54	. 64464	. 36681	57	. 63319	. 01145	3	. 98855	54
7	. 35590	54	. 64410	. 36738	57	. 63262	. 01148	3	. 98852	53
8	. 35644	54	. 64356	. 36795	57	. 63205	. 01151	3	. 98849	52
9	. 35698	54	. 64302	. 36852	57	. 63148	. 01154	3	. 98846	51
10	9. 35752	54	10. 64248	9. 36909	57	10. 63091	10. 01157	3	9. 98843	50
11	. 35806	54	. 64194	. 36966	57	. 63034	. 01160	3	. 98840	49
12	. 35860	54	. 64140	. 37023	57	. 62977	. 01163	3	. 98837	48
13	. 35914	54	. 64086	. 37080	57	. 62920	. 01166	3	. 98834	47
14	. 35968	54	. 64032	. 37137	56	. 62863	. 01169	3	. 98831	46
15	9. 36022	53	10. 63978	9. 37193	57	10. 62807	10. 01172	3	9. 98828	45
16	. 36075	54	. 63925	. 37250	56	. 62750	. 01175	3	. 98825	44
17	. 36129	53	. 63871	. 37306	57	. 62694	. 01178	3	. 98822	43
18	. 36182	54	. 63818	. 37363	56	. 62637	. 01181	3	. 98819	42
19	. 36236	53	. 63764	. 37419	57	. 62581	. 01184	3	. 98816	41
20	9. 36289	53	10. 63711	9. 37476	56	10. 62524	10. 01187	3	9. 98813	40
21	. 36342	53	. 63658	. 37532	56	. 62468	. 01190	3	. 98810	39
22	. 36395	53	. 63605	. 37588	56	. 62412	. 01193	3	. 98807	38
23	. 36449	54	. 63551	. 37644	56	. 62356	. 01196	3	. 98804	37
24	. 36502	53	. 63498	. 37700	56	. 62300	. 01199	3	. 98801	36
25	9. 36555	53	10. 63445	9. 37756	56	10. 62244	10. 01202	3	9. 98798	35
26	. 36608	52	. 63392	. 37812	56	. 62188	. 01205	3	. 98795	34
27	. 36660	53	. 63340	. 37868	56	. 62132	. 01208	3	. 98792	33
28	. 36713	53	. 63287	. 37924	56	. 62076	. 01211	3	. 98789	32
29	. 36766	53	. 63234	. 37980	55	. 62020	. 01214	3	. 98786	31
30	9. 36819	52	10. 63181	9. 38035	56	10. 61965	10. 01217	3	9. 98783	30
31	. 36871	53	. 63129	. 38091	56	. 61909	. 01220	3	. 98780	29
32	. 36924	52	. 63076	. 38147	55	. 61853	. 01223	3	. 98777	28
33	. 36976	52	. 63024	. 38202	55	. 61798	. 01226	3	. 98774	27
34	. 37028	53	. 62972	. 38257	56	. 61743	. 01229	3	. 98771	26
35	9. 37081	52	10. 62919	9. 38313	55	10. 61687	10. 01232	3	9. 98768	25
36	. 37133	52	. 62867	. 38368	55	. 61632	. 01235	3	. 98765	24
37	. 37185	52	. 62815	. 38423	56	. 61577	. 01238	3	. 98762	23
38	. 37237	52	. 62763	. 38479	55	. 61521	. 01241	3	. 98759	22
39	. 37289	52	. 62711	. 38534	55	. 61466	. 01244	3	. 98756	21
40	9. 37341	52	10. 62659	9. 38589	55	10. 61411	10. 01247	3	9. 98753	20
41	. 37393	52	. 62607	. 38644	55	. 61356	. 01250	4	. 98750	19
42	. 37445	52	. 62555	. 38699	55	. 61301	. 01254	3	. 98746	18
43	. 37497	52	. 62503	. 38754	54	. 61246	. 01257	3	. 98743	17
44	. 37549	51	. 62451	. 38808	55	. 61192	. 01260	3	. 98740	16
45	9. 37600	52	10. 62400	9. 38863	55	10. 61137	10. 01263	3	9. 98737	15
46	. 37652	51	. 62348	. 38918	54	. 61082	. 01266	3	. 98734	14
47	. 37703	52	. 62297	. 38972	55	. 61028	. 01269	3	. 98731	13
48	. 37755	51	. 62245	. 39027	55	. 60973	. 01272	3	. 98728	12
49	. 37806	52	. 62194	. 39082	54	. 60918	. 01275	3	. 98725	11
50	9. 37858	51	10. 62142	9. 39136	54	10. 60864	10. 01278	3	9. 98722	10
51	. 37909	51	. 62091	. 39190	55	. 60810	. 01281	4	. 98719	9
52	. 37960	51	. 62040	. 39245	54	. 60755	. 01285	3	. 98715	8
53	. 38011	51	. 61989	. 39299	54	. 60701	. 01288	3	. 98712	7
54	. 38062	51	. 61938	. 39353	54	. 60647	. 01291	3	. 98709	6
55	9. 38113	51	10. 61887	9. 39407	54	10. 60593	10. 01294	3	9. 98706	5
56	. 38164	51	. 61836	. 39461	54	. 60539	. 01297	3	. 98703	4
57	. 38215	51	. 61785	. 39515	54	. 60485	. 01300	3	. 98700	3
58	. 38266	51	. 61734	. 39569	54	. 60431	. 01303	3	. 98697	2
59	. 38317	51	. 61683	. 39623	54	. 60377	. 01306	4	. 98694	1
60	9. 38368		10. 61632	9. 39677		10. 60323	10. 01310		9. 98690	0
↑ 103° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin ↑	← 76°

14° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 165° ↓	
′										′
0	9. 38368	50	10. 61632	9. 39677	54	10. 60323	10. 01310	3	9. 98690	60
1	. 38418	51	. 61582	. 39731	54	. 60269	. 01313	3	. 98687	59
2	. 38469	50	. 61531	. 39785	53	. 60215	. 01316	3	. 98684	58
3	. 38519	51	. 61481	. 39838	54	. 60162	. 01319	3	. 98681	57
4	. 38570	50	. 61430	. 39892	53	. 60108	. 01322	3	. 98678	56
5	9. 38620	50	10. 61380	9. 39945	54	10. 60055	10. 01325	4	9. 98675	55
6	. 38670	51	. 61330	. 39999	53	. 60001	. 01329	3	. 98671	54
7	. 38721	50	. 61279	. 40052	54	. 59948	. 01332	3	. 98668	53
8	. 38771	50	. 61229	. 40106	53	. 59894	. 01335	3	. 98665	52
9	. 38821	50	. 61179	. 40159	53	. 59841	. 01338	3	. 98662	51
10	9. 38871	50	10. 61129	9. 40212	54	10. 59788	10. 01341	3	9. 98659	50
11	. 38921	50	. 61079	. 40266	53	. 59734	. 01344	4	. 98656	49
12	. 38971	50	. 61029	. 40319	53	. 59681	. 01348	3	. 98652	48
13	. 39021	50	. 60979	. 40372	53	. 59628	. 01351	3	. 98649	47
14	. 39071	50	. 60929	. 40425	53	. 59575	. 01354	3	. 98646	46
15	9. 39121	49	10. 60879	9. 40478	53	10. 59522	10. 01357	3	9. 98643	45
16	. 39170	50	. 60830	. 40531	53	. 59469	. 01360	4	. 98640	44
17	. 39220	50	. 60780	. 40584	52	. 59416	. 01364	3	. 98636	43
18	. 39270	49	. 60730	. 40636	53	. 59364	. 01367	3	. 98633	42
19	. 39319	50	. 60681	. 40689	53	. 59311	. 01370	3	. 98630	41
20	9. 39369	49	10. 60631	9. 40742	53	10. 59258	10. 01373	4	9. 98627	40
21	. 39418	49	. 60582	. 40795	52	. 59205	. 01377	3	. 98623	39
22	. 39467	50	. 60533	. 40847	53	. 59153	. 01380	3	. 98620	38
23	. 39517	49	. 60483	. 40900	52	. 59100	. 01383	3	. 98617	37
24	. 39566	49	. 60434	. 40952	53	. 59048	. 01386	4	. 98614	36
25	9. 39615	49	10. 60385	9. 41005	52	10. 58995	10. 01390	3	9. 98610	35
26	. 39664	49	. 60336	. 41057	52	. 58943	. 01393	3	. 98607	34
27	. 39713	49	. 60287	. 41109	52	. 58891	. 01396	3	. 98604	33
28	. 39762	49	. 60238	. 41161	53	. 58839	. 01399	4	. 98601	32
29	. 39811	49	. 60189	. 41214	52	. 58786	. 01403	3	. 98597	31
30	9. 39860	49	10. 60140	9. 41266	52	10. 58734	10. 01406	3	9. 98594	30
31	. 39909	49	. 60091	. 41318	52	. 58682	. 01409	3	. 98591	29
32	. 39958	48	. 60042	. 41370	52	. 58630	. 01412	4	. 98588	28
33	. 40006	49	. 59994	. 41422	52	. 58578	. 01416	3	. 98584	27
34	. 40055	48	. 59945	. 41474	52	. 58526	. 01419	3	. 98581	26
35	9. 40103	49	10. 59897	9. 41526	52	10. 58474	10. 01422	4	9. 98578	25
36	. 40152	48	. 59848	. 41578	51	. 58422	. 01426	3	. 98574	24
37	. 40200	49	. 59800	. 41629	52	. 58371	. 01429	3	. 98571	23
38	. 40249	48	. 59751	. 41681	52	. 58319	. 01432	3	. 98568	22
39	. 40297	49	. 59703	. 41733	51	. 58267	. 01435	4	. 98565	21
40	9. 40346	48	10. 59654	9. 41784	52	10. 58216	10. 01439	3	9. 98561	20
41	. 40394	48	. 59606	. 41836	51	. 58164	. 01442	3	. 98558	19
42	. 40442	48	. 59558	. 41887	52	. 58113	. 01445	4	. 98555	18
43	. 40490	48	. 59510	. 41939	51	. 58061	. 01449	3	. 98551	17
44	. 40538	48	. 59462	. 41990	51	. 58010	. 01452	3	. 98548	16
45	9. 40586	48	10. 59414	9. 42041	52	10. 57959	10. 01455	4	9. 98545	15
46	. 40634	48	. 59366	. 42093	51	. 57907	. 01459	3	. 98541	14
47	. 40682	48	. 59318	. 42144	51	. 57856	. 01462	3	. 98538	13
48	. 40730	48	. 59270	. 42195	51	. 57805	. 01465	4	. 98535	12
49	. 40778	47	. 59222	. 42246	51	. 57754	. 01469	3	. 98531	11
50	9. 40825	48	10. 59175	9. 42297	51	10. 57703	10. 01472	3	9. 98528	10
51	. 40873	48	. 59127	. 42348	51	. 57652	. 01475	4	. 98525	9
52	. 40921	48	. 59079	. 42399	51	. 57601	. 01479	3	. 98521	8
53	. 40968	47	. 59032	. 42450	51	. 57550	. 01482	3	. 98518	7
54	. 41016	48	. 58984	. 42501	51	. 57499	. 01485	3	. 98515	6
55	9. 41063	47	10. 58937	9. 42552	51	10. 57448	10. 01489	4	9. 98511	5
56	. 41111	48	. 58889	. 42603	50	. 57397	. 01492	3	. 98508	4
57	. 41158	47	. 58842	. 42653	51	. 57347	. 01495	3	. 98505	3
58	. 41205	47	. 58795	. 42704	51	. 57296	. 01499	4	. 98501	2
59	. 41252	47	. 58748	. 42755	50	. 57245	. 01502	3	. 98498	1
60	9. 41300	48	10. 58700	9. 42805	51	10. 57195	10. 01506	4	9. 98494	0
↑ 104° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	← 75° ↑

15° → ′	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 164° ′
0	9. 41300	47	10. 58700	9. 42805	51	10. 57195	10. 01506	3	9. 98494	60
1	. 41347	47	. 58653	. 42856	50	. 57144	. 01509	3	. 98491	59
2	. 41394	47	. 58606	. 42906	51	. 57094	. 01512	4	. 98488	58
3	. 41441	47	. 58559	. 42957	50	. 57043	. 01516	3	. 98484	57
4	. 41488	47	. 58512	. 43007	50	. 56993	. 01519	4	. 98481	56
5	9. 41535	47	10. 58465	9. 43057	51	10. 56943	10. 01523	3	9. 98477	55
6	. 41582	46	. 58418	. 43108	50	. 56892	. 01526	3	. 98474	54
7	. 41628	47	. 58372	. 43158	50	. 56842	. 01529	4	. 98471	53
8	. 41675	47	. 58325	. 43208	50	. 56792	. 01533	3	. 98467	52
9	. 41722	46	. 58278	. 43258	50	. 56742	. 01536	4	. 98464	51
10	9. 41768	47	10. 58232	9. 43308	50	10. 56692	10. 01540	3	9. 98460	50
11	. 41815	46	. 58185	. 43358	50	. 56642	. 01543	4	. 98457	49
12	. 41861	47	. 58139	. 43408	50	. 56592	. 01547	3	. 98453	48
13	. 41908	46	. 58092	. 43458	50	. 56542	. 01550	3	. 98450	47
14	. 41954	47	. 58046	. 43508	50	. 56492	. 01553	4	. 98447	46
15	9. 42001	46	10. 57999	9. 43558	49	10. 56442	10. 01557	3	9. 98443	45
16	. 42047	46	. 57953	. 43607	50	. 56393	. 01560	4	. 98440	44
17	. 42093	47	. 57907	. 43657	50	. 56343	. 01564	3	. 98436	43
18	. 42140	46	. 57860	. 43707	49	. 56293	. 01567	4	. 98433	42
19	. 42186	46	. 57814	. 43756	50	. 56244	. 01571	3	. 98429	41
20	9. 42232	46	10. 57768	9. 43806	49	10. 56194	10. 01574	4	9. 98426	40
21	. 42278	46	. 57722	. 43855	50	. 56145	. 01578	3	. 98422	39
22	. 42324	46	. 57676	. 43905	49	. 56095	. 01581	4	. 98419	38
23	. 42370	46	. 57630	. 43954	50	. 56046	. 01585	3	. 98415	37
24	. 42416	45	. 57584	. 44004	49	. 55996	. 01588	3	. 98412	36
25	9. 42461	46	10. 57539	9. 44053	49	10. 55947	10. 01591	4	9. 98409	35
26	. 42507	46	. 57493	. 44102	49	. 55898	. 01595	3	. 98405	34
27	. 42553	46	. 57447	. 44151	50	. 55849	. 01598	4	. 98402	33
28	. 42599	45	. 57401	. 44201	49	. 55799	. 01602	3	. 98398	32
29	. 42644	46	. 57356	. 44250	49	. 55750	. 01605	4	. 98395	31
30	9. 42690	45	10. 57310	9. 44299	49	10. 55701	10. 01609	3	9. 98391	30
31	. 42735	46	. 57265	. 44348	49	. 55652	. 01612	4	. 98388	29
32	. 42781	45	. 57219	. 44397	49	. 55603	. 01616	3	. 98384	28
33	. 42826	46	. 57174	. 44446	49	. 55554	. 01619	4	. 98381	27
34	. 42872	45	. 57128	. 44495	49	. 55505	. 01623	4	. 98377	26
35	9. 42917	45	10. 57083	9. 44544	48	10. 55456	10. 01627	3	9. 98373	25
36	. 42962	46	. 57038	. 44592	49	. 55408	. 01630	4	. 98370	24
37	. 43008	45	. 56992	. 44641	49	. 55359	. 01634	3	. 98366	23
38	. 43053	45	. 56947	. 44690	48	. 55310	. 01637	4	. 98363	22
39	. 43098	45	. 56902	. 44738	49	. 55262	. 01641	3	. 98359	21
40	9. 43143	45	10. 56857	9. 44787	49	10. 55213	10. 01644	4	9. 98356	20
41	. 43188	45	. 56812	. 44836	48	. 55164	. 01648	3	. 98352	19
42	. 43233	45	. 56767	. 44884	49	. 55116	. 01651	4	. 98349	18
43	. 43278	45	. 56722	. 44933	48	. 55067	. 01655	3	. 98345	17
44	. 43323	44	. 56677	. 44981	48	. 55019	. 01658	4	. 98342	16
45	9. 43367	45	10. 56633	9. 45029	49	10. 54971	10. 01662	4	9. 98338	15
46	. 43412	45	. 56588	. 45078	48	. 54922	. 01666	3	. 98334	14
47	. 43457	45	. 56543	. 45126	48	. 54874	. 01669	4	. 98331	13
48	. 43502	45	. 56498	. 45174	48	. 54826	. 01673	3	. 98327	12
49	. 43546	44	. 56454	. 45222	49	. 54778	. 01676	4	. 98324	11
50	9. 43591	45	10. 56409	9. 45271	48	10. 54729	10. 01680	3	9. 98320	10
51	. 43635	44	. 56365	. 45319	48	. 54681	. 01683	4	. 98317	9
52	. 43680	45	. 56320	. 45367	48	. 54633	. 01687	4	. 98313	8
53	. 43724	44	. 56276	. 45415	48	. 54585	. 01691	3	. 98309	7
54	. 43769	45	. 56231	. 45463	48	. 54537	. 01694	4	. 98306	6
55	9. 43813	44	10. 56187	9. 45511	48	10 54489	10. 01698	3	9. 98302	5
56	. 43857	44	. 56143	. 45559	47	. 54441	. 01701	4	. 98299	4
57	. 43901	44	. 56099	. 45606	48	. 54394	. 01705	4	. 98295	3
58	. 43946	45	. 56054	. 45654	48	. 54346	. 01709	3	. 98291	2
59	. 43990	44	. 56010	. 45702	48	. 54298	. 01712	4	. 98288	1
60	9. 44034	44	10. 55966	9. 45750	48	10. 54250	10. 01716	4	9. 98284	0
↑ 105° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	← 74° ↑

16° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 163° ↓
0	9. 44034		10. 55966	9. 45750		10. 54250	10. 01716		9. 98284	60
1	. 44078	44	. 55922	. 45797	47	. 54203	. 01719	3	. 98281	59
2	. 44122	44	. 55878	. 45845	48	. 54155	. 01723	4	. 98277	58
3	. 44166	44	. 55834	. 45892	47	. 54108	. 01727	4	. 98273	57
4	. 44210	44	. 55790	. 45940	48	. 54060	. 01730	3	. 98270	56
5	9. 44253	43	10. 55747	9. 45987	47	10. 54013	10. 01734	4	9. 98266	55
6	. 44297	44	. 55703	. 46035	48	. 53965	. 01738	4	. 98262	54
7	. 44341	44	. 55659	. 46082	47	. 53918	. 01741	3	. 98259	53
8	. 44385	44	. 55615	. 46130	48	. 53870	. 01745	4	. 98255	52
9	. 44428	43	. 55572	. 46177	47	. 53823	. 01749	4	. 98251	51
10	9. 44472	44	10. 55528	9. 46224	47	10. 53776	10. 01752	3	9. 98248	50
11	. 44516	44	. 55484	. 46271	47	. 53729	. 01756	4	. 98244	49
12	. 44559	43	. 55441	. 46319	48	. 53681	. 01760	4	. 98240	48
13	. 44602	43	. 55398	. 46366	47	. 53634	. 01763	3	. 98237	47
14	. 44646	44	. 55354	. 46413	47	. 53587	. 01767	4	. 98233	46
15	9. 44689	43	10. 55311	9. 46460	47	10. 53540	10. 01771	4	9. 98229	45
16	. 44733	44	. 55267	. 46507	47	. 53493	. 01774	3	. 98226	44
17	. 44776	43	. 55224	. 46554	47	. 53446	. 01778	4	. 98222	43
18	. 44819	43	. 55181	. 46601	47	. 53399	. 01782	4	. 98218	42
19	. 44862	43	. 55138	. 46648	46	. 53352	. 01785	3	. 98215	41
20	9. 44905	43	10. 55095	9. 46694	47	10. 53306	10. 01789	4	9. 98211	40
21	. 44948	43	. 55052	. 46741	47	. 53259	. 01793	3	. 98207	39
22	. 44992	44	. 55008	. 46788	47	. 53212	. 01796	4	. 98204	38
23	. 45035	43	. 54965	. 46835	46	. 53165	. 01800	4	. 98200	37
24	. 45077	42	. 54923	. 46881	47	. 53119	. 01804	4	. 98196	36
25	9. 45120	43	10. 54880	9. 46928	47	10. 53072	10. 01808	4	9. 98192	35
26	. 45163	43	. 54837	. 46975	47	. 53025	. 01811	3	. 98189	34
27	. 45206	43	. 54794	. 47021	46	. 52979	. 01815	4	. 98185	33
28	. 45249	43	. 54751	. 47068	47	. 52932	. 01819	4	. 98181	32
29	. 45292	43	. 54708	. 47114	46	. 52886	. 01823	4	. 98177	31
30	9. 45334	42	10. 54666	9. 47160	46	10. 52840	10. 01826	3	9. 98174	30
31	. 45377	43	. 54623	. 47207	47	. 52793	. 01830	4	. 98170	29
32	. 45419	42	. 54581	. 47253	46	. 52747	. 01834	4	. 98166	28
33	. 45462	43	. 54538	. 47299	46	. 52701	. 01838	4	. 98162	27
34	. 45504	42	. 54496	. 47346	47	. 52654	. 01841	3	. 98159	26
35	9. 45547	43	10. 54453	9. 47392	46	10. 52608	10. 01845	4	9. 98155	25
36	. 45589	42	. 54411	. 47438	46	. 52562	. 01849	4	. 98151	24
37	. 45632	43	. 54368	. 47484	46	. 52516	. 01853	4	. 98147	23
38	. 45674	42	. 54326	. 47530	46	. 52470	. 01856	3	. 98144	22
39	. 45716	42	. 54284	. 47576	46	. 52424	. 01860	4	. 98140	21
40	9. 45758	42	10. 54242	9. 47622	46	10. 52378	10. 01864	4	9. 98136	20
41	. 45801	43	. 54199	. 47668	46	. 52332	. 01868	4	. 98132	19
42	. 45843	42	. 54157	. 47714	46	. 52286	. 01871	3	. 98129	18
43	. 45885	42	. 54115	. 47760	46	. 52240	. 01875	4	. 98125	17
44	. 45927	42	. 54073	. 47806	46	. 52194	. 01879	4	. 98121	16
45	9. 45969	42	10. 54031	9. 47852	45	10. 52148	10. 01883	4	9. 98117	15
46	. 46011	42	. 53989	. 47897	46	. 52103	. 01887	3	. 98113	14
47	. 46053	42	. 53947	. 47943	46	. 52057	. 01890	4	. 98110	13
48	. 46095	41	. 53905	. 47989	46	. 52011	. 01894	4	. 98106	12
49	. 46136	42	. 53864	. 48035	45	. 51965	. 01898	4	. 98102	11
50	9. 46178	42	10. 53822	9. 48080	46	10. 51920	10. 01902	4	9. 98098	10
51	. 46220	42	. 53780	. 48126	45	. 51874	. 01906	4	. 98094	9
52	. 46262	41	. 53738	. 48171	46	. 51829	. 01910	3	. 98090	8
53	. 46303	42	. 53697	. 48217	45	. 51783	. 01913	4	. 98087	7
54	. 46345	41	. 53655	. 48262	45	. 51738	. 01917	4	. 98083	6
55	9. 46386	42	10. 53614	9. 48307	46	10. 51693	10. 01921	4	9. 98079	5
56	. 46428	41	. 53572	. 48353	45	. 51647	. 01925	4	. 98075	4
57	. 46469	42	. 53531	. 48398	45	. 51602	. 01929	4	. 98071	3
58	. 46511	41	. 53489	. 48443	46	. 51557	. 01933	4	. 98067	2
59	. 46552	42	. 53448	. 48489	45	. 51511	. 01937	3	. 98063	1
60	9. 46594		10. 53406	9. 48534		10. 51466	10. 01940		9. 98060	0
↑ 106° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 73°

17° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 162° ↓	
′										′
0	9. 46594	41	10. 53406	9. 48534	45	10. 51466	10. 01940	4	9. 98060	60
1	. 46635	41	. 53365	. 48579	45	. 51421	. 01944	4	. 98056	59
2	. 46676	41	. 53324	. 48624	45	. 51376	. 01948	4	. 98052	58
3	. 46717	41	. 53283	. 48669	45	. 51331	. 01952	4	. 98048	57
4	. 46758	42	. 53242	. 48714	45	. 51286	. 01956	4	. 98044	56
5	9. 46800	41	10. 53200	9. 48759	45	10. 51241	10. 01960	4	9. 98040	55
6	. 46841	41	. 53159	. 48804	45	. 51196	. 01964	4	. 98036	54
7	. 46882	41	. 53118	. 48849	45	. 51151	. 01968	3	. 98032	53
8	. 46923	41	. 53077	. 48894	45	. 51106	. 01971	4	. 98029	52
9	. 46964	41	. 53036	. 48939	45	. 51061	. 01975	4	. 98025	51
10	9. 47005	40	10. 52995	9. 48984	45	10. 51016	10. 01979	4	9. 98021	50
11	. 47045	41	. 52955	. 49029	44	. 50971	. 01983	4	. 98017	49
12	. 47086	41	. 52914	. 49073	45	. 50927	. 01987	4	. 98013	48
13	. 47127	41	. 52873	. 49118	45	. 50882	. 01991	4	. 98009	47
14	. 47168	41	. 52832	. 49163	44	. 50837	. 01995	4	. 98005	46
15	9. 47209	40	10. 52791	9. 49207	45	10. 50793	10. 01999	4	9. 98001	45
16	. 47249	41	. 52751	. 49252	44	. 50748	. 02003	4	. 97997	44
17	. 47290	40	. 52710	. 49296	45	. 50704	. 02007	4	. 97993	43
18	. 47330	41	. 52670	. 49341	44	. 50659	. 02011	3	. 97989	42
19	. 47371	40	. 52629	. 49385	45	. 50615	. 02014	4	. 97986	41
20	9. 47411	41	10. 52589	9. 49430	44	10. 50570	10. 02018	4	9. 97982	40
21	. 47452	40	. 52548	. 49474	45	. 50526	. 02022	4	. 97978	39
22	. 47492	41	. 52508	. 49519	44	. 50481	. 02026	4	. 97974	38
23	. 47533	40	. 52467	. 49563	44	. 50437	. 02030	4	. 97970	37
24	. 47573	40	. 52427	. 49607	45	. 50393	. 02034	4	. 97966	36
25	9. 47613	41	10. 52387	9. 49652	44	10. 50348	10. 02038	4	9. 97962	35
26	. 47654	40	. 52346	. 49696	44	. 50304	. 02042	4	. 97958	34
27	. 47694	40	. 52306	. 49740	44	. 50260	. 02046	4	. 97954	33
28	. 47734	40	. 52266	. 49784	44	. 50216	. 02050	4	. 97950	32
29	. 47774	40	. 52226	. 49828	44	. 50172	. 02054	4	. 97946	31
30	9. 47814	40	10. 52186	9. 49872	44	10. 50128	10. 02058	4	9. 97942	30
31	. 47854	40	. 52146	. 49916	44	. 50084	. 02062	4	. 97938	29
32	. 47894	40	. 52106	. 49960	44	. 50040	. 02066	4	. 97934	28
33	. 47934	40	. 52066	. 50004	44	. 49996	. 02070	4	. 97930	27
34	. 47974	40	. 52026	. 50048	44	. 49952	. 02074	4	. 97926	26
35	9. 48014	40	10. 51986	9. 50092	44	10. 49908	10. 02078	4	9. 97922	25
36	. 48054	40	. 51946	. 50136	44	. 49864	. 02082	4	. 97918	24
37	. 48094	39	. 51906	. 50180	43	. 49820	. 02086	4	. 97914	23
38	. 48133	40	. 51867	. 50223	44	. 49777	. 02090	4	. 97910	22
39	. 48173	40	. 51827	. 50267	44	. 49733	. 02094	4	. 97906	21
40	9. 48213	39	10. 51787	9. 50311	44	10. 49689	10. 02098	4	9. 97902	20
41	. 48252	40	. 51748	. 50355	43	. 49645	. 02102	4	. 97898	19
42	. 48292	40	. 51708	. 50398	44	. 49602	. 02106	4	. 97894	18
43	. 48332	39	. 51668	. 50442	43	. 49558	. 02110	4	. 97890	17
44	. 48371	40	. 51629	. 50485	44	. 49515	. 02114	4	. 97886	16
45	9. 48411	39	10. 51589	9. 50529	43	10. 49471	10. 02118	4	9. 97882	15
46	. 48450	40	. 51550	. 50572	44	. 49428	. 02122	4	. 97878	14
47	. 48490	39	. 51510	. 50616	43	. 49384	. 02126	4	. 97874	13
48	. 48529	39	. 51471	. 50659	44	. 49341	. 02130	4	. 97870	12
49	. 48568	39	. 51432	. 50703	43	. 49297	. 02134	4	. 97866	11
50	9. 48607	40	10. 51393	9. 50746	43	10. 49254	10. 02139	5	9. 97861	10
51	. 48647	39	. 51353	. 50789	44	. 49211	. 02143	4	. 97857	9
52	. 48686	39	. 51314	. 50833	43	. 49167	. 02147	4	. 97853	8
53	. 48725	39	. 51275	. 50876	43	. 49124	. 02151	4	. 97849	7
54	. 48764	39	. 51236	. 50919	43	. 49081	. 02155	4	. 97845	6
55	9. 48803	39	10. 51197	9. 50962	43	10. 49038	10. 02159	4	9. 97841	5
56	. 48842	39	. 51158	. 51005	43	. 48995	. 02163	4	. 97837	4
57	. 48881	39	. 51119	. 51048	44	. 48952	. 02167	4	. 97833	3
58	. 48920	39	. 51080	. 51092	43	. 48908	. 02171	4	. 97829	2
59	. 48959	39	. 51041	. 51135	43	. 48865	. 02175	4	. 97825	1
60	9. 48998		10. 51002	9. 51178		10. 48822	10. 02179		9. 97821	0
↑ 107° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 72°

′	18°→ sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ←161°	′
0	9. 48998		10. 51002	9. 51178		10. 48822	10. 02179		9. 97821	60
1	. 49037	39	. 50963	. 51221	43	. 48779	. 02183	4	. 97817	59
2	. 49076	39	. 50924	. 51264	43	. 48736	. 02188	5	. 97812	58
3	. 49115	39	. 50885	. 51306	42	. 48694	. 02192	4	. 97808	57
4	. 49153	38	. 50847	. 51349	43	. 48651	. 02196	4	. 97804	56
5	9. 49192	39	10. 50808	9. 51392	43	10. 48608	10. 02200	4	9. 97800	55
6	. 49231	39	. 50769	. 51435	43	. 48565	. 02204	4	. 97796	54
7	. 49269	38	. 50731	. 51478	42	. 48522	. 02208	4	. 97792	53
8	. 49308	39	. 50692	. 51520	43	. 48480	. 02212	4	. 97788	52
9	. 49347	39	. 50653	. 51563	43	. 48437	. 02216	4	. 97784	51
10	9. 49385	38	10. 50615	9. 51606	42	10. 48394	10. 02221	5	9. 97779	50
11	. 49424	39	. 50576	. 51648	43	. 48352	. 02225	4	. 97775	49
12	. 49462	38	. 50538	. 51691	43	. 48309	. 02229	4	. 97771	48
13	. 49500	38	. 50500	. 51734	42	. 48266	. 02233	4	. 97767	47
14	. 49539	39	. 50461	. 51776	43	. 48224	. 02237	4	. 97763	46
15	9. 49577	38	10. 50423	9. 51819	42	10. 48181	10. 02241	5	9. 97759	45
16	. 49615	38	. 50385	. 51861	42	. 48139	. 02246	4	. 97754	44
17	. 49654	39	. 50346	. 51903	43	. 48097	. 02250	4	. 97750	43
18	. 49692	38	. 50308	. 51946	42	. 48054	. 02254	4	. 97746	42
19	. 49730	38	. 50270	. 51988	43	. 48012	. 02258	4	. 97742	41
20	9. 49768	38	10. 50232	9. 52031	42	10. 47969	10. 02262	4	9. 97738	40
21	. 49806	38	. 50194	. 52073	42	. 47927	. 02266	5	. 97734	39
22	. 49844	38	. 50156	. 52115	42	. 47885	. 02271	4	. 97729	38
23	. 49882	38	. 50118	. 52157	43	. 47843	. 02275	4	. 97725	37
24	. 49920	38	. 50080	. 52200	42	. 47800	. 02279	4	. 97721	36
25	9. 49958	38	10. 50042	9. 52242	42	10. 47758	10. 02283	4	9. 97717	35
26	. 49996	38	. 50004	. 52284	42	. 47716	. 02287	4	. 97713	34
27	. 50034	38	. 49966	. 52326	42	. 47674	. 02292	5	. 97708	33
28	. 50072	38	. 49928	. 52368	42	. 47632	. 02296	4	. 97704	32
29	. 50110	38	. 49890	. 52410	42	. 47590	. 02300	4	. 97700	31
30	9. 50148	37	10. 49852	9. 52452	42	10. 47548	10. 02304	4	9. 97696	30
31	. 50185	38	. 49815	. 52494	42	. 47506	. 02309	5	. 97691	29
32	. 50223	38	. 49777	. 52536	42	. 47464	. 02313	4	. 97687	28
33	. 50261	37	. 49739	. 52578	42	. 47422	. 02317	4	. 97683	27
34	. 50298	38	. 49702	. 52620	41	. 47380	. 02321	4	. 97679	26
35	9. 50336	38	10. 49664	9. 52661	42	10. 47339	10. 02326	5	9. 97674	25
36	. 50374	37	. 49626	. 52703	42	. 47297	. 02330	4	. 97670	24
37	. 50411	38	. 49589	. 52745	42	. 47255	. 02334	4	. 97666	23
38	. 50449	37	. 49551	. 52787	42	. 47213	. 02338	4	. 97662	22
39	. 50486	37	. 49514	. 52829	41	. 47171	. 02343	5	. 97657	21
40	9. 50523	38	10. 49477	9. 52870	42	10. 47130	10. 02347	4	9. 97653	20
41	. 50561	37	. 49439	. 52912	41	. 47088	. 02351	4	. 97649	19
42	. 50598	37	. 49402	. 52953	42	. 47047	. 02355	5	. 97645	18
43	. 50635	38	. 49365	. 52995	42	. 47005	. 02360	4	. 97640	17
44	. 50673	37	. 49327	. 53037	41	. 46963	. 02364	4	. 97636	16
45	9. 50710	37	10. 49290	9. 53078	42	10. 46922	10. 02368	4	9. 97632	15
46	. 50747	37	. 49253	. 53120	41	. 46880	. 02372	5	. 97628	14
47	. 50784	37	. 49216	. 53161	41	. 46839	. 02377	4	. 97623	13
48	. 50821	37	. 49179	. 53202	42	. 46798	. 02381	4	. 97619	12
49	. 50858	38	. 49142	. 53244	41	. 46756	. 02385	5	. 97615	11
50	9. 50896	37	10. 49104	9. 53285	42	10. 46715	10. 02390	4	9. 97610	10
51	. 50933	37	. 49067	. 53327	41	. 46673	. 02394	4	. 97606	9
52	. 50970	37	. 49030	. 53368	41	. 46632	. 02398	5	. 97602	8
53	. 51007	37	. 48993	. 53409	41	. 46591	. 02403	4	. 97597	7
54	. 51043	36	. 48957	. 53450	42	. 46550	. 02407	4	. 97593	6
55	9. 51080	37	10. 48920	9. 53492	41	10. 46508	10. 02411	5	9. 97589	5
56	. 51117	37	. 48883	. 53533	41	. 46467	. 02416	4	. 97584	4
57	. 51154	37	. 48846	. 53574	41	. 46426	. 02420	4	. 97580	3
58	. 51191	37	. 48809	. 53615	41	. 46385	. 02424	5	. 97576	2
59	. 51227	36	. 48773	. 53656	41	. 46344	. 02429	4	. 97571	1
60	9. 51264	37	10. 48736	9. 53697		10. 46303	10. 02433		9. 97567	0
′	108°→ cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin ←71°	′

19° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 160° ↓
0	9. 51264	37	10. 48736	9. 53697	41	10. 46303	10. 02433	4	9. 97567	60
1	.51301	37	.48699	.53738	41	.46262	.02437	5	.97563	59
2	.51338	36	.48662	.53779	41	.46221	.02442	4	.97558	58
3	.51374	37	.48626	.53820	41	.46180	.02446	4	.97554	57
4	.51411	36	.48589	.53861	41	.46139	.02450	5	.97550	56
5	9. 51447	37	10. 48553	9. 53902	41	10. 46098	10. 02455	4	9. 97545	55
6	.51484	36	.48516	.53943	41	.46057	.02459	5	.97541	54
7	.51520	37	.48480	.53984	41	.46016	.02464	4	.97536	53
8	.51557	36	.48443	.54025	40	.45975	.02468	4	.97532	52
9	.51593	36	.48407	.54065	41	.45935	.02472	5	.97528	51
10	9. 51629	37	10. 48371	9. 54106	41	10. 45894	10. 02477	4	9. 97523	50
11	.51666	36	.48334	.54147	40	.45853	.02481	4	.97519	49
12	.51702	36	.48298	.54187	41	.45813	.02485	5	.97515	48
13	.51738	36	.48262	.54228	41	.45772	.02490	4	.97510	47
14	.51774	37	.48226	.54269	40	.45731	.02494	5	.97506	46
15	9. 51811	36	10. 48189	9. 54309	41	10. 45691	10. 02499	4	9. 97501	45
16	.51847	36	.48153	.54350	40	.45650	.02503	5	.97497	44
17	.51883	36	.48117	.54390	41	.45610	.02508	4	.97492	43
18	.51919	36	.48081	.54431	40	.45569	.02512	4	.97488	42
19	.51955	36	.48045	.54471	41	.45529	.02516	5	.97484	41
20	9. 51991	36	10. 48009	9. 54512	40	10. 45488	10. 02521	4	9. 97479	40
21	.52027	36	.47973	.54552	41	.45448	.02525	5	.97475	39
22	.52063	36	.47937	.54593	40	.45407	.02530	4	.97470	38
23	.52099	36	.47901	.54633	40	.45367	.02534	5	.97466	37
24	.52135	36	.47865	.54673	41	.45327	.02539	4	.97461	36
25	9. 52171	36	10. 47829	9. 54714	40	10. 45286	10. 02543	4	9. 97457	35
26	.52207	35	.47793	.54754	40	.45246	.02547	5	.97453	34
27	.52242	36	.47758	.54794	41	.45206	.02552	4	.97448	33
28	.52278	36	.47722	.54835	40	.45165	.02556	5	.97444	32
29	.52314	36	.47686	.54875	40	.45125	.02561	4	.97439	31
30	9. 52350	35	10. 47650	9. 54915	40	10. 45085	10. 02565	5	9. 97435	30
31	.52385	36	.47615	.54955	40	.45045	.02570	4	.97430	29
32	.52421	35	.47579	.54995	40	.45005	.02574	5	.97426	28
33	.52456	36	.47544	.55035	40	.44965	.02579	4	.97421	27
34	.52492	35	.47508	.55075	40	.44925	.02583	5	.97417	26
35	9. 52527	36	10. 47473	9. 55115	40	10. 44885	10. 02588	4	9. 97412	25
36	.52563	35	.47437	.55155	40	.44845	.02592	5	.97408	24
37	.52598	36	.47402	.55195	40	.44805	.02597	4	.97403	23
38	.52634	35	.47366	.55235	40	.44765	.02601	5	.97399	22
39	.52669	36	.47331	.55275	40	.44725	.02606	4	.97394	21
40	9. 52705	35	10. 47295	9. 55315	40	10. 44685	10. 02610	5	9. 97390	20
41	.52740	35	.47260	.55355	40	.44645	.02615	4	.97385	19
42	.52775	36	.47225	.55395	39	.44605	.02619	5	.97381	18
43	.52811	35	.47189	.55434	40	.44566	.02624	4	.97376	17
44	.52846	35	.47154	.55474	40	.44526	.02628	5	.97372	16
45	9. 52881	35	10. 47119	9. 55514	40	10. 44486	10. 02633	4	9. 97367	15
46	.52916	35	.47084	.55554	39	.44446	.02637	5	.97363	14
47	.52951	35	.47049	.55593	40	.44407	.02642	5	.97358	13
48	.52986	35	.47014	.55633	40	.44367	.02647	4	.97353	12
49	.53021	35	.46979	.55673	39	.44327	.02651	5	.97349	11
50	9. 53056	36	10. 46944	9. 55712	40	10. 44288	10. 02656	4	9. 97344	10
51	.53092	34	.46908	.55752	39	.44248	.02660	5	.97340	9
52	.53126	35	.46874	.55791	40	.44209	.02665	4	.97335	8
53	.53161	35	.46839	.55831	39	.44169	.02669	5	.97331	7
54	.53196	35	.46804	.55870	40	.44130	.02674	4	.97326	6
55	9. 53231	35	10. 46769	9. 55910	39	10. 44090	10. 02678	5	9. 97322	5
56	.53266	35	.46734	.55949	40	.44051	.02683	5	.97317	4
57	.53301	35	.46699	.55989	39	.44011	.02688	4	.97312	3
58	.53336	34	.46664	.56028	39	.43972	.02692	5	.97308	2
59	.53370	35	.46630	.56067	40	.43933	.02697	4	.97303	1
60	9. 53405		10. 46595	9. 56107		10. 43893	10. 02701		9. 97299	0
↑ 109° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	← 70° ↑

20° → ↓ ′	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 159° ↓ ′
0	9. 53405		10. 46595	9. 56107		10. 43893	10. 02701		9. 97299 60
1	. 53440	35	. 46560	. 56146	39	. 43854	. 02706	5	. 97294 59
2	. 53475	35	. 46525	. 56185	39	. 43815	. 02711	5	. 97289 58
3	. 53509	34	. 46491	. 56224	39	. 43776	. 02715	4	. 97285 57
4	. 53544	35	. 46456	. 56264	40	. 43736	. 02720	5	. 97280 56
5	9. 53578	34	10. 46422	9. 56303	39	10. 43697	10. 02724	4	9. 97276 55
6	. 53613	35	. 46387	. 56342	39	. 43658	. 02729	5	. 97271 54
7	. 53647	34	. 46353	. 56381	39	. 43619	. 02734	5	. 97266 53
8	. 53682	35	. 46318	. 56420	39	. 43580	. 02738	4	. 97262 52
9	. 53716	34	. 46284	. 56459	39	. 43541	. 02743	5	. 97257 51
10	9. 53751	35	10. 46249	9. 56498	39	10. 43502	10. 02748	5	9. 97252 50
11	. 53785	34	. 46215	. 56537	39	. 43463	. 02753	4	. 97248 49
12	. 53819	34	. 46181	. 56576	39	. 43424	. 02757	5	. 97243 48
13	. 53854	35	. 46146	. 56615	39	. 43385	. 02762	5	. 97238 47
14	. 53888	34	. 46112	. 56654	39	. 43346	. 02766	4	. 97234 46
15	9. 53922	34	10. 46078	9. 56693	39	10. 43307	10. 02771	5	9. 97229 45
16	. 53957	35	. 46043	. 56732	39	. 43268	. 02776	5	. 97224 44
17	. 53991	34	. 46009	. 56771	39	. 43229	. 02780	4	. 97220 43
18	. 54025	34	. 45975	. 56810	39	. 43190	. 02785	5	. 97215 42
19	. 54059	34	. 45941	. 56849	38	. 43151	. 02790	5	. 97210 41
20	9. 54093	34	10. 45907	9. 56887	39	10. 43113	10. 02794	4	9. 97206 40
21	. 54127	34	. 45873	. 56926	39	. 43074	. 02799	5	. 97201 39
22	. 54161	34	. 45839	. 56965	39	. 43035	. 02804	5	. 97196 38
23	. 54195	34	. 45805	. 57004	38	. 42996	. 02808	4	. 97192 37
24	. 54229	34	. 45771	. 57042	39	. 42958	. 02813	5	. 97187 36
25	9. 54263	34	10. 45737	9. 57081	39	10. 42919	10. 02818	5	9. 97182 35
26	. 54297	34	. 45703	. 57120	38	. 42880	. 02822	4	. 97178 34
27	. 54331	34	. 45669	. 57158	39	. 42842	. 02827	5	. 97173 33
28	. 54365	34	. 45635	. 57197	38	. 42803	. 02832	5	. 97168 32
29	. 54399	34	. 45601	. 57235	39	. 42765	. 02837	5	. 97163 31
30	9. 54433	33	10. 45567	9. 57274	38	10. 42726	10. 02841	4	9. 97159 30
31	. 54466	34	. 45534	. 57312	39	. 42688	. 02846	5	. 97154 29
32	. 54500	34	. 45500	. 57351	38	. 42649	02851	5	. 97149 28
33	. 54534	33	. 45466	. 57389	39	. 42611	. 02855	4	. 97145 27
34	. 54567	34	. 45433	. 57428	38	. 42572	. 02860	5	. 97140 26
35	9. 54601	34	10. 45399	9. 57466	38	10. 42534	10. 02865	5	9. 97135 25
36	. 54635	33	. 45365	. 57504	39	. 42496	. 02870	5	. 97130 24
37	. 54668	34	. 45332	. 57543	38	. 42457	. 02874	4	. 97126 23
38	. 54702	33	. 45298	. 57581	38	. 42419	. 02879	5	. 97121 22
39	. 54735	34	. 45265	. 57619	39	. 42381	. 02884	5	. 97116 21
40	9. 54769	33	10. 45231	9. 57658	38	10. 42342	10. 02889	5	9. 97111 20
41	. 54802	34	. 45198	. 57696	38	. 42304	. 02893	4	. 97107 19
42	. 54836	33	. 45164	. 57734	38	. 42266	. 02898	5	. 97102 18
43	. 54869	34	. 45131	. 57772	38	. 42228	. 02903	5	. 97097 17
44	. 54903	33	. 45097	. 57810	39	. 42190	. 02908	5	. 97092 16
45	9. 54936	33	10. 45064	9. 57849	38	10. 42151	10. 02913	5	9. 97087 15
46	. 54969	34	. 45031	. 57887	38	. 42113	. 02917	4	. 97083 14
47	. 55003	33	. 44997	. 57925	38	. 42075	. 02922	5	. 97078 13
48	. 55036	33	. 44964	. 57963	38	. 42037	. 02927	5	. 97073 12
49	. 55069	33	. 44931	. 58001	38	. 41999	. 02932	5	. 97068 11
50	9. 55102	34	10. 44898	9. 58039	38	10. 41961	10. 02937	5	9. 97063 10
51	. 55136	33	. 44864	. 58077	38	. 41923	. 02941	4	. 97059 9
52	. 55169	33	. 44831	. 58115	38	. 41885	. 02946	5	. 97054 8
53	. 55202	33	. 44798	. 58153	38	. 41847	. 02951	5	. 97049 7
54	. 55235	33	. 44765	. 58191	38	. 41809	. 02956	5	. 97044 6
55	9. 55268	33	10. 44732	9. 58229	38	10. 41771	10. 02961	5	9. 97039 5
56	. 55301	33	. 44699	. 58267	37	. 41733	. 02965	4	. 97035 4
57	. 55334	33	. 44666	. 58304	38	. 41696	. 02970	5	. 97030 3
58	. 55367	33	. 44633	. 58342	38	. 41658	. 02975	5	. 97025 2
59	. 55400	33	. 44600	. 58380	38	. 41620	. 02980	5	. 97020 1
60	9. 55433	33	10. 44567	9. 58418	38	10. 41582	10. 02985	5	9. 97015 0
↑ 110° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin ← ↑ 69°

21° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 158° ↓
0	9. 55433		10. 44567	9. 58418		10. 41582	10. 02985		9. 97015	60
1	55466	33	44534	58455	37	41545	02990	5	97010	59
2	55499	33	44501	58493	38	41507	02995	5	97005	58
3	55532	33	44468	58531	38	41469	02999	4	97001	57
4	55564	32	44436	58569	38	41431	03004	5	96996	56
5	9. 55597	33	10. 44403	9. 58606	37	10. 41394	10. 03009	5	9. 96991	55
6	55630	33	44370	58644	38	41356	03014	5	96986	54
7	55663	33	44337	58681	37	41319	03019	5	96981	53
8	55695	32	44305	58719	38	41281	03024	5	96976	52
9	55728	33	44272	58757	38	41243	03029	5	96971	51
10	9. 55761	33	10. 44239	9. 58794	37	10. 41206	10. 03034	5	9. 96966	50
11	55793	32	44207	58832	38	41168	03038	4	96962	49
12	55826	33	44174	58869	37	41131	03043	5	96957	48
13	55858	32	44142	58907	38	41093	03048	5	96952	47
14	55891	33	44109	58944	37	41056	03053	5	96947	46
15	9. 55923	32	10. 44077	9. 58981	37	10. 41019	10. 03058	5	9. 96942	45
16	55956	33	44044	59019	38	40981	03063	5	96937	44
17	55988	32	44012	59056	37	40944	03068	5	96932	43
18	56021	33	43979	59094	38	40906	03073	5	96927	42
19	56053	32	43947	59131	37	40869	03078	5	96922	41
20	9. 56085	32	10. 43915	9. 59168	37	10. 40832	10. 03083	5	9. 96917	40
21	56118	33	43882	59205	38	40795	03088	5	96912	39
22	56150	32	43850	59243	37	40757	03093	5	96907	38
23	56182	32	43818	59280	37	40720	03097	4	96903	37
24	56215	33	43785	59317	37	40683	03102	5	96898	36
25	9. 56247	32	10. 43753	9. 59354	37	10. 40646	10. 03107	5	9. 96893	35
26	56279	32	43721	59391	38	40609	03112	5	96888	34
27	56311	32	43689	59429	37	40571	03117	5	96883	33
28	56343	32	43657	59466	37	40534	03122	5	96878	32
29	56375	33	43625	59503	37	40497	03127	5	96873	31
30	9. 56408	32	10. 43592	9. 59540	37	10. 40460	10. 03132	5	9. 96868	30
31	56440	32	43560	59577	37	40423	03137	5	96863	29
32	56472	32	43528	59614	37	40386	03142	5	96858	28
33	56504	32	43496	59651	37	40349	03147	5	96853	27
34	56536	32	43464	59688	37	40312	03152	5	96848	26
35	9. 56568	31	10. 43432	9. 59725	37	10. 40275	10. 03157	5	9. 96843	25
36	56599	32	43401	59762	37	40238	03162	5	96838	24
37	56631	32	43369	59799	36	40201	03167	5	96833	23
38	56663	32	43337	59835	37	40165	03172	5	96828	22
39	56695	32	43305	59872	37	40128	03177	5	96823	21
40	9. 56727	32	10. 43273	9. 59909	37	10. 40091	10. 03182	5	9. 96818	20
41	56759	31	43241	59946	37	40054	03187	5	96813	19
42	56790	32	43210	59983	36	40017	03192	5	96808	18
43	56822	32	43178	60019	37	39981	03197	5	96803	17
44	56854	32	43146	60056	37	39944	03202	5	96798	16
45	9. 56886	31	10. 43114	9. 60093	37	10. 39907	10. 03207	5	9. 96793	15
46	56917	32	43083	60130	36	39870	03212	5	96788	14
47	56949	31	43051	60166	37	39834	03217	5	96783	13
48	56980	32	43020	60203	37	39797	03222	6	96778	12
49	57012	32	42988	60240	36	39760	03228	5	96772	11
50	9. 57044	31	10. 42956	9. 60276	37	10. 39724	10. 03233	5	9. 96767	10
51	57075	32	42925	60313	36	39687	03238	5	96762	9
52	57107	31	42893	60349	37	39651	03243	5	96757	8
53	57138	31	42862	60386	36	39614	03248	5	96752	7
54	57169	32	42831	60422	37	39578	03253	5	96747	6
55	9. 57201	31	10. 42799	9. 60459	36	10. 39541	10. 03258	5	9. 96742	5
56	57232	32	42768	60495	37	39505	03263	5	96737	4
57	57264	31	42736	60532	36	39468	03268	5	96732	3
58	57295	31	42705	60568	37	39432	03273	5	96727	2
59	57326	32	42674	60605	36	39395	03278	5	96722	1
60	9. 57358		10. 42642	9. 60641		10. 39359	10. 03283		9. 96717	0
↑ 111° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 68°

Logarithms of Trigonometric Functions

22° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 157° ↓	
′										′
0	9. 57358	31	10. 42642	9. 60641	36	10. 39359	10. 03283	6	9. 96717	60
1	. 57389	31	. 42611	. 60677	37	. 39323	. 03289	5	. 96711	59
2	. 57420	31	. 42580	. 60714	36	. 39286	. 03294	5	. 96706	58
3	. 57451	31	. 42549	. 60750	36	. 39250	. 03299	5	. 96701	57
4	. 57482	32	. 42518	. 60786	37	. 39214	. 03304	5	. 96696	56
5	9. 57514	31	10. 42486	9. 60823	36	10. 39177	10. 03309	5	9. 96691	55
6	. 57545	31	. 42455	. 60859	36	. 39141	. 03314	5	. 96686	54
7	. 57576	31	. 42424	. 60895	36	. 39105	. 03319	5	. 96681	53
8	. 57607	31	. 42393	. 60931	36	. 39069	. 03324	6	. 96676	52
9	. 57638	31	. 42362	. 60967	37	. 39033	. 03330	5	. 96670	51
10	9. 57669	31	10. 42331	9. 61004	36	10. 38996	10. 03335	5	9. 96665	50
11	. 57700	31	. 42300	. 61040	36	. 38960	. 03340	5	. 96660	49
12	. 57731	31	. 42269	. 61076	36	. 38924	. 03345	5	. 96655	48
13	. 57762	31	. 42238	. 61112	36	. 38888	. 03350	5	. 96650	47
14	. 57793	31	. 42207	. 61148	36	. 38852	. 03355	5	. 96645	46
15	9. 57824	31	10. 42176	9. 61184	36	10. 38816	10. 03360	6	9. 96640	45
16	. 57855	30	. 42145	. 61220	36	. 38780	. 03366	5	. 96634	44
17	. 57885	31	. 42115	. 61256	36	. 38744	. 03371	5	. 96629	43
18	. 57916	31	. 42084	. 61292	36	. 38708	. 03376	5	. 96624	42
19	. 57947	31	. 42053	. 61328	36	. 38672	. 03381	5	. 96619	41
20	9. 57978	30	10. 42022	9. 61364	36	10. 38636	10. 03386	6	9. 96614	40
21	. 58008	31	. 41992	. 61400	36	. 38600	. 03392	5	. 96608	39
22	. 58039	31	. 41961	. 61436	36	. 38564	. 03397	5	. 96603	38
23	. 58070	31	. 41930	. 61472	36	. 38528	. 03402	5	. 96598	37
24	. 58101	30	. 41899	. 61508	36	. 38492	. 03407	5	. 96593	36
25	9. 58131	31	10. 41869	9. 61544	36	10. 38456	10. 03412	6	9. 96588	35
26	. 58162	30	. 41838	. 61579	35	. 38421	. 03418	5	. 96582	34
27	. 58192	31	. 41808	. 61615	36	. 38385	. 03423	5	. 96577	33
28	. 58223	30	. 41777	. 61651	36	. 38349	. 03428	5	. 96572	32
29	. 58253	31	. 41747	. 61687	36	. 38313	. 03433	5	. 96567	31
30	9. 58284	30	10. 41716	9. 61722	35	10. 38278	10. 03438	6	9. 96562	30
31	. 58314	31	. 41686	. 61758	36	. 38242	. 03444	5	. 96556	29
32	. 58345	30	. 41655	. 61794	36	. 38206	. 03449	5	. 96551	28
33	. 58375	31	. 41625	. 61830	36	. 38170	. 03454	5	. 96546	27
34	. 58406	30	. 41594	. 61865	35	. 38135	. 03459	5	. 96541	26
35	9. 58436	31	10. 41564	9. 61901	36	10. 38099	10. 03465	6	9. 96535	25
36	. 58467	30	. 41533	. 61936	35	. 38064	. 03470	5	. 96530	24
37	. 58497	30	. 41503	. 61972	36	. 38028	. 03475	5	. 96525	23
38	. 58527	30	. 41473	. 62008	36	. 37992	. 03480	5	. 96520	22
39	. 58557	31	. 41443	. 62043	35	. 37957	. 03486	6	. 96514	21
40	9. 58588	30	10. 41412	9. 62079	36	10. 37921	10. 03491	5	9. 96509	20
41	. 58618	30	. 41382	. 62114	35	. 37886	. 03496	5	. 96504	19
42	. 58648	30	. 41352	. 62150	36	. 37850	. 03502	6	. 96498	18
43	. 58678	31	. 41322	. 62185	35	. 37815	. 03507	5	. 96493	17
44	. 58709	30	. 41291	. 62221	36	. 37779	. 03512	5	. 96488	16
45	9. 58739	30	10. 41261	9. 62256	35	10. 37744	10. 03517	5	9. 96483	15
46	. 58769	30	. 41231	. 62292	36	. 37708	. 03523	6	. 96477	14
47	. 58799	30	. 41201	. 62327	35	. 37673	. 03528	5	. 96472	13
48	. 58829	30	. 41171	. 62362	35	. 37638	. 03533	5	. 96467	12
49	. 58859	30	. 41141	. 62398	36	. 37602	. 03539	6	. 96461	11
50	9. 58889	30	10. 41111	9. 62433	35	10. 37567	10. 03544	5	9. 96456	10
51	. 58919	30	. 41081	. 62468	35	. 37532	. 03549	5	. 96451	9
52	. 58949	30	. 41051	. 62504	36	. 37496	. 03555	6	. 96445	8
53	. 58979	30	. 41021	. 62539	35	. 37461	. 03560	5	. 96440	7
54	. 59009	30	. 40991	. 62574	35	. 37426	. 03565	5	. 96435	6
55	9. 59039	30	10. 40961	9. 62609	35	10. 37391	10. 03571	6	9. 96429	5
56	. 59069	29	. 40931	. 62645	36	. 37355	. 03576	5	. 96424	4
57	. 59098	30	. 40902	. 62680	35	. 37320	. 03581	5	. 96419	3
58	. 59128	30	. 40872	. 62715	35	. 37285	. 03587	6	. 96413	2
59	. 59158	30	. 40842	. 62750	35	. 37250	. 03592	5	. 96408	1
60	9. 59188	30	10. 40812	9. 62785	35	10. 37215	10. 03597	5	9. 96403	0
↑ 112° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin ← 67° ↑	

23° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 156° ↓
′										′
0	9. 59188	30	10. 40812	9. 62785	35	10. 37215	10. 03597	6	9. 96403	60
1	. 59218	29	. 40782	. 62820	35	. 37180	. 03603	5	. 96397	59
2	. 59247	30	. 40753	. 62855	35	. 37145	. 03608	5	. 96392	58
3	. 59277	30	. 40723	. 62890	36	. 37110	. 03613	6	. 96387	57
4	. 59307	29	. 40693	. 62926	35	. 37074	. 03619	5	. 96381	56
5	9. 59336	30	10. 40664	9. 62961	35	10. 37039	10. 03624	6	9. 96376	55
6	. 59366	30	. 40634	. 62996	35	. 37004	. 03630	5	. 96370	54
7	. 59396	29	. 40604	. 63031	35	. 36969	. 03635	5	. 96365	53
8	. 59425	30	. 40575	. 63066	35	. 36934	. 03640	6	. 96360	52
9	. 59455	29	. 40545	. 63101	34	. 36899	. 03646	5	. 96354	51
10	9. 59484	30	10. 40516	9. 63135	35	10. 36865	10. 03651	6	9. 96349	50
11	. 59514	29	. 40486	. 63170	35	. 36830	. 03657	5	. 96343	49
12	. 59543	30	. 40457	. 63205	35	. 36795	. 03662	5	. 96338	48
13	. 59573	29	. 40427	. 63240	35	. 36760	. 03667	6	. 96333	47
14	. 59602	30	. 40398	. 63275	35	. 36725	. 03673	5	. 96327	46
15	9. 59632	29	10. 40368	9. 63310	35	10. 36690	10. 03678	6	9. 96322	45
16	. 59661	29	. 40339	. 63345	34	. 36655	. 03684	5	. 96316	44
17	. 59690	30	. 40310	. 63379	35	. 36621	. 03689	6	. 96311	43
18	. 59720	29	. 40280	. 63414	35	. 36586	. 03695	5	. 96305	42
19	. 59749	29	. 40251	. 63449	35	. 36551	. 03700	6	. 96300	41
20	9. 59778	30	10. 40222	9. 63484	35	10. 36516	10. 03706	5	9. 96294	40
21	. 59808	29	. 40192	. 63519	34	. 36481	. 03711	5	. 96289	39
22	. 59837	29	. 40163	. 63553	35	. 36447	. 03716	6	. 96284	38
23	. 59866	29	. 40134	. 63588	35	. 36412	. 03722	5	. 96278	37
24	. 59895	29	. 40105	. 63623	34	. 36377	. 03727	6	. 96273	36
25	9. 59924	30	10. 40076	9. 63657	35	10. 36343	10. 03733	5	9. 96267	35
26	. 59954	29	. 40046	. 63692	34	. 36308	. 03738	6	. 96262	34
27	. 59983	29	. 40017	. 63726	35	. 36274	. 03744	5	. 96256	33
28	. 60012	29	. 39988	. 63761	35	. 36239	. 03749	6	. 96251	32
29	. 60041	29	. 39959	. 63796	34	. 36204	. 03755	5	. 96245	31
30	9. 60070	29	10. 39930	9. 63830	35	10. 36170	10. 03760	6	9. 96240	30
31	. 60099	29	. 39901	. 63865	34	. 36135	. 03766	5	. 96234	29
32	. 60128	29	. 39872	. 63899	35	. 36101	. 03771	6	. 96229	28
33	. 60157	29	. 39843	. 63934	34	. 36066	. 03777	5	. 96223	27
34	. 60186	29	. 39814	. 63968	35	. 36032	. 03782	6	. 96218	26
35	9. 60215	29	10. 39785	9. 64003	34	10. 35997	10. 03788	5	9. 96212	25
36	. 60244	29	. 39756	. 64037	35	. 35963	. 03793	6	. 96207	24
37	. 60273	29	. 39727	. 64072	34	. 35928	. 03799	5	. 96201	23
38	. 60302	29	. 39698	. 64106	34	. 35894	. 03804	6	. 96196	22
39	. 60331	28	. 39669	. 64140	35	. 35860	. 03810	5	. 96190	21
40	9. 60359	29	10. 39641	9. 64175	34	10. 35825	10. 03815	6	9. 96185	20
41	. 60388	29	. 39612	. 64209	34	. 35791	. 03821	5	. 96179	19
42	. 60417	29	. 39583	. 64243	35	. 35757	. 03826	6	. 96174	18
43	. 60446	29	. 39554	. 64278	34	. 35722	. 03832	6	. 96168	17
44	. 60474	28	. 39526	. 64312	34	. 35688	. 03838	5	. 96162	16
45	9. 60503	29	10. 39497	9. 64346	35	10. 35654	10. 03843	6	9. 96157	15
46	. 60532	29	. 39468	. 64381	34	. 35619	. 03849	5	. 96151	14
47	. 60561	29	. 39439	. 64415	34	. 35585	. 03854	6	. 96146	13
48	. 60589	28	. 39411	. 64449	34	. 35551	. 03860	5	. 96140	12
49	. 60618	29	. 39382	. 64483	34	. 35517	. 03865	6	. 96135	11
50	9. 60646	28	10. 39354	9. 64517	35	10. 35483	10. 03871	6	9. 96129	10
51	. 60675	29	. 39325	. 64552	34	. 35448	. 03877	5	. 96123	9
52	. 60704	29	. 39296	. 64586	34	. 35414	. 03882	6	. 96118	8
53	. 60732	28	. 39268	. 64620	34	. 35380	. 03888	5	. 96112	7
54	. 60761	29	. 39239	. 64654	34	. 35346	. 03893	6	. 96107	6
55	9. 60789	28	10. 39211	9. 64688	34	10. 35312	10. 03899	6	9. 96101	5
56	. 60818	29	. 39182	. 64722	34	. 35278	. 03905	5	. 96095	4
57	. 60846	28	. 39154	. 64756	34	. 35244	. 03910	6	. 96090	3
58	. 60875	29	. 39125	. 64790	34	. 35210	. 03916	5	. 96084	2
59	. 60903	28	. 39097	. 64824	34	. 35176	. 03921	6	. 96079	1
60	9. 60931	28	10. 39069	9. 64858	34	10. 35142	10. 03927	6	9. 96073	0
↑ 113° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 66°

24°→ ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	←155° ↓
0	9. 60931	29	10. 39069	9. 64858	34	10. 35142	10. 03927	6	9. 96073	60
1	. 60960	28	. 39040	. 64892	34	. 35108	. 03933	5	. 96067	59
2	. 60988	28	. 39012	. 64926	34	. 35074	. 03938	6	. 96062	58
3	. 61016	29	. 38984	. 64960	34	. 35040	. 03944	6	. 96056	57
4	. 61045	28	. 38955	. 64994	34	. 35006	. 03950	5	. 96050	56
5	9. 61073	28	10. 38927	9. 65028	34	10. 34972	10. 03955	6	9. 96045	55
6	. 61101	28	. 38899	. 65062	34	. 34938	. 03961	5	. 96039	54
7	. 61129	29	. 38871	. 65096	34	. 34904	. 03966	6	. 96034	53
8	. 61158	28	. 38842	. 65130	34	. 34870	. 03972	6	. 96028	52
9	. 61186	28	. 38814	. 65164	33	. 34836	03978	5	. 96022	51
10	9. 61214	28	10. 38786	9. 65197	34	10. 34803	10. 03983	6	9. 96017	50
11	. 61242	28	. 38758	. 65231	34	. 34769	. 03989	6	. 96011	49
12	. 61270	28	. 38730	. 65265	34	. 34735	. 03995	5	. 96005	48
13	. 61298	28	. 38702	. 65299	34	. 34701	. 04000	6	. 96000	47
14	. 61326	28	. 38674	. 65333	33	. 34667	. 04006	6	. 95994	46
15	9. 61354	28	10. 38646	9. 65366	34	10. 34634	10. 04012	6	9. 95988	45
16	. 61382	28	. 38618	. 65400	34	. 34600	. 04018	5	. 95982	44
17	. 61411	29	. 38589	. 65434	33	. 34566	. 04023	6	. 95977	43
18	. 61438	27	. 38562	. 65467	34	. 34533	. 04029	6	. 95971	42
19	. 61466	28	. 38534	. 65501	34	. 34499	. 04035	5	. 95965	41
20	9. 61494	28	10. 38506	9. 65535	33	10. 34465	10. 04040	6	9. 95960	40
21	. 61522	28	. 38478	. 65568	34	. 34432	. 04046	6	. 95954	39
22	. 61550	28	. 38450	. 65602	34	. 34398	. 04052	6	. 95948	38
23	. 61578	28	. 38422	. 65636	33	. 34364	. 04058	5	. 95942	37
24	. 61606	28	. 38394	. 65669	34	. 34331	. 04063	6	. 95937	36
25	9. 61634	28	10. 38366	9. 65703	33	10. 34297	10. 04069	6	9. 95931	35
26	. 61662	27	. 38338	. 65736	34	. 34264	. 04075	5	. 95925	34
27	. 61689	28	. 38311	. 65770	33	. 34230	. 04080	6	. 95920	33
28	. 61717	28	. 38283	. 65803	34	. 34197	. 04086	6	. 95914	32
29	. 61745	28	. 38255	. 65837	33	. 34163	. 04092	6	. 95908	31
30	9. 61773	27	10. 38227	9. 65870	34	10. 34130	10. 04098	5	9. 95902	30
31	. 61800	28	. 38200	. 65904	33	. 34096	. 04103	6	. 95897	29
32	. 61828	28	. 38172	. 65937	34	. 34063	. 04109	6	. 95891	28
33	. 61856	27	. 38144	. 65971	33	. 34029	. 04115	6	. 95885	27
34	. 61883	28	. 38117	. 66004	34	. 33996	. 04121	6	. 95879	26
35	9. 61911	28	10. 38089	9. 66038	33	10. 33962	10. 04127	5	9. 95873	25
36	. 61939	27	. 38061	. 66071	33	. 33929	. 04132	6	. 95868	24
37	. 61966	28	. 38034	. 66104	34	. 33896	. 04138	6	. 95862	23
38	. 61994	27	. 38006	. 66138	33	. 33862	. 04144	6	. 95856	22
39	. 62021	28	. 37979	. 66171	33	. 33829	. 04150	6	. 95850	21
40	9. 62049	27	10. 37951	9. 66204	34	10. 33796	10. 04156	5	9. 95844	20
41	. 62076	28	. 37924	. 66238	33	. 33762	. 04161	6	. 95839	19
42	. 62104	27	. 37896	. 66271	33	. 33729	. 04167	6	. 95833	18
43	. 62131	28	. 37869	. 66304	33	. 33696	. 04173	6	. 95827	17
44	. 62159	27	. 37841	. 66337	34	. 33663	. 04179	6	. 95821	16
45	9. 62186	28	10. 37814	9. 66371	33	10. 33629	10. 04185	5	9. 95815	15
46	. 62214	27	. 37786	. 66404	33	. 33596	. 04190	6	. 95810	14
47	. 62241	27	. 37759	. 66437	33	. 33563	. 04196	6	. 95804	13
48	. 62268	28	. 37732	. 66470	33	. 33530	. 04202	6	. 95798	12
49	. 62296	27	. 37704	. 66503	34	. 33497	. 04208	6	. 95792	11
50	9. 62323	27	10. 37677	9. 66537	33	10. 33463	10. 04214	6	9. 95786	10
51	. 62350	27	. 37650	. 66570	33	. 33430	. 04220	5	. 95780	9
52	. 62377	28	. 37623	. 66603	33	. 33397	. 04225	6	. 95775	8
53	. 62405	27	. 37595	. 66636	33	. 33364	. 04231	6	. 95769	7
54	. 62432	27	. 37568	. 66669	33	. 33331	. 04237	6	. 95763	6
55	9. 62459	27	10. 37541	9. 66702	33	10. 33298	10. 04243	6	9. 95757	5
56	. 62486	27	. 37514	. 66735	33	. 33265	. 04249	6	. 95751	4
57	. 62513	28	. 37487	. 66768	33	. 33232	. 04255	6	. 95745	3
58	. 62541	27	. 37459	. 66801	33	. 33199	. 04261	6	. 95739	2
59	. 62568	27	. 37432	. 66834	33	. 33166	. 04267	6	. 95733	1
60	9. 62595		10. 37405	9. 66867		10. 33133	10. 04272	5	9. 95728	0
↑ 114°→	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ←65°

25° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 154° ↓
′										′
0	9. 62595	27	10. 37405	9. 66867	33	10. 33133	10. 04272	6	9. 95728	60
1	. 62622	27	. 37378	. 66900	33	. 33100	. 04278	6	. 95722	59
2	. 62649	27	. 37351	. 66933	33	. 33067	. 04284	6	. 95716	58
3	. 62676	27	. 37324	. 66966	33	. 33034	. 04290	6	. 95710	57
4	. 62703	27	. 37297	. 66999	33	. 33001	. 04296	6	. 95704	56
5	9. 62730	27	10. 37270	9. 67032	33	10. 32968	10. 04302	6	9. 95698	55
6	. 62757	27	. 37243	. 67065	33	. 32935	. 04308	6	. 95692	54
7	. 62784	27	. 37216	. 67098	33	. 32902	. 04314	6	. 95686	53
8	. 62811	27	. 37189	. 67131	32	. 32869	. 04320	6	. 95680	52
9	. 62838	27	. 37162	. 67163	33	. 32837	. 04326	6	. 95674	51
10	9. 62865	27	10. 37135	9. 67196	33	10. 32804	10. 04332	5	9. 95668	50
11	. 62892	26	. 37108	. 67229	33	. 32771	. 04337	6	. 95663	49
12	. 62918	27	. 37082	. 67262	33	. 32738	. 04343	6	. 95657	48
13	. 62945	27	. 37055	. 67295	32	. 32705	. 04349	6	. 95651	47
14	. 62972	27	. 37028	. 67327	33	. 32673	. 04355	6	. 95645	46
15	9. 62999	27	10. 37001	9. 67360	33	10. 32640	10. 04361	6	9. 95639	45
16	. 63026	26	. 36974	. 67393	33	. 32607	. 04367	6	. 95633	44
17	. 63052	27	. 36948	. 67426	32	. 32574	. 04373	6	. 95627	43
18	. 63079	27	. 36921	. 67458	33	. 32542	. 04379	6	. 95621	42
19	. 63106	27	. 36894	. 67491	33	. 32509	. 04385	6	. 95615	41
20	9. 63133	26	10. 36867	9. 67524	32	10. 32476	10. 04391	6	9. 95609	40
21	. 63159	27	. 36841	. 67556	33	. 32444	. 04397	6	. 95603	39
22	. 63186	27	. 36814	. 67589	33	. 32411	. 04403	6	. 95597	38
23	. 63213	26	. 36787	. 67622	32	. 32378	. 04409	6	. 95591	37
24	. 63239	27	. 36761	. 67654	33	. 32346	. 04415	6	. 95585	36
25	9. 63266	26	10. 36734	9. 67687	32	10. 32313	10. 04421	6	9. 95579	35
26	. 63292	27	. 36708	. 67719	33	. 32281	. 04427	6	. 95573	34
27	. 63319	26	. 36681	. 67752	33	. 32248	. 04433	6	. 95567	33
28	. 63345	27	. 36655	. 67785	32	. 32215	. 04439	6	. 95561	32
29	. 63372	26	. 36628	. 67817	33	. 32183	. 04445	6	. 95555	31
30	9. 63398	27	10. 36602	9. 67850	32	10. 32150	10. 04451	6	9. 95549	30
31	. 63425	26	. 36575	. 67882	33	. 32118	. 04457	6	. 95543	29
32	. 63451	27	. 36549	. 67915	32	. 32085	. 04463	6	. 95537	28
33	. 63478	26	. 36522	. 67947	33	. 32053	. 04469	6	. 95531	27
34	. 63504	27	. 36496	. 67980	32	. 32020	. 04475	6	. 95525	26
35	9. 63531	26	10. 36469	9. 68012	32	10. 31988	10. 04481	6	9. 95519	25
36	. 63557	26	. 36443	. 68044	33	. 31956	. 04487	6	. 95513	24
37	. 63583	27	. 36417	. 68077	32	. 31923	. 04493	7	. 95507	23
38	. 63610	26	. 36390	. 68109	33	. 31891	. 04500	6	. 95500	22
39	. 63636	26	. 36364	. 68142	32	. 31858	. 04506	6	. 95494	21
40	9. 63662	27	10. 36338	9. 68174	32	10. 31826	10. 04512	6	9. 95488	20
41	. 63689	26	. 36311	. 68206	33	. 31794	. 04518	6	. 95482	19
42	. 63715	26	. 36285	. 68239	32	. 31761	. 04524	6	. 95476	18
43	. 63741	26	. 36259	. 68271	32	. 31729	. 04530	6	. 95470	17
44	. 63767	27	. 36233	. 68303	33	. 31697	. 04536	6	. 95464	16
45	9. 63794	26	10. 36206	9. 68336	32	10. 31664	10. 04542	6	9. 95458	15
46	. 63820	26	. 36180	. 68368	32	. 31632	. 04548	6	. 95452	14
47	. 63846	26	. 36154	. 68400	32	. 31600	. 04554	6	. 95446	13
48	. 63872	26	. 36128	. 68432	33	. 31568	. 04560	6	. 95440	12
49	. 63898	26	. 36102	. 68465	32	. 31535	. 04566	7	. 95434	11
50	9. 63924	26	10. 36076	9. 68497	32	10. 31503	10. 04573	6	9. 95427	10
51	. 63950	26	. 36050	. 68529	32	. 31471	. 04579	6	. 95421	9
52	. 63976	26	. 36024	. 68561	32	. 31439	. 04585	6	. 95415	8
53	. 64002	26	. 35998	. 68593	33	. 31407	. 04591	6	. 95409	7
54	. 64028	26	. 35972	. 68626	32	. 31374	. 04597	6	. 95403	6
55	9. 64054	26	10. 35946	9. 68658	32	10. 31342	10. 04603	6	9. 95397	5
56	. 64080	26	. 35920	. 68690	32	. 31310	. 04609	7	. 95391	4
57	. 64106	26	. 35894	. 68722	32	. 31278	. 04616	6	. 95384	3
58	. 64132	26	. 35868	. 68754	32	. 31246	. 04622	6	. 95378	2
59	. 64158	26	. 35842	. 68786	32	. 31214	. 04628	6	. 95372	1
60	9. 64184		10. 35816	9. 68818		10. 31182	10. 04634		9. 95366	0
↑ 115° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 64°

26° →	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 153°
0	9. 64184	26	10. 35816	9. 68818	32	10. 31182	10. 04634	6	9. 95366	60
1	. 64210	26	. 35790	. 68850	32	. 31150	. 04640	6	. 95360	59
2	. 64236	26	. 35764	. 68882	32	. 31118	. 04646	6	. 95354	58
3	. 64262	26	. 35738	. 68911	32	. 31086	. 04652	7	. 95348	57
4	. 64288	25	. 35712	. 68946	32	. 31054	. 04659	6	. 95341	56
5	9. 64313	26	10. 35687	9. 68978	32	10. 31022	10. 04665	6	9. 95335	55
6	. 64339	26	. 35661	. 69010	32	. 30990	. 04671	6	. 95329	54
7	. 64365	26	. 35635	. 69042	32	. 30958	. 04677	6	. 95323	53
8	. 64391	26	. 35609	. 69074	32	. 30926	. 04683	7	. 95317	52
9	. 64417	25	. 35583	. 69106	32	. 30894	. 04690	6	. 95310	51
10	9. 64442	26	10. 35558	9. 69138	32	10. 30862	10. 04696	6	9. 95304	50
11	. 64468	26	. 35532	. 69170	32	. 30830	. 04702	6	. 95298	49
12	. 64494	26	. 35506	. 69202	32	. 30798	. 04708	6	. 95292	48
13	. 64519	25	. 35481	. 69231	32	. 30766	. 04714	7	. 95286	47
14	. 64545	26	. 35455	. 69266	32	. 30734	. 04721	6	. 95279	46
15	9. 64571	25	10. 35429	9. 69298	31	10. 30702	10. 04727	6	9. 95273	45
16	. 64596	26	. 35404	. 69329	32	. 30671	. 04733	6	. 95267	44
17	. 64622	25	. 35378	. 69361	32	. 30639	. 04739	7	. 95261	43
18	. 64647	26	. 35353	. 69393	32	. 30607	. 04746	6	. 95254	42
19	. 64673	25	. 35327	. 69425	32	. 30575	. 04752	6	. 95248	41
20	9. 64698	26	10. 35302	9. 69457	31	10. 30543	10. 04758	6	9. 95242	40
21	. 64721	25	. 35276	. 69488	32	. 30512	. 04764	7	. 95236	39
22	. 64749	26	. 35251	. 69520	32	. 30480	. 04771	6	. 95229	38
23	. 64775	25	. 35225	. 69552	32	. 30448	. 04777	6	. 95223	37
24	. 64800	26	. 35200	. 69581	31	. 30116	. 01783	6	. 95217	36
25	9. 64826	25	10. 35174	9. 69615	32	10. 30385	10. 04789	7	9. 95211	35
26	. 64851	26	. 35149	. 69647	32	. 30353	. 04796	6	. 95204	34
27	. 64877	25	. 35123	. 69679	31	. 30321	. 04802	6	. 95198	33
28	. 61902	25	. 35098	. 69710	32	. 30290	. 04808	7	. 95192	32
29	. 61927	26	. 35073	. 69742	32	. 30258	. 04815	6	. 95185	31
30	9. 64953	25	10. 35047	9. 69774	31	10. 30226	10. 04821	6	9. 95179	30
31	. 64978	25	. 35022	. 69805	32	. 30195	. 04827	6	. 95173	29
32	. 65003	26	. 34997	. 69837	31	. 30163	. 04833	7	. 95167	28
33	. 65029	25	. 34971	. 69868	32	. 30132	. 04840	6	. 95160	27
34	. 65054	25	. 34946	. 69900	32	. 30100	. 04846	6	. 95154	26
35	9. 65079	25	10. 34921	9. 69932	31	10. 30068	10. 04852	7	9. 95148	25
36	. 65104	26	. 34896	. 69963	32	. 30037	. 04859	6	. 95141	24
37	. 65130	25	. 34870	. 69995	31	. 30005	. 04865	6	. 95135	23
38	. 65155	25	. 34845	. 70026	32	. 29974	. 04871	7	. 95129	22
39	. 65180	25	. 34820	. 70058	31	. 29942	. 04878	6	. 95122	21
40	9. 65205	25	10. 34795	9. 70089	32	10. 29911	10. 04881	6	9. 95116	20
41	. 65230	25	. 34770	. 70121	31	. 29879	. 04890	7	. 95110	19
42	. 65255	26	. 34745	. 70152	32	. 29848	. 04897	6	. 95103	18
43	. 65281	25	. 34719	. 70184	31	. 29816	. 04903	7	. 95097	17
44	. 65306	25	. 34694	. 70215	32	. 29785	. 04910	6	. 95090	16
45	9. 65331	25	10. 34669	9. 70247	31	10. 29753	10. 04916	6	9. 95084	15
46	. 65356	25	. 34644	. 70278	31	. 29722	. 04922	7	. 95078	14
47	. 65381	25	. 34619	. 70309	32	. 28691	. 04929	6	. 95071	13
48	. 65406	25	. 34594	. 70341	31	. 29659	. 04935	6	. 95065	12
49	. 65431	25	. 34569	. 70372	32	. 29628	. 04941	7	. 95059	11
50	9. 65456	25	10. 34544	9. 70404	31	10. 29596	10. 04948	6	9. 95052	10
51	. 65481	25	. 34519	. 70435	31	. 29565	. 04954	7	. 95046	9
52	. 65506	25	. 34494	. 70466	32	. 29531	. 04961	6	. 95039	8
53	. 65531	25	. 34469	. 70498	31	. 29502	. 04967	6	. 95033	7
54	. 65556	24	. 34444	. 70529	31	. 29471	. 04973	7	. 95027	6
55	9. 65580	25	10. 34420	9. 70560	32	10. 29440	10. 04980	6	9. 95020	5
56	. 65605	25	. 34395	. 70592	31	. 29408	. 04986	7	. 95014	4
57	. 65630	25	. 34370	. 70623	31	. 29377	. 04993	6	. 95007	3
58	. 65655	25	. 34345	. 70654	31	. 29346	. 04999	6	. 95001	2
59	. 65680	25	. 34320	. 70685	32	. 29315	. 05005	7	. 94995	1
60	9. 65705		10. 34295	9. 70717		10. 29283	10. 05012		9. 94988	0
↑ 116° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 63°

27° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 152° ↓	
0	9. 65705	24	10. 34295	9. 70717	31	10. 29283	10. 05012	6	9. 94988	60
1	. 65729	25	. 34271	. 70748	31	. 29252	. 05018	7	. 94982	59
2	. 65754	25	. 34246	. 70779	31	. 29221	. 05025	6	. 94975	58
3	. 65779	25	. 34221	. 70810	31	. 29190	. 05031	7	. 94969	57
4	. 65804	24	. 34196	. 70841	32	. 29159	. 05038	6	. 94962	56
5	9. 65828	25	10. 34172	9. 70873	31	10. 29127	10. 05044	7	9. 94956	55
6	. 65853	25	. 34147	. 70904	31	. 29096	. 05051	6	. 94949	54
7	. 65878	24	. 34122	. 70935	31	. 29065	. 05057	7	. 94943	53
8	. 65902	25	. 34098	. 70966	31	. 29034	. 05064	6	. 94936	52
9	. 65927	25	. 34073	. 70997	31	. 29003	. 05070	7	. 94930	51
10	9. 65952	24	10. 34048	9. 71028	31	10. 28972	10. 05077	6	9. 94923	50
11	. 65976	25	. 34024	. 71059	31	. 28941	. 05083	6	. 94917	49
12	. 66001	24	. 33999	. 71090	31	. 28910	. 05089	7	. 94911	48
13	. 66025	25	. 33975	. 71121	32	. 28879	. 05096	6	. 94904	47
14	. 66050	25	. 33950	. 71153	31	. 28847	. 05102	7	. 94898	46
15	9. 66075	24	10. 33925	9. 71184	31	10. 28816	10. 05109	6	9. 94891	45
16	. 66099	25	. 33901	. 71215	31	. 28785	. 05115	7	. 94885	44
17	. 66124	24	. 33876	. 71246	31	. 28754	. 05122	7	. 94878	43
18	. 66148	25	. 33852	. 71277	31	. 28723	. 05129	6	. 94871	42
19	. 66173	24	. 33827	. 71308	31	. 28692	. 05135	7	. 94865	41
20	9. 66197	24	10. 33803	9. 71339	31	10. 28661	10. 05142	6	9. 94858	40
21	. 66221	25	. 33779	. 71370	31	. 28630	. 05148	7	. 94852	39
22	. 66246	24	. 33754	. 71401	30	. 28599	. 05155	6	. 94845	38
23	. 66270	25	. 33730	. 71431	31	. 28569	. 05161	7	. 94839	37
24	. 66295	24	. 33705	. 71462	31	. 28538	. 05168	6	. 94832	36
25	9. 66319	24	10. 33681	9. 71493	31	10. 28507	10. 05174	7	9. 94826	35
26	. 66343	25	. 33657	. 71524	31	. 28476	. 05181	6	. 94819	34
27	. 66368	24	. 33632	. 71555	31	. 28445	. 05187	7	. 94813	33
28	. 66392	24	. 33608	. 71586	31	. 28414	. 05194	7	. 94806	32
29	. 66416	25	. 33584	. 71617	31	. 28383	. 05201	6	. 94799	31
30	9. 66441	24	10. 33559	9. 71648	31	10. 28352	10. 05207	7	9. 94793	30
31	. 66465	24	. 33535	. 71679	30	. 28321	. 05214	6	. 94786	29
32	. 66489	24	. 33511	. 71709	31	. 28291	. 05220	7	. 94780	28
33	. 66513	24	. 33487	. 71740	31	. 28260	. 05227	6	. 94773	27
34	. 66537	25	. 33463	. 71771	31	. 28229	. 05233	7	. 94767	26
35	9. 66562	24	10. 33438	9. 71802	31	10. 28198	10. 05240	7	9. 94760	25
36	. 66586	24	. 33414	. 71833	30	. 28167	. 05247	6	. 94753	24
37	. 66610	24	. 33390	. 71863	31	. 28137	. 05253	7	. 94747	23
38	. 66634	24	. 33366	. 71894	31	. 28106	. 05260	6	. 94740	22
39	. 66658	24	. 33342	. 71925	30	. 28075	. 05266	7	. 94734	21
40	9. 66682	24	10. 33318	9. 71955	31	10. 28045	10. 05273	7	9. 94727	20
41	. 66706	25	. 33294	. 71986	31	. 28014	. 05280	6	. 94720	19
42	. 66731	24	. 33269	. 72017	31	. 27983	. 05286	7	. 94714	18
43	. 66755	24	. 33245	. 72048	30	. 27952	. 05293	7	. 94707	17
44	. 66779	24	. 33221	. 72078	31	. 27922	. 05300	6	. 94700	16
45	9. 66803	24	10. 33197	9. 72109	31	10. 27891	10. 05306	7	9. 94694	15
46	. 66827	24	. 33173	. 72140	30	. 27860	. 05313	7	. 94687	14
47	. 66851	24	. 33149	. 72170	31	. 27830	. 05320	6	. 94680	13
48	. 66875	24	. 33125	. 72201	30	. 27799	. 05326	7	. 94674	12
49	. 66899	23	. 33101	. 72231	31	. 27769	. 05333	7	. 94667	11
50	9. 66922	24	10. 33078	9. 72262	31	10. 27738	10. 05340	6	9. 94660	10
51	. 66946	24	. 33054	. 72293	30	. 27707	. 05346	7	. 94654	9
52	. 66970	24	. 33030	. 72323	31	. 27677	. 05353	7	. 94647	8
53	. 66994	24	. 33006	. 72354	30	. 27646	. 05360	6	. 94640	7
54	. 67018	24	. 32982	. 72384	31	. 27616	. 05366	7	. 94634	6
55	9. 67042	24	10. 32958	9. 72415	30	10. 27585	10. 05373	7	9. 94627	5
56	. 67066	24	. 32934	. 72445	31	. 27555	. 05380	6	. 94620	4
57	. 67090	23	. 32910	. 72476	30	. 27524	. 05386	7	. 94614	3
58	. 67113	24	. 32887	. 72506	31	. 27494	. 05393	7	. 94607	2
59	. 67137	24	. 32863	. 72537	30	. 27463	. 05400	7	. 94600	1
60	9. 67161		10. 32839	9. 72567		10. 27433	10. 05407		9. 94593	0
↑ 117° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	← 62° ↑

28° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 151° ↓
0	9. 67161	24	10. 32839	9. 72567	31	10. 27433	10. 05407	6	9. 94593	60
1	. 67185	23	. 32815	. 72598	30	. 27402	. 05413	7	. 94587	59
2	. 67208	24	. 32792	. 72628	31	. 27372	. 05420	7	. 94580	58
3	. 67232	24	. 32768	. 72659	30	. 27341	. 05427	6	. 94573	57
4	. 67256	24	. 32744	. 72689	31	. 27311	. 05433	7	. 94567	56
5	9. 67280	23	10. 32720	9. 72720	30	10. 27280	10. 05440	7	9. 94560	55
6	. 67303	24	. 32697	. 72750	30	. 27250	. 05447	7	. 94553	54
7	. 67327	23	. 32673	. 72780	31	. 27220	. 05454	6	. 94546	53
8	. 67350	24	. 32650	. 72811	30	. 27189	. 05460	7	. 94540	52
9	. 67374	24	. 32626	. 72841	31	. 27159	. 05467	7	. 94533	51
10	9. 67398	23	10. 32602	9. 72872	30	10. 27128	10. 05474	7	9. 94526	50
11	. 67421	24	. 32579	. 72902	30	. 27098	. 05481	6	. 94519	49
12	. 67445	23	. 32555	. 72932	31	. 27068	. 05487	7	. 94513	48
13	. 67468	24	. 32532	. 72963	30	. 27037	. 05494	7	. 94506	47
14	. 67492	23	. 32508	. 72993	30	. 27007	. 05501	7	. 94499	46
15	9. 67515	24	10. 32485	9. 73023	31	10. 26977	10. 05508	7	9. 94492	45
16	. 67539	23	. 32461	. 73054	30	. 26946	. 05515	6	. 94485	44
17	. 67562	24	. 32438	. 73084	30	. 26916	. 05521	7	. 94479	43
18	. 67586	23	. 32414	. 73114	30	. 26886	. 05528	7	. 94472	42
19	. 67609	24	. 32391	. 73144	31	. 26856	. 05535	7	. 94465	41
20	9. 67633	23	10. 32367	9. 73175	30	10. 26825	10. 05542	7	9. 94458	40
21	. 67656	24	. 32344	. 73205	30	. 26795	. 05549	6	. 94451	39
22	. 67680	23	. 32320	. 73235	30	. 26765	. 05555	7	. 94445	38
23	. 67703	23	. 32297	. 73265	30	. 26735	. 05562	7	. 94438	37
24	. 67726	24	. 32274	. 73295	31	. 26705	. 05569	7	. 94431	36
25	9. 67750	23	10. 32250	9. 73326	30	10. 26674	10. 05576	7	9. 94424	35
26	. 67773	23	. 32227	. 73356	30	. 26644	. 05583	7	. 94417	34
27	. 67796	24	. 32204	. 73386	30	. 26614	. 05590	6	. 94410	33
28	. 67820	23	. 32180	. 73416	30	. 26584	. 05596	7	. 94404	32
29	. 67843	23	. 32157	. 73446	30	. 26554	. 05603	7	. 94397	31
30	9. 67866	24	10. 32134	9. 73476	31	10. 26524	10. 05610	7	9. 94390	30
31	. 67890	23	. 32110	. 73507	30	. 26493	. 05617	7	. 94383	29
32	. 67913	23	. 32087	. 73537	30	. 26463	. 05624	7	. 94376	28
33	. 67936	23	. 32064	. 73567	30	. 26433	. 05631	7	. 94369	27
34	. 67959	23	. 32041	. 73597	30	. 26403	. 05638	7	. 94362	26
35	9. 67982	24	10. 32018	9. 73627	30	10. 26373	10. 05645	6	9. 94355	25
36	. 68006	23	. 31994	. 73657	30	. 26343	. 05651	7	. 94349	24
37	. 68029	23	. 31971	. 73687	30	. 26313	. 05658	7	. 94342	23
38	. 68052	23	. 31948	. 73717	30	. 26283	. 05665	7	. 94335	22
39	. 68075	23	. 31925	. 73747	30	. 26253	. 05672	7	. 94328	21
40	9. 68098	23	10. 31902	9. 73777	30	10. 26223	10. 05679	7	9. 94321	20
41	. 68121	23	. 31879	. 73807	30	. 26193	. 05686	7	. 94314	19
42	. 68144	23	. 31856	. 73837	30	. 26163	. 05693	7	. 94307	18
43	. 68167	23	. 31833	. 73867	30	. 26133	. 05700	7	. 94300	17
44	. 68190	23	. 31810	. 73897	30	. 26103	. 05707	7	. 94293	16
45	9. 68213	24	10. 31787	9. 73927	30	10. 26073	10. 05714	7	9. 94286	15
46	. 68237	23	. 31763	. 73957	30	. 26043	. 05721	6	. 94279	14
47	. 68260	23	. 31740	. 73987	30	. 26013	. 05727	7	. 94273	13
48	. 68283	22	. 31717	. 74017	30	. 25983	. 05734	7	. 94266	12
49	. 68305	23	. 31695	. 74047	30	. 25953	. 05741	7	. 94259	11
50	9. 68328	23	10. 31672	9. 74077	30	10. 25923	10. 05748	7	9. 94252	10
51	. 68351	23	. 31649	. 74107	30	. 25893	. 05755	7	. 94245	9
52	. 68374	23	. 31626	. 74137	29	. 25863	. 05762	7	. 94238	8
53	. 68397	23	. 31603	. 74166	30	. 25834	. 05769	7	. 94231	7
54	. 68420	23	. 31580	. 74196	30	. 25804	. 05776	7	. 94224	6
55	9. 68443	23	10. 31557	9. 74226	30	10. 25774	10. 05783	7	9. 94217	5
56	. 68466	23	. 31534	. 74256	30	. 25744	. 05790	7	. 94210	4
57	. 68489	23	. 31511	. 74286	30	. 25714	. 05797	7	. 94203	3
58	. 68512	23	. 31488	. 74316	29	. 25684	. 05804	7	. 94196	2
59	. 68534	22	. 31466	. 74345	30	. 25655	. 05811	7	. 94189	1
60	9. 68557	23	10. 31443	9. 74375		10. 25625	10. 05818		9. 94182	0
↑ 118° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	← 61° ↑

29° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 150° ↓
0	9. 68557	23	10. 31443	9. 74375	30	10. 25625	10. 05818	7	9. 94182	60
1	. 68580	23	. 31420	. 74405	30	. 25595	. 05825	7	. 94175	59
2	. 68603	22	. 31397	. 74435	30	. 25565	. 05832	7	. 94168	58
3	. 68625	23	. 31375	. 74465	29	. 25535	. 05839	7	. 94161	57
4	. 68648	23	. 31352	. 74494	30	. 25506	. 05846	7	. 94154	56
5	9. 68671	23	10. 31329	9. 74524	30	10. 25476	10. 05853	7	9. 94147	55
6	. 68694	22	. 31306	. 74554	29	. 25446	. 05860	7	. 94140	54
7	. 68716	23	. 31284	. 74583	30	. 25417	. 05867	7	. 94133	53
8	. 68739	23	. 31261	. 74613	30	. 25387	. 05874	7	. 94126	52
9	. 68762	22	. 31238	. 74643	30	. 25357	. 05881	7	. 94119	51
10	9. 68784	23	10. 31216	9. 74673	29	10. 25327	10. 05888	7	9. 94112	50
11	. 68807	22	. 31193	. 74702	30	. 25298	. 05895	7	. 94105	49
12	. 68829	23	. 31171	. 74732	30	. 25268	. 05902	8	. 94098	48
13	. 68852	23	. 31148	. 74762	29	. 25238	. 05910	7	. 94090	47
14	. 68875	22	31125	. 74791	30	. 25209	. 05917	7	. 94083	46
15	9. 68897	23	10. 31103	9. 74821	30	10. 25179	10. 05924	7	9. 94076	45
16	. 68920	22	. 31080	. 74851	29	. 25140	. 05931	7	. 94069	44
17	. 68942	23	. 31058	. 74880	30	. 25120	. 05938	7	. 94062	43
18	. 68965	22	. 31035	. 74910	29	. 25090	. 05945	7	. 94055	42
19	. 68987	23	. 31013	. 74939	30	. 25061	. 05952	7	. 94048	41
20	9. 69010	22	10. 30990	9. 74969	29	10. 25031	10. 05959	7	9. 94041	40
21	. 69032	23	. 30968	. 74998	30	. 25002	. 05966	7	. 94034	39
22	. 69055	22	. 30945	. 75028	30	. 24972	. 05973	7	. 94027	38
23	. 69077	23	. 30923	. 75058	29	. 24942	. 05980	8	. 94020	37
24	. 69100	22	. 30900	. 75087	30	. 24913	. 05988	7	. 94012	36
25	9. 69122	22	10. 30878	9. 75117	29	10. 24883	10. 05995	7	9. 94005	35
26	. 69144	23	. 30856	. 75146	30	. 24854	. 06002	7	. 93998	34
27	. 69167	22	. 30833	. 75176	29	. 24824	. 06009	7	. 93991	33
28	. 69189	23	. 30811	. 75205	30	. 24795	. 06016	7	. 93984	32
29	. 69212	22	. 30788	. 75235	29	. 24765	. 06023	7	. 93977	31
30	9. 69234	22	10. 30766	9. 75264	30	10. 24736	10. 06030	7	9. 93970	30
31	. 69256	23	. 30744	. 75294	29	. 24706	. 06037	8	. 93963	29
32	. 69279	22	. 30721	. 75323	30	. 24677	. 06045	7	. 93955	28
33	. 69301	22	. 30699	. 75353	29	. 24647	. 06052	7	. 93948	27
34	. 69323	22	. 30677	. 75382	29	. 24618	. 06059	7	. 93941	26
35	9. 69345	23	10. 30655	9. 75411	30	10. 24589	10. 06066	7	9. 93934	25
36	. 69368	22	. 30632	. 75441	29	. 24559	. 06073	7	. 93927	24
37	. 69390	22	. 30610	. 75470	30	. 24530	. 06080	8	. 93920	23
38	. 69412	22	. 30588	. 75500	29	. 24500	. 06088	7	. 93912	22
39	. 69434	22	. 30566	. 75529	29	. 24471	. 06095	7	. 93905	21
40	9. 69456	23	10. 30544	9. 75558	30	10. 24442	10. 06102	7	9. 93898	20
41	. 69479	22	. 30521	. 75588	29	. 24412	. 06109	7	. 93891	19
42	. 69501	22	. 30499	. 75617	30	. 24383	. 06116	8	. 93884	18
43	. 69523	22	. 30477	. 75647	29	. 24353	. 06124	7	. 93876	17
44	. 69545	22	. 30455	. 75676	29	. 24324	. 06131	7	. 93869	16
45	9. 69567	22	10. 30433	9. 75705	30	10. 24295	10. 06138	7	9. 93862	15
46	. 69589	22	. 30411	. 75735	29	. 24265	. 06145	8	. 93855	14
47	. 69611	22	. 30389	. 75764	29	. 24236	. 06153	7	. 93847	13
48	. 69633	22	. 30367	. 75793	29	. 24207	. 06160	7	. 93840	12
49	. 69655	22	. 30345	. 75822	30	. 24178	. 06167	7	. 93833	11
50	9. 69677	22	10. 30323	9. 75852	29	10. 24148	10. 06174	7	9. 93826	10
51	. 69699	22	. 30301	. 75881	29	. 24119	. 06181	8	. 93819	9
52	. 69721	22	. 30279	. 75910	29	. 24090	. 06189	7	. 93811	8
53	. 69743	22	. 30257	. 75939	30	. 24061	. 06196	7	. 93804	7
54	. 69765	22	. 30235	. 75969	29	. 24031	. 06203	8	. 93797	6
55	9. 69787	22	10. 30213	9. 75998	29	10. 24002	10. 06211	7	9. 93789	5
56	. 69809	22	. 30191	. 76027	29	. 23973	. 06218	7	. 93782	4
57	. 69831	22	. 30169	. 76056	30	. 23944	. 06225	7	. 93775	3
58	. 69853	22	. 30147	. 76086	29	. 23914	. 06232	8	. 93768	2
59	. 69875	22	. 30125	. 76115	29	. 23885	. 06240	7	. 93760	1
60	9. 69897	22	10. 30103	9. 76144	29	10. 23856	10. 06247	7	9. 93753	0
↑ 119° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 60°

30° → ′ ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 149° ↓ ′
0	9. 69897		10. 30103	9. 76144		10. 23856	10. 06247		9. 93753 60
1	. 69919	22	. 30081	. 76173	29	. 23827	. 06254	7	. 93746 59
2	. 69941	22	. 30059	. 76202	29	. 23798	. 06262	8	. 93738 58
3	. 69963	22	. 30037	. 76231	29	. 23769	. 06269	7	. 93731 57
4	. 69984	21	. 30016	. 76261	30	. 23739	. 06276	7	. 93724 56
5	9. 70006	22	10. 29994	9. 76290	29	10. 23710	10. 06283	7	9. 93717 55
6	. 70028	22	. 29972	. 76319	29	. 23681	. 06291	8	. 93709 54
7	. 70050	22	. 29950	. 76348	29	. 23652	. 06298	7	. 93702 53
8	. 70072	21	. 29928	. 76377	29	. 23623	. 06305	7	. 93695 52
9	. 70093	22	. 29907	. 76406	29	. 23594	. 06313	8	. 93687 51
10	9. 70115	22	10. 29885	9. 76435	29	10. 23565	10. 06320	7	9. 93680 50
11	. 70137	22	. 29863	. 76464	29	. 23536	. 06327	7	. 93673 49
12	. 70159	22	. 29841	. 76493	29	. 23507	. 06335	8	. 93665 48
13	. 70180	21	. 29820	. 76522	29	. 23478	. 06342	7	. 93658 47
14	. 70202	22	. 29798	. 76551	29	. 23449	. 06350	8	. 93650 46
15	9. 70224	22	10. 29776	9. 76580	29	10. 23420	10. 06357	7	9. 93643 45
16	. 70245	21	. 29755	. 76609	30	. 23391	. 06364	7	. 93636 44
17	. 70267	22	. 29733	. 76639	29	. 23361	. 06372	8	. 93628 43
18	. 70288	21	. 29712	. 76668	29	. 23332	. 06379	7	. 93621 42
19	. 70310	22	. 29690	. 76697	28	. 23303	. 06386	7	. 93614 41
20	9. 70332	22	10. 29668	9. 76725	29	10. 23275	10. 06394	8	9. 93606 40
21	. 70353	21	. 29647	. 76754	29	. 23246	. 06401	7	. 93599 39
22	. 70375	22	. 29625	. 76783	29	. 23217	. 06409	8	. 93591 38
23	. 70396	21	. 29604	. 76812	29	. 23188	. 06416	7	. 93584 37
24	. 70418	22	. 29582	. 76841	29	. 23159	. 06423	7	. 93577 36
25	9. 70439	21	10. 29561	9. 76870	29	10. 23130	10. 06431	8	9. 93569 35
26	. 70461	22	. 29539	. 76899	29	. 23101	. 06438	7	. 93562 34
27	. 70482	21	. 29518	. 76928	29	. 23072	. 06446	8	. 93554 33
28	. 70504	22	. 29496	. 76957	29	. 23043	. 06453	7	. 93547 32
29	. 70525	21	. 29475	. 76986	29	. 23014	. 06461	8	. 93539 31
30	9. 70547	22	10. 29453	9. 77015	29	10. 22985	10. 06468	7	9. 93532 30
31	. 70568	21	. 29432	. 77044	29	. 22956	. 06475	7	. 93525 29
32	. 70590	22	. 29410	. 77073	28	. 22927	. 06483	8	. 93517 28
33	. 70611	21	. 29389	. 77101	29	. 22899	. 06490	7	. 93510 27
34	. 70633	22	. 29367	. 77130	29	. 22870	. 06498	8	. 93502 26
35	9. 70654	21	10. 29346	9. 77159	29	10. 22841	10. 06505	7	9. 93495 25
36	. 70675	21	. 29325	. 77188	29	. 22812	. 06513	8	. 93487 24
37	. 70697	22	. 29303	. 77217	29	. 22783	. 06520	7	. 93480 23
38	. 70718	21	. 29282	. 77246	28	. 22754	. 06528	8	. 93472 22
39	. 70739	21	. 29261	. 77274	29	. 22726	. 06535	7	. 93465 21
40	9. 70761	22	10. 29239	9. 77303	29	10. 22697	10. 06543	8	9. 93457 20
41	. 70782	21	. 29218	. 77332	29	. 22668	. 06550	7	. 93450 19
42	. 70803	21	. 29197	. 77361	29	. 22639	. 06558	8	. 93442 18
43	. 70824	21	. 29176	. 77390	28	. 22610	. 06565	7	. 93435 17
44	. 70846	22	. 29154	. 77418	29	. 22582	. 06573	8	. 93427 16
45	9. 70867	21	10. 29133	9. 77447	29	10. 22553	10. 06580	7	9. 93420 15
46	. 70888	21	. 29112	. 77476	29	. 22524	. 06588	8	. 93412 14
47	. 70909	21	. 29091	. 77505	28	. 22495	. 06595	7	. 93405 13
48	. 70931	22	. 29069	. 77533	29	. 22467	. 06603	8	. 93397 12
49	. 70952	21	. 29048	. 77562	29	. 22438	. 06610	7	. 93390 11
50	9. 70973	21	10. 29027	9. 77591	28	10. 22409	10. 06618	8	9. 93382 10
51	. 70994	21	. 29006	. 77619	29	. 22381	. 06625	7	. 93375 9
52	. 71015	21	. 28985	. 77648	29	. 22352	. 06633	8	. 93367 8
53	. 71036	22	. 28964	. 77677	29	. 22323	. 06640	7	. 93360 7
54	. 71058	21	. 28942	. 77706	28	. 22294	. 06648	8	. 93352 6
55	9. 71079	21	10. 28921	9. 77734	29	10. 22266	10. 06656	8	9. 93344 5
56	. 71100	21	. 28900	. 77763	28	. 22237	. 06663	7	. 93337 4
57	. 71121	21	. 28879	. 77791	29	. 22209	. 06671	8	. 93329 3
58	. 71142	21	. 28858	. 77820	29	. 22180	. 06678	7	. 93322 2
59	. 71163	21	. 28837	. 77849	28	. 22151	. 06686	8	. 93314 1
60	9. 71184	21	10. 28816	9. 77877		10. 22123	10. 06693	7	9. 93307 0
120° → ↑ ′	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin ← 59° ↑

31° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 148° ↓	
′										
0	9. 71184	21	10. 28816	9. 77877	29	10. 22123	10. 06693	8	9. 93307	60
1	. 71205	21	. 28795	. 77906	29	. 22094	. 06701	8	. 93299	59
2	. 71226	21	. 28774	. 77935	28	. 22065	. 06709	7	. 93291	58
3	. 71247	21	. 28753	. 77963	29	. 22037	. 06716	8	. 93284	57
4	. 71268	21	. 28732	. 77992	28	. 22008	. 06724	7	. 93276	56
5	9. 71289	21	10. 28711	9. 78020	29	10. 21980	10. 06731	8	9. 93269	55
6	. 71310	21	. 28690	. 78049	28	. 21951	. 06739	8	. 93261	54
7	. 71331	21	. 28669	. 78077	29	. 21923	. 06747	7	. 93253	53
8	. 71352	21	. 28648	. 78106	29	. 21894	. 06754	8	. 93246	52
9	. 71373	20	. 28627	. 78135	28	. 21865	. 06762	8	. 93238	51
10	9. 71393	21	10. 28607	9. 78163	29	10. 21837	10. 06770	7	9. 93230	50
11	. 71414	21	. 28586	. 78192	28	. 21808	. 06777	8	. 93223	49
12	. 71435	21	. 28565	. 78220	29	. 21780	. 06785	8	. 93215	48
13	. 71456	21	. 28544	. 78249	28	. 21751	. 06793	7	. 93207	47
14	. 71477	21	. 28523	. 78277	29	. 21723	. 06800	8	. 93200	46
15	9. 71498	21	10. 28502	9. 78306	28	10. 21694	10. 06808	8	9. 93192	45
16	. 71519	20	. 28481	. 78334	29	. 21666	. 06816	7	. 93184	44
17	. 71539	21	. 28461	. 78363	28	. 21637	. 06823	8	. 93177	43
18	. 71560	21	. 28440	. 78391	28	. 21609	. 06831	8	. 93169	42
19	. 71581	21	. 28419	. 78419	29	. 21581	. 06839	7	. 93161	41
20	9. 71602	20	10. 28398	9. 78448	28	10. 21552	10. 06846	8	9. 93154	40
21	. 71622	21	. 28378	. 78476	29	. 21524	. 06854	8	. 93146	39
22	. 71643	21	. 28357	. 78505	28	. 21495	. 06862	7	. 93138	38
23	. 71664	21	. 28336	. 78533	29	. 21467	. 06869	8	. 93131	37
24	. 71685	20	. 28315	. 78562	28	. 21438	. 06877	8	. 93123	36
25	9. 71705	21	10. 28295	9. 78590	28	10. 21410	10. 06885	7	9. 93115	35
26	. 71726	21	. 28274	. 78618	29	. 21382	. 06892	8	. 93108	34
27	. 71747	20	. 28253	. 78647	28	. 21353	. 06900	8	. 93100	33
28	. 71767	21	. 28233	. 78675	29	. 21325	. 06908	8	. 93092	32
29	. 71788	21	. 28212	. 78704	28	. 21296	. 06916	7	. 93084	31
30	9. 71809	20	10. 28191	9. 78732	28	10. 21268	10. 06923	8	9. 93077	30
31	. 71829	21	. 28171	. 78760	29	. 21240	. 06931	8	. 93069	29
32	. 71850	20	. 28150	. 78789	28	. 21211	. 06939	8	. 93061	28
33	. 71870	21	. 28130	. 78817	28	. 21183	. 06947	7	. 93053	27
34	. 71891	20	. 28109	. 78845	29	. 21155	. 06954	8	. 93046	26
35	9. 71911	21	10. 28089	9. 78874	28	10. 21126	10. 06962	8	9. 93038	25
36	. 71932	20	. 28068	. 78902	28	. 21098	. 06970	8	. 93030	24
37	. 71952	21	. 28048	. 78930	29	. 21070	. 06978	8	. 93022	23
38	. 71973	21	. 28027	. 78959	28	. 21041	. 06986	7	. 93014	22
39	. 71994	20	. 28006	. 78987	28	. 21013	. 06993	8	. 93007	21
40	9. 72014	20	10. 27986	9. 79015	28	10. 20985	10. 07001	8	9. 92999	20
41	. 72034	21	. 27966	. 79043	29	. 20957	. 07009	8	. 92991	19
42	. 72055	20	. 27945	. 79072	28	. 20928	. 07017	7	. 92983	18
43	. 72075	21	. 27925	. 79100	28	. 20900	. 07024	8	. 92976	17
44	. 72096	20	. 27904	. 79128	28	. 20872	. 07032	8	. 92968	16
45	9. 72116	21	10. 27884	9. 79156	29	10. 20844	10. 07040	8	9. 92960	15
46	. 72137	20	. 27863	. 79185	28	. 20815	. 07048	8	. 92952	14
47	. 72157	20	. 27843	. 79213	28	. 20787	. 07056	8	. 92944	13
48	. 72177	21	. 27823	. 79241	28	. 20759	. 07064	7	. 92936	12
49	. 72198	20	. 27802	. 79269	28	. 20731	. 07071	8	. 92929	11
50	9. 72218	20	10. 27782	9. 79297	29	10. 20703	10. 07079	8	9. 92921	10
51	. 72238	21	. 27762	. 79326	28	. 20674	. 07087	8	. 92913	9
52	. 72259	20	. 27741	. 79354	28	. 20646	. 07095	8	. 92905	8
53	. 72279	20	. 27721	. 79382	28	. 20618	. 07103	8	. 92897	7
54	. 72299	21	. 27701	. 79410	28	. 20590	. 07111	8	. 92889	6
55	9. 72320	20	10. 27680	9. 79438	28	10. 20562	10. 07119	7	9. 92881	5
56	. 72340	20	. 27660	. 79466	29	. 20534	. 07126	8	. 92874	4
57	. 72360	21	. 27640	. 79495	28	. 20505	. 07134	8	. 92866	3
58	. 72381	20	. 27619	. 79523	28	. 20477	. 07142	8	. 92858	2
59	. 72401	20	. 27599	. 79551	28	. 20449	. 07150	8	. 92850	1
60	9. 72421		10. 27579	9. 79579		10. 20421	10. 07158		9. 92842	0
↑ 121° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin ← 58° ↑	

Logarithms of Trigonometric Functions

32° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 147° ↓
′										′
0	9. 72421	20	10. 27579	9. 79579	28	10. 20421	10. 07158	8	9. 92842	60
1	. 72441	20	. 27559	. 79607	28	. 20393	. 07166	8	. 92834	59
2	. 72461	21	. 27539	. 79635	28	. 20365	. 07174	8	. 92826	58
3	. 72482	20	. 27518	. 79663	28	. 20337	. 07182	8	. 92818	57
4	. 72502	20	. 27498	. 79691	28	. 20309	. 07190	7	. 92810	56
5	9. 72522	20	10. 27478	9. 79719	28	10. 20281	10. 07197	8	9. 92803	55
6	. 72542	20	. 27458	. 79747	29	. 20253	. 07205	8	. 92795	54
7	. 72562	20	. 27438	. 79776	28	. 20224	. 07213	8	. 92787	53
8	. 72582	20	. 27418	. 79804	28	. 20196	. 07221	8	. 92779	52
9	. 72602	20	. 27398	. 79832	28	. 20168	. 07229	8	. 92771	51
10	9. 72622	21	10. 27378	9. 79860	28	10. 20140	10. 07237	8	9. 92763	50
11	. 72643	20	. 27357	. 79888	28	. 20112	. 07245	8	. 92755	49
12	. 72663	20	. 27337	. 79916	28	. 20084	. 07253	8	. 92747	48
13	. 72683	20	. 27317	. 79944	28	. 20056	. 07261	8	. 92739	47
14	. 72703	20	. 27297	. 79972	28	. 20028	. 07269	8	. 92731	46
15	9. 72723	20	10. 27277	9. 80000	28	10. 20000	10. 07277	8	9. 92723	45
16	. 72743	20	. 27257	. 80028	28	. 19972	. 07285	8	. 92715	44
17	. 72763	20	. 27237	. 80056	28	. 19944	. 07293	8	. 92707	43
18	. 72783	20	. 27217	. 80084	28	. 19916	. 07301	8	. 92699	42
19	. 72803	20	. 27197	. 80112	28	. 19888	. 07309	8	. 92691	41
20	9. 72823	20	10. 27177	9. 80140	28	10. 19860	10. 07317	8	9. 92683	40
21	. 72843	20	. 27157	. 80168	27	. 19832	. 07325	8	. 92675	39
22	. 72863	20	. 27137	. 80195	28	. 19805	. 07333	8	. 92667	38
23	. 72883	19	. 27117	. 80223	28	. 19777	. 07341	8	. 92659	37
24	. 72902	20	. 27098	. 80251	28	. 19749	. 07349	8	. 92651	36
25	9. 72922	20	10. 27078	9. 80279	28	10. 19721	10. 07357	8	9. 92643	35
26	. 72942	20	. 27058	. 80307	28	. 19693	. 07365	8	. 92635	34
27	. 72962	20	. 27038	. 80335	28	. 19665	. 07373	8	. 92627	33
28	. 72982	20	. 27018	. 80363	28	. 19637	. 07381	8	. 92619	32
29	. 73002	20	. 26998	. 80391	28	. 19609	. 07389	8	. 92611	31
30	9. 73022	19	10. 26978	9. 80419	28	10. 19581	10. 07397	8	9. 92603	30
31	. 73041	20	. 26959	. 80447	27	. 19553	. 07405	8	. 92595	29
32	. 73061	20	. 26939	. 80474	28	. 19526	. 07413	8	. 92587	28
33	. 73081	20	. 26919	. 80502	28	. 19498	. 07421	8	. 92579	27
34	. 73101	20	. 26899	. 80530	28	. 19470	. 07429	8	. 92571	26
35	9. 73121	19	10. 26879	9. 80558	28	10. 19442	10. 07437	8	9. 92563	25
36	. 73140	20	. 26860	. 80586	28	. 19414	. 07445	9	. 92555	24
37	. 73160	20	. 26840	. 80614	28	. 19386	. 07454	8	. 92546	23
38	. 73180	20	. 26820	. 80642	27	. 19358	. 07462	8	. 92538	22
39	. 73200	19	. 26800	. 80669	28	. 19331	. 07470	8	. 92530	21
40	9. 73219	20	10. 26781	9. 80697	28	10. 19303	10. 07478	8	9. 92522	20
41	. 73239	20	. 26761	. 80725	28	. 19275	. 07486	8	. 92514	19
42	. 73259	19	. 26741	. 80753	28	. 19247	. 07494	8	. 92506	18
43	. 73278	20	. 26722	. 80781	27	. 19219	. 07502	8	. 92498	17
44	. 73298	20	. 26702	. 80808	28	. 19192	. 07510	8	. 92490	16
45	9. 73318	19	10. 26682	9. 80836	28	10. 19164	10. 07518	9	9. 92482	15
46	. 73337	20	. 26663	. 80864	28	. 19136	. 07527	8	. 92473	14
47	. 73357	20	. 26643	. 80892	27	. 19108	. 07535	8	. 92465	13
48	. 73377	19	. 26623	. 80919	28	. 19081	. 07543	8	. 92457	12
49	. 73396	20	. 26604	. 80947	28	. 19053	. 07551	8	. 92449	11
50	9. 73416	19	10. 26584	9. 80975	28	10. 19025	10. 07559	8	9. 92441	10
51	. 73435	20	. 26565	. 81003	27	. 18997	. 07567	8	. 92433	9
52	. 73455	19	. 26545	. 81030	28	. 18970	. 07575	8	. 92425	8
53	. 73474	20	. 26526	. 81058	28	. 18942	. 07584	9	. 92416	7
54	. 73494	19	. 26506	. 81086	27	. 18914	. 07592	8	. 92408	6
55	9. 73513	20	10. 26487	9. 81113	28	10. 18887	10. 07600	8	9. 92400	5
56	. 73533	19	. 26467	. 81141	28	. 18859	. 07608	8	. 92392	4
57	. 73552	20	. 26448	. 81169	27	. 18831	. 07616	8	. 92384	3
58	. 73572	19	. 26428	. 81196	28	. 18804	. 07624	9	. 92376	2
59	. 73591	20	. 26409	. 81224	28	. 18776	. 07633	8	. 92367	1
60	9. 73611		10. 26389	9. 81252		10. 18748	10. 07641		9. 92359	0
↑ 122° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 57°

33° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 146° ↓
0	9. 73611	19	10. 26389	9. 81252	27	10. 18748	10. 07641	8	9. 92359	60
1	. 73630	20	. 26370	. 81279	28	. 18721	. 07649	8	. 92351	59
2	. 73650	19	. 26350	. 81307	28	. 18693	. 07657	8	. 92343	58
3	. 73669	20	. 26331	. 81335	27	. 18665	. 07665	9	. 92335	57
4	. 73689	19	. 26311	. 81362	28	. 18638	. 07674	8	. 92326	56
5	9. 73708	19	10. 26292	9. 81390	28	10. 18610	10. 07682	8	9. 92318	55
6	. 73727	20	. 26273	. 81418	27	. 18582	. 07690	8	. 92310	54
7	. 73747	19	. 26253	. 81445	28	. 18555	. 07698	9	. 92302	53
8	. 73766	19	. 26234	. 81473	27	. 18527	. 07707	8	. 92293	52
9	. 73785	20	. 26215	. 81500	28	. 18500	. 07715	8	. 92285	51
10	9. 73805	19	10. 26195	9. 81528	28	10. 18472	10. 07723	8	9. 92277	50
11	. 73824	19	. 26176	. 81556	27	. 18444	. 07731	9	. 92269	49
12	. 73843	20	. 26157	. 81583	28	. 18417	. 07740	8	. 92260	48
13	. 73863	19	. 26137	. 81611	27	. 18389	. 07748	8	. 92252	47
14	. 73882	19	. 26118	. 81638	28	. 18362	. 07756	9	. 92244	46
15	9. 73901	20	10. 26099	9. 81666	27	10. 18334	10. 07765	8	9. 92235	45
16	. 73921	19	. 26079	. 81693	28	. 18307	. 07773	8	. 92227	44
17	. 73940	19	. 26060	. 81721	27	. 18279	. 07781	8	. 92219	43
18	. 73959	19	. 26041	. 81748	28	. 18252	. 07789	9	. 92211	42
19	. 73978	19	. 26022	. 81776	27	. 18224	. 07798	8	. 92202	41
20	9. 73997	20	10. 26003	9. 81803	28	10. 18197	10. 07806	8	9. 92194	40
21	. 74017	19	. 25983	. 81831	27	. 18169	. 07814	9	. 92186	39
22	. 74036	19	. 25964	. 81858	28	. 18142	. 07823	8	. 92177	38
23	. 74055	19	. 25945	. 81886	27	. 18114	. 07831	8	. 92169	37
24	. 74074	19	. 25926	. 81913	28	. 18087	. 07839	9	. 92161	36
25	9. 74093	20	10. 25907	9. 81941	27	10. 18059	10. 07848	8	9. 92152	35
26	. 74113	19	. 25887	. 81968	28	. 18032	. 07856	8	. 92144	34
27	. 74132	19	. 25868	. 81996	27	. 18004	. 07864	9	. 92136	33
28	. 74151	19	. 25849	. 82023	28	. 17977	. 07873	8	. 92127	32
29	. 74170	19	. 25830	. 82051	27	. 17949	. 07881	8	. 92119	31
30	9. 74189	19	10. 25811	9. 82078	28	10. 17922	10. 07889	9	9. 92111	30
31	. 74208	19	. 25792	. 82106	27	. 17894	. 07898	8	. 92102	29
32	. 74227	19	. 25773	. 82133	28	. 17867	. 07906	8	. 92094	28
33	. 74246	19	. 25754	. 82161	27	. 17839	. 07914	9	. 92086	27
34	. 74265	19	. 25735	. 82188	27	. 17812	. 07923	8	. 92077	26
35	9. 74284	19	10. 25716	9. 82215	28	10. 17785	10. 07931	9	9. 92069	25
36	. 74303	19	. 25697	. 82243	27	. 17757	. 07940	8	. 92060	24
37	. 74322	19	. 25678	. 82270	28	. 17730	. 07948	8	. 92052	23
38	. 74341	19	. 25659	. 82298	27	. 17702	. 07956	9	. 92044	22
39	. 74360	19	. 25640	. 82325	27	. 17675	. 07965	8	. 92035	21
40	9. 74379	19	10. 25621	9. 82352	28	10. 17648	10. 07973	9	9. 92027	20
41	. 74398	19	. 25602	. 82380	27	. 17620	. 07982	8	. 92018	19
42	. 74417	19	. 25583	. 82407	28	. 17593	. 07990	8	. 92010	18
43	. 74436	19	. 25564	. 82435	27	. 17565	. 07998	9	. 92002	17
44	. 74455	19	. 25545	. 82462	27	. 17538	. 08007	8	. 91993	16
45	9. 74474	19	10. 25526	9. 82489	28	10. 17511	10. 08015	9	9. 91985	15
46	. 74493	19	. 25507	. 82517	27	. 17483	. 08024	8	. 91976	14
47	. 74512	19	. 25488	. 82544	27	. 17456	. 08032	9	. 91968	13
48	. 74531	18	. 25469	. 82571	28	. 17429	. 08041	8	. 91959	12
49	. 74549	19	. 25451	. 82599	27	. 17401	. 08049	9	. 91951	11
50	9. 74568	19	10. 25432	9. 82626	27	10. 17374	10. 08058	8	9. 91942	10
51	. 74587	19	. 25413	. 82653	28	. 17347	. 08066	9	. 91934	9
52	. 74606	19	. 25394	. 82681	27	. 17319	. 08075	8	. 91925	8
53	. 74625	19	. 25375	. 82708	27	. 17292	. 08083	9	. 91917	7
54	. 74644	18	. 25356	. 82735	27	. 17265	. 08092	8	. 91908	6
55	9. 74662	19	10. 25338	9. 82762	28	10. 17238	10. 08100	9	9. 91900	5
56	. 74681	19	. 25319	. 82790	27	. 17210	. 08109	8	. 91891	4
57	. 74700	19	. 25300	. 82817	27	. 17183	. 08117	9	. 91883	3
58	. 74719	18	. 25281	. 82844	27	. 17156	. 08126	8	. 91874	2
59	. 74737	19	. 25263	. 82871	28	. 17129	. 08134	9	. 91866	1
60	9. 74750		10. 25244	9. 82899		10. 17101	10. 08143		9. 91857	0
↑ 123° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 56°

34° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 145° ↓	
′										′
0	9. 74756	19	10. 25244	9. 82899	27	10. 17101	10. 08143	8	9. 91857	60
1	. 74775	19	. 25225	. 82926	27	. 17074	. 08151	9	. 91849	59
2	. 74794	18	. 25206	. 82953	27	. 17047	. 08160	8	. 91840	58
3	. 74812	19	. 25188	. 82980	28	. 17020	. 08168	9	. 91832	57
4	. 74831	19	. 25169	. 83008	27	. 16992	. 08177	8	. 91823	56
5	9. 74850	18	10. 25150	9. 83035	27	10. 16965	10. 08185	9	9. 91815	55
6	. 74868	19	. 25132	. 83062	27	. 16938	. 08194	8	. 91806	54
7	. 74887	19	. 25113	. 83089	28	. 16911	. 08202	9	. 91798	53
8	. 74906	18	. 25094	. 83117	27	. 16883	. 08211	8	. 91789	52
9	. 74924	19	. 25076	. 83144	27	. 16856	. 08219	9	. 91781	51
10	9. 74943	18	10. 25057	9. 83171	27	10. 16829	10. 08228	9	9. 91772	50
11	. 74961	19	. 25039	. 83198	27	. 16802	. 08237	8	. 91763	49
12	. 74980	19	. 25020	. 83225	27	. 16775	. 08245	9	. 91755	48
13	. 74999	18	. 25001	. 83252	28	. 16748	. 08254	8	. 91746	47
14	. 75017	19	. 24983	. 83280	27	. 16720	. 08262	9	. 91738	46
15	9. 75036	18	10. 24964	9. 83307	27	10. 16693	10. 08271	9	9. 91729	45
16	. 75054	19	. 24946	. 83334	27	. 16666	. 08280	8	. 91720	44
17	. 75073	18	. 24927	. 83361	27	. 16639	. 08288	9	. 91712	43
18	9. 75091	19	. 24909	. 83388	27	. 16612	. 08297	8	. 91703	42
19	. 75110	18	. 24890	. 83415	27	. 16585	. 08305	9	. 91695	41
20	9. 75128	19	10. 24872	9. 83442	28	10. 16558	10. 08314	9	9. 91686	40
21	. 75147	18	. 24853	. 83470	27	. 16530	. 08323	8	. 91677	39
22	. 75165	19	. 24835	. 83497	27	. 16503	. 08331	9	. 91669	38
23	. 75184	18	. 24816	. 83524	27	. 16476	. 08340	9	. 91660	37
24	. 75202	19	. 24798	. 83551	27	. 16449	. 08349	8	. 91651	36
25	9. 75221	18	10. 24779	9. 83578	27	10. 16422	10. 08357	9	9. 91643	35
26	. 75239	19	. 24761	. 83605	27	. 16395	. 08366	9	. 91634	34
27	. 75258	18	. 24742	. 83632	27	. 16368	. 08375	8	. 91625	33
28	. 75276	18	. 24724	. 83659	27	. 16341	. 08383	9	. 91617	32
29	. 75294	19	. 24706	. 83686	27	. 16314	. 08392	9	. 91608	31
30	9. 75313	18	10. 24687	9. 83713	27	10. 16287	10. 08401	8	9. 91599	30
31	. 75331	19	. 24669	. 83740	28	. 16260	. 08409	9	. 91591	29
32	. 75350	18	. 24650	. 83768	27	. 16232	. 08418	9	. 91582	28
33	. 75368	18	. 24632	. 83795	27	. 16205	. 08427	8	. 91573	27
34	. 75386	19	. 24614	. 83822	27	. 16178	. 08435	9	. 91565	26
35	9. 75405	18	10. 24595	9. 83849	27	10. 16151	10. 08444	9	9. 91556	25
36	. 75423	18	. 24577	. 83876	27	. 16124	. 08453	9	. 91547	24
37	. 75441	18	. 24559	. 83903	27	. 16097	. 08462	8	. 91538	23
38	. 75459	19	. 24541	. 83930	27	. 16070	. 08470	9	. 91530	22
39	. 75478	18	. 24522	. 83957	27	. 16043	. 08479	9	. 91521	21
40	9. 75496	18	10. 24504	9. 83984	27	10. 16016	10. 08488	8	9. 91512	20
41	. 75514	19	. 24486	. 84011	27	. 15989	. 08496	9	. 91504	19
42	. 75533	18	. 24467	. 84038	27	. 15962	. 08505	9	. 91495	18
43	. 75551	18	. 24449	. 84065	27	. 15935	. 08514	9	. 91486	17
44	. 75569	18	. 24431	. 84092	27	. 15908	. 08523	9	. 91477	16
45	9. 75587	18	10. 24413	9. 84119	27	10. 15881	10. 08531	8	9. 91469	15
46	. 75605	19	. 24395	. 84146	27	. 15854	. 08540	9	. 91460	14
47	. 75624	18	. 24376	. 84173	27	. 15827	. 08549	9	. 91451	13
48	. 75642	18	. 24358	. 84200	27	. 15800	. 08558	9	. 91442	12
49	. 75660	18	. 24340	. 84227	27	. 15773	. 08567	9	. 91433	11
50	9. 75678	18	10. 24322	9. 84254	26	10. 15746	10. 08575	8	9. 91425	10
51	. 75696	18	. 24304	. 84280	27	. 15720	. 08584	9	. 91416	9
52	. 75714	18	. 24286	. 84307	27	. 15693	. 08593	9	. 91407	8
53	. 75733	19	. 24267	. 84334	27	. 15666	. 08602	9	. 91398	7
54	. 75751	18	. 24249	. 84361	27	. 15639	. 08611	9	. 91389	6
55	9. 75769	18	10. 24231	9. 84388	27	10. 15612	10. 08619	8	9. 91381	5
56	. 75787	18	. 24213	. 84415	27	. 15585	. 08628	9	. 91372	4
57	. 75805	18	. 24195	. 84442	27	. 15558	. 08637	9	. 91363	3
58	. 75823	18	. 24177	. 84469	27	. 15531	. 08646	9	. 91354	2
59	. 75841	18	. 24159	. 84496	27	. 15504	. 08655	9	. 91345	1
60	9. 75859	18	10. 24141	9. 84523	27	10. 15477	10. 08664	9	9. 91336	0
↑ 124° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin ← 55° ↑	

35° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 144° ↓	
0	9. 75859	18	10. 24141	9. 84523	27	10. 15477	10. 08664	8	9. 91336	60
1	. 75877	18	. 24123	. 84550	26	. 15450	. 08672	9	. 91328	59
2	. 75895	18	. 24105	. 84576	27	. 15424	. 08681	9	. 91319	58
3	. 75913	18	. 24087	. 84603	27	. 15397	. 08690	9	. 91310	57
4	. 75931	18	. 24069	. 84630	27	. 15370	. 08699	9	. 91301	56
5	9. 75949	18	10. 24051	9. 84657	27	10. 15343	10. 08708	9	9. 91292	55
6	. 75967	18	. 24033	. 84684	27	. 15316	. 08717	9	. 91283	54
7	. 75985	18	. 24015	. 84711	27	. 15289	. 08726	9	. 91274	53
8	. 76003	18	. 23997	. 84738	26	. 15262	. 08734	8	. 91266	52
9	. 76021	18	. 23979	. 84764	27	. 15236	. 08743	9	. 91257	51
10	9. 76039	18	10. 23961	9. 84791	27	10. 15209	10. 08752	9	9. 91248	50
11	. 76057	18	. 23943	. 84818	27	. 15182	. 08761	9	. 91239	49
12	. 76075	18	. 23925	. 84845	27	. 15155	. 08770	9	. 91230	48
13	. 76093	18	. 23907	. 84872	27	. 15128	. 08779	9	. 91221	47
14	. 76111	18	. 23889	. 84899	26	. 15101	. 08788	9	. 91212	46
15	9. 76129	17	10. 23871	9. 84925	27	10. 15075	10. 08797	9	9. 91203	45
16	. 76146	18	. 23854	. 84952	27	. 15048	. 08806	9	. 91194	44
17	. 76164	18	. 23836	. 84979	27	. 15021	. 08815	9	. 91185	43
18	. 76182	18	. 23818	. 85006	27	. 14994	. 08824	9	. 91176	42
19	. 76200	18	. 23800	. 85033	26	. 14967	. 08833	9	. 91167	41
20	9. 76218	18	10. 23782	9. 85059	27	10. 14941	10. 08842	9	9. 91158	40
21	. 76236	17	. 23764	. 85086	27	. 14914	. 08851	8	. 91149	39
22	. 76253	18	. 23747	. 85113	27	. 14887	. 08859	9	. 91141	38
23	. 76271	18	. 23729	. 85140	26	. 14860	. 08868	9	. 91132	37
24	. 76289	18	. 23711	. 85166	27	. 14834	. 08877	9	. 91123	36
25	9. 76307	17	10. 23693	9. 85193	27	10. 14807	10. 08886	9	9. 91114	35
26	. 76324	18	. 23676	. 85220	27	. 14780	. 08895	9	. 91105	34
27	. 76342	18	. 23658	. 85247	26	. 14753	. 08904	9	. 91096	33
28	. 76360	18	. 23640	. 85273	27	. 14727	. 08913	9	. 91087	32
29	. 76378	17	. 23622	. 85300	27	. 14700	. 08922	9	. 91078	31
30	9. 76395	18	10. 23605	9. 85327	27	10. 14673	10. 08931	9	9. 91069	30
31	. 76413	18	. 23587	. 85354	26	. 14646	. 08940	9	. 91060	29
32	. 76431	17	. 23569	. 85380	27	. 14620	. 08949	9	. 91051	28
33	. 76448	18	. 23552	. 85407	27	. 14593	. 08958	9	. 91042	27
34	. 76466	18	. 23534	. 85434	26	. 14566	. 08967	9	. 91033	26
35	9. 76484	17	10. 23516	9. 85460	27	10. 14540	10. 08977	10	9. 91023	25
36	. 76501	18	. 23499	. 85487	27	. 14513	. 08986	9	. 91014	24
37	. 76519	18	. 23481	. 85514	26	. 14486	. 08995	9	. 91005	23
38	. 76537	17	. 23463	. 85540	27	. 14460	. 09004	9	. 90996	22
39	. 76554	18	. 23446	. 85567	27	. 14433	. 09013	9	. 90987	21
40	9. 76572	18	10. 23428	9. 85594	26	10. 14406	10. 09022	9	9. 90978	20
41	. 76590	17	. 23410	. 85620	27	. 14380	. 09031	9	. 90969	19
42	. 76607	18	. 23393	. 85647	27	. 14353	. 09040	9	. 90960	18
43	. 76625	17	. 23375	. 85674	26	. 14326	. 09049	9	. 90951	17
44	. 76642	18	. 23358	. 85700	27	. 14300	. 09058	9	. 90942	16
45	9. 76660	17	10. 23340	9. 85727	27	10. 14273	10. 09067	9	9. 90933	15
46	. 76677	18	. 23323	. 85754	26	. 14246	. 09076	9	. 90924	14
47	. 76695	17	. 23305	. 85780	27	. 14220	. 09085	9	. 90915	13
48	. 76712	18	. 23288	. 85807	27	. 14193	. 09094	10	. 90906	12
49	. 76730	17	. 23270	. 85834	26	. 14166	. 09104	9	. 90896	11
50	9. 76747	18	10. 23253	9. 85860	27	10. 14140	10. 09113	9	9. 90887	10
51	. 76765	17	. 23235	. 85887	26	. 14113	. 09122	9	. 90878	9
52	. 76782	18	. 23218	. 85913	27	. 14087	. 09131	9	. 90869	8
53	. 76800	17	. 23200	. 85940	27	. 14060	. 09140	9	. 90860	7
54	. 76817	18	. 23183	. 85967	26	. 14033	. 09149	9	. 90851	6
55	9. 76835	17	10. 23165	9. 85993	27	10. 14007	10. 09158	10	9. 90842	5
56	. 76852	18	. 23148	. 86020	26	. 13980	. 09168	9	. 90832	4
57	. 76870	17	. 23130	. 86046	27	. 13954	. 09177	9	. 90823	3
58	. 76887	17	. 23113	. 86073	27	. 13927	. 09186	9	. 90814	2
59	. 76904	18	. 23096	. 86100	26	. 13900	. 09195	9	. 90805	1
60	9. 76922		10. 23078	9. 86126		10. 13874	10. 09204		9. 90796	0
↑ 125° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	← 54° ↑

36° → ′	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 143° ′
0	9. 76922	17	10. 23078	9. 86126	27	10. 13874	10. 09204	9	9. 90796 60
1	. 76939	18	. 23061	. 86153	26	. 13847	. 09213	10	. 90787 59
2	. 76957	17	. 23043	. 86179	27	. 13821	. 09223	9	. 90777 58
3	. 76974	17	. 23026	. 86206	26	. 13794	. 09232	9	. 90768 57
4	. 76991	18	. 23009	. 86232	27	. 13768	. 09241	9	. 90759 56
5	9. 77009	17	10. 22991	9. 86259	26	10. 13741	10. 09250	9	9. 90750 55
6	. 77026	17	. 22974	. 86285	27	. 13715	. 09259	10	. 90741 54
7	. 77043	18	. 22957	. 86312	26	. 13688	. 09269	9	. 90731 53
8	. 77061	17	. 22939	. 86338	27	. 13662	. 09278	9	. 90722 52
9	. 77078	17	. 22922	. 86365	27	. 13635	. 09287	9	. 90713 51
10	9. 77095	17	10. 22905	9. 86392	26	10. 13608	10. 09296	10	9. 90704 50
11	. 77112	18	. 22888	. 86418	27	. 13582	. 09306	9	. 90694 49
12	. 77130	17	. 22870	. 86445	26	. 13555	. 09315	9	. 90685 48
13	. 77147	17	. 22853	. 86471	27	. 13529	. 09324	9	. 90676 47
14	. 77164	17	. 22836	. 86498	26	. 13502	. 09333	10	. 90667 46
15	9. 77181	18	10. 22819	9. 86524	27	10. 13476	10. 09343	9	9. 90657 45
16	. 77199	17	. 22801	. 86551	26	. 13449	. 09352	9	. 90648 44
17	. 77216	17	. 22784	. 86577	26	. 13423	. 09361	9	. 90639 43
18	. 77233	17	. 22767	. 86603	27	. 13397	. 09370	10	. 90630 42
19	. 77250	18	. 22750	. 86630	26	. 13370	. 09380	9	. 90620 41
20	9. 77268	17	10. 22732	9. 86656	27	10. 13344	10. 09389	9	9. 90611 40
21	. 77285	17	. 22715	. 86683	26	. 13317	. 09398	10	. 90602 39
22	. 77302	17	. 22698	. 86709	27	. 13291	. 09408	9	. 90592 38
23	. 77319	17	. 22681	. 86736	26	. 13264	. 09417	9	. 90583 37
24	. 77336	17	. 22664	. 86762	27	. 13238	. 09426	9	. 90574 36
25	9. 77353	17	10. 22647	9. 86789	26	10. 13211	10. 09435	10	9. 90565 35
26	. 77370	17	. 22630	. 86815	27	. 13185	. 09445	9	. 90555 34
27	. 77387	18	. 22613	. 86842	26	. 13158	. 09454	9	. 90546 33
28	. 77405	17	. 22595	. 86868	26	. 13132	. 09463	10	. 90537 32
29	. 77422	17	. 22578	. 86894	27	. 13106	. 09473	9	. 90527 31
30	9. 77439	17	10. 22561	9. 86921	26	10. 13079	10. 09482	9	9. 90518 30
31	. 77456	17	. 22544	. 86947	27	. 13053	. 09491	10	. 90509 29
32	. 77473	17	. 22527	. 86974	26	. 13026	. 09501	9	. 90499 28
33	. 77490	17	. 22510	. 87000	27	. 13000	. 09510	10	. 90490 27
34	. 77507	17	. 22493	. 87027	26	. 12973	. 09520	9	. 90480 26
35	9. 77524	17	10. 22476	9. 87053	26	10. 12947	10. 09529	9	9. 90471 25
36	. 77541	17	. 22459	. 87079	27	. 12921	. 09538	10	. 90462 24
37	. 77558	17	. 22442	. 87106	26	. 12894	. 09548	9	. 90452 23
38	. 77575	17	. 22425	. 87132	26	. 12868	. 09557	9	. 90443 22
39	. 77592	17	. 22408	. 87158	27	. 12842	. 09566	10	. 90434 21
40	9. 77609	17	10. 22391	9. 87185	26	10. 12815	10. 09576	9	9. 90424 20
41	. 77626	17	. 22374	. 87211	27	. 12789	. 09585	10	. 90415 19
42	. 77643	17	. 22357	. 87238	26	. 12762	. 09595	9	. 90405 18
43	. 77660	17	. 22340	. 87264	26	. 12736	. 09604	10	. 90396 17
44	. 77677	17	. 22323	. 87290	27	. 12710	. 09614	9	. 90386 16
45	9. 77694	17	10. 22306	9. 87317	26	10. 12683	10. 09623	9	9. 90377 15
46	. 77711	17	. 22289	. 87343	26	. 12657	. 09632	10	. 90368 14
47	. 77728	16	. 22272	. 87369	27	. 12631	. 09642	9	. 90358 13
48	. 77744	17	. 22256	. 87396	26	. 12604	. 09651	10	. 90349 12
49	. 77761	17	. 22239	. 87422	26	. 12578	. 09661	9	. 90339 11
50	9. 77778	17	10. 22222	9. 87448	27	10. 12552	10. 09670	10	9. 90330 10
51	. 77795	17	. 22205	. 87475	26	. 12525	. 09680	9	. 90320 9
52	. 77812	17	. 22188	. 87501	26	. 12499	. 09689	10	. 90311 8
53	. 77829	17	. 22171	. 87527	27	. 12473	. 09699	9	. 90301 7
54	. 77846	16	. 22154	. 87554	26	. 12446	. 09708	10	. 90292 6
55	9. 77862	17	10. 22138	9. 87580	26	10. 12420	10. 09718	9	9. 90282 5
56	. 77879	17	. 22121	. 87606	27	. 12394	. 09727	10	. 90273 4
57	. 77896	17	. 22104	. 87633	26	. 12367	. 09737	9	. 90263 3
58	. 77913	17	. 22087	. 87659	26	. 12341	. 09746	10	. 90254 2
59	. 77930	17	. 22070	. 87685	26	. 12315	. 09756	9	. 90244 1
60	9. 77946	16	10. 22054	9. 87711	26	10. 12289	10. 09765	9	9. 90235 0
↑ 126° → ′	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin ← 53° ↑ ′

37° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 142° ↓
0	9. 77946	17	10. 22054	9. 87711	27	10. 12289	10. 09765	10	9. 90235	60
1	. 77963	17	. 22037	. 87738	26	. 12262	. 09775	9	. 90225	59
2	. 77980	17	. 22020	. 87764	26	. 12236	. 09781	10	. 90216	58
3	. 77997	16	. 22003	. 87790	27	. 12210	. 09794	9	. 90206	57
4	. 78013	17	. 21987	. 87817	26	. 12183	. 09803	10	. 90197	56
5	9. 78030	17	10. 21970	9. 87843	26	10. 12157	10. 09813	9	9. 90187	55
6	. 78047	17	. 21953	. 87869	26	. 12131	. 09822	10	. 90178	54
7	. 78063	16	. 21937	. 87895	27	. 12105	. 09832	9	. 90168	53
8	. 78080	17	. 21920	. 87922	26	. 12078	. 09841	10	. 90159	52
9	. 78097	17	. 21903	. 87948	26	. 12052	. 09851	10	. 90149	51
10	9. 78113	16	10. 21887	9. 87974	26	10. 12026	10. 09861	9	9. 90139	50
11	. 78130	17	. 21870	. 88000	27	. 12000	. 09870	10	. 90130	49
12	. 78147	17	. 21853	. 88027	26	. 11973	. 09880	9	. 90120	48
13	. 78163	16	. 21837	. 88053	26	. 11947	. 09889	10	. 90111	47
14	. 78180	17	. 21820	. 88079	26	. 11921	. 09899	10	. 90101	46
15	9. 78197	17	10. 21803	9. 88105	26	10. 11895	10. 09909	9	9. 90091	45
16	. 78213	16	. 21787	. 88131	26	. 11869	. 09918	10	. 90082	44
17	. 78230	17	. 21770	. 88158	27	. 11842	. 09928	9	. 90072	43
18	. 78246	16	. 21754	. 88184	26	. 11816	. 09937	10	. 90063	42
19	. 78263	17	. 21737	. 88210	26	. 11790	. 09947	10	. 90053	41
20	9. 78280	17	10. 21720	9. 88236	26	10. 11764	10. 09957	9	9. 90043	40
21	. 78296	16	. 21704	. 88262	27	. 11738	. 09966	10	. 90034	39
22	. 78313	17	. 21687	. 88289	26	. 11711	. 09976	10	. 90024	38
23	. 78329	16	. 21671	. 88315	26	. 11685	. 09986	9	. 90014	37
24	. 78346	17	. 21654	. 88341	26	. 11659	. 09995	10	. 90005	36
25	9. 78362	16	10. 21638	9. 88367	26	10. 11633	10. 10005	10	9. 89995	35
26	. 78379	17	. 21621	. 88393	27	. 11607	. 10015	9	. 89985	34
27	. 78395	16	. 21605	. 88420	26	. 11580	. 10024	10	. 89976	33
28	. 78412	17	. 21588	. 88446	26	. 11554	. 10034	10	. 89966	32
29	. 78428	16	. 21572	. 88472	26	. 11528	. 10044	9	. 89956	31
30	9. 78445	17	10. 21555	9. 88498	26	10. 11502	10. 10053	10	9. 89947	30
31	. 78461	16	. 21539	. 88524	26	. 11476	. 10063	10	. 89937	29
32	. 78478	17	. 21522	. 88550	27	. 11450	. 10073	9	. 89927	28
33	. 78494	16	. 21506	. 88577	26	. 11423	. 10082	10	. 89918	27
34	. 78510	16	. 21490	. 88603	26	. 11397	. 10092	10	. 89908	26
35	9. 78527	17	10. 21473	9. 88629	26	10. 11371	10. 10102	10	9. 89898	25
36	. 78543	16	. 21457	. 88655	26	. 11345	. 10112	9	. 89888	24
37	. 78560	17	. 21440	. 88681	26	. 11319	. 10121	10	. 89879	23
38	. 78576	16	. 21424	. 88707	26	. 11293	. 10131	10	. 89869	22
39	. 78592	16	. 21408	. 88733	26	. 11267	. 10141	10	. 89859	21
40	9. 78609	17	10. 21391	9. 88759	27	10. 11241	10. 10151	9	9. 89849	20
41	. 78625	16	. 21375	. 88786	26	. 11214	. 10160	10	. 89840	19
42	. 78642	17	. 21358	. 88812	26	. 11188	. 10170	10	. 89830	18
43	. 78658	16	. 21342	. 88838	26	. 11162	. 10180	10	. 89820	17
44	. 78674	16	. 21326	. 88864	26	. 11136	. 10190	10	. 89810	16
45	9. 78691	17	10. 21309	9. 88890	26	10. 11110	10. 10199	9	9. 89801	15
46	. 78707	16	. 21293	. 88916	26	. 11084	. 10209	10	. 89791	14
47	. 78723	16	. 21277	. 88942	26	. 11058	. 10219	10	. 89781	13
48	. 78739	16	. 21261	. 88968	26	. 11032	. 10229	10	. 89771	12
49	. 78756	17	. 21244	. 88994	26	. 11006	. 10239	10	. 89761	11
50	9. 78772	16	10. 21228	9. 89020	26	10. 10980	10. 10248	9	9. 89752	10
51	. 78788	16	. 21212	. 89046	27	. 10954	. 10258	10	. 89742	9
52	. 78805	17	. 21195	. 89073	26	. 10927	. 10268	10	. 89732	8
53	. 78821	16	. 21179	. 89099	26	. 10901	. 10278	10	. 89722	7
54	. 78837	16	. 21163	. 89125	26	. 10875	. 10288	10	. 89712	6
55	9. 78853	16	10. 21147	9. 89151	26	10. 10849	10. 10298	9	9. 89702	5
56	. 78869	16	. 21131	. 89177	26	. 10823	. 10307	10	. 89693	4
57	. 78886	17	. 21114	. 89203	26	. 10797	. 10317	10	. 89683	3
58	. 78902	16	. 21098	. 89229	26	. 10771	. 10327	10	. 89673	2
59	. 78918	16	. 21082	89255	26	. 10745	. 10337	10	. 89663	1
60	9. 78934	16	10. 21066	9. 89281	26	10. 10719	10. 10347	10	9. 89653	0
↑ 127° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 52°

38° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 141° ↓
0	9. 78934	16	10. 21066	9. 89281	26	10. 10719	10. 10347	10	9. 89653	60
1	. 78950	17	. 21050	. 89307	26	. 10693	. 10357	10	. 89643	59
2	. 78967	16	. 21033	. 89333	26	. 10667	. 10367	9	. 89633	58
3	. 78983	16	. 21017	. 89359	26	. 10641	. 10376	10	. 89624	57
4	. 78999	16	. 21001	. 89385	26	. 10615	. 10386	10	. 89614	56
5	9. 79015	16	10. 20985	9. 89411	26	10. 10589	10. 10396	10	9. 89604	55
6	. 79031	16	. 20969	. 89437	26	. 10563	. 10406	10	. 89594	54
7	. 79047	16	. 20953	. 89463	26	. 10537	. 10416	10	. 89584	53
8	. 79063	16	. 20937	. 89489	26	. 10511	. 10426	10	. 89574	52
9	. 79079	16	. 20921	. 89515	26	. 10485	. 10436	10	. 89564	51
10	9. 79095	16	10. 20905	9. 89541	26	10. 10459	10. 10446	10	9. 89554	50
11	. 79111	17	. 20889	. 89567	26	. 10433	. 10456	10	. 89544	49
12	. 79128	16	. 20872	. 89593	26	. 10407	. 10466	10	. 89534	48
13	. 79144	16	. 20856	. 89619	26	. 10381	. 10476	10	. 89524	47
14	. 79160	16	. 20840	. 89645	26	. 10355	. 10486	10	. 89514	46
15	9. 79176	16	10. 20824	9. 89671	26	10. 10329	10. 10496	9	9. 89504	45
16	. 79192	16	. 20808	. 89697	26	. 10303	. 10505	10	. 89495	44
17	. 79208	16	. 20792	. 89723	26	. 10277	. 10515	10	. 89485	43
18	. 79224	16	. 20776	. 89749	26	. 10251	. 10525	10	. 89475	42
19	. 79240	16	. 20760	. 89775	26	. 10225	. 10535	10	. 89465	41
20	9. 79256	16	10. 20744	9. 89801	26	10. 10199	10. 10545	10	9. 89455	40
21	. 79272	16	. 20728	. 89827	26	. 10173	. 10555	10	. 89445	39
22	. 79288	16	. 20712	. 89853	26	. 10147	. 10565	10	. 89435	38
23	. 79304	15	. 20696	. 89879	26	. 10121	. 10575	10	. 89425	37
24	. 79319	16	. 20681	. 89905	26	. 10095	. 10585	10	. 89415	36
25	9. 79335	16	10. 20665	9. 89931	26	10. 10069	10. 10595	10	9. 89405	35
26	. 79351	16	. 20649	. 89957	26	. 10043	. 10605	10	. 89395	34
27	. 79367	16	. 20633	. 89983	26	. 10017	. 10615	10	. 89385	33
28	. 79383	16	. 20617	. 90009	26	. 09991	. 10625	10	. 89375	32
29	. 79399	16	. 20601	. 90035	26	. 09965	. 10636	11	. 89364	31
30	9. 79415	16	10. 20585	9. 90061	25	10. 09939	10. 10646	10	9. 89354	30
31	. 79431	16	. 20569	. 90086	26	. 09914	. 10656	10	. 89344	29
32	. 79447	16	. 20553	. 90112	26	. 09888	. 10666	10	. 89334	28
33	. 79463	15	. 20537	. 90138	26	. 09862	. 10676	10	. 89324	27
34	. 79478	16	. 20522	. 90164	26	. 09836	. 10686	10	. 89314	26
35	9. 79494	16	10. 20506	9. 90190	26	10. 09810	10. 10696	10	9. 89304	25
36	. 79510	16	. 20490	. 90216	26	. 09784	. 10706	10	. 89294	24
37	. 79526	16	. 20474	. 90242	26	. 09758	. 10716	10	. 89284	23
38	. 79542	16	. 20458	. 90268	26	. 09732	. 10726	10	. 89274	22
39	. 79558	15	. 20442	. 90294	26	. 09706	. 10736	10	. 89264	21
40	9. 79573	16	10. 20427	9. 90320	26	10. 09680	10. 10746	10	9. 89254	20
41	. 79589	16	. 20411	. 90346	25	. 09654	. 10756	11	. 89244	19
42	. 79605	16	. 20395	. 90371	26	. 09629	. 10767	10	. 89233	18
43	. 79621	15	. 20379	. 90397	26	. 09603	. 10777	10	. 89223	17
44	. 79636	16	. 20364	. 90423	26	. 09577	. 10787	10	. 89213	16
45	9. 79652	16	10. 20348	9. 90449	26	10. 09551	10. 10797	10	9. 89203	15
46	. 79668	16	. 20332	. 90475	26	. 09525	. 10807	10	. 89193	14
47	. 79684	15	. 20316	. 90501	26	. 09499	. 10817	10	. 89183	13
48	. 79699	16	. 20301	. 90527	26	. 09473	. 10827	11	. 89173	12
49	. 79715	16	. 20285	. 90553	25	. 09447	. 10838	10	. 89162	11
50	9. 79731	15	10. 20269	9. 90578	26	10. 09422	10. 10848	10	9. 89152	10
51	. 79746	16	. 20254	. 90604	26	. 09396	. 10858	10	. 89142	9
52	. 79762	16	. 20238	. 90630	26	. 09370	. 10868	10	. 89132	8
53	. 79778	15	. 20222	. 90656	26	. 09344	. 10878	10	. 89122	7
54	. 79793	16	. 20207	. 90682	26	. 09318	. 10888	11	. 89112	6
55	9. 79809	16	10. 20191	9. 90708	26	10. 09292	10. 10899	10	9. 89101	5
56	. 79825	15	. 20175	. 90734	25	. 09266	. 10909	10	. 89091	4
57	. 79840	16	. 20160	. 90759	26	. 09241	. 10919	10	. 89081	3
58	. 79856	16	. 20144	. 90785	26	. 09215	. 10929	11	. 89071	2
59	. 79872	15	. 20128	. 90811	26	. 09189	. 10940	10	. 89060	1
60	9. 79887		10. 20113	9. 90837		10. 09163	10. 10950		9. 89050	0
↑ 128° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 51°

39° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ← 140° ↓	
0	9. 79887	16	10. 20113	9. 90837	26	10. 09163	10. 10950	10	9. 89050	60
1	. 79903	15	. 20097	. 90863	26	. 09137	. 10960	10	. 89040	59
2	. 79918	16	. 20082	. 90889	25	. 09111	. 10970	10	. 89030	58
3	. 79934	16	. 20066	. 90914	26	. 09086	. 10980	11	. 89020	57
4	. 79950	15	. 20050	. 90940	26	. 09060	. 10991	10	. 89009	56
5	9. 79965	16	10. 20035	9. 90966	26	10. 09034	10. 11001	10	9. 88999	55
6	. 79981	15	. 20019	. 90992	26	. 09008	. 11011	11	. 88989	54
7	. 79996	16	. 20004	. 91018	25	. 08982	. 11022	10	. 88978	53
8	. 80012	15	. 19988	. 91043	26	. 08957	. 11032	10	. 88968	52
9	. 80027	16	. 19973	. 91069	26	. 08931	. 11042	10	. 88958	51
10	9. 80043	15	10. 19957	9. 91095	26	10. 08905	10. 11052	11	9. 88948	50
11	. 80058	16	. 19942	. 91121	26	. 08879	. 11063	10	. 88937	49
12	. 80074	15	. 19926	. 91147	25	. 08853	. 11073	10	. 88927	48
13	. 80089	16	. 19911	. 91172	26	. 08828	. 11083	11	. 88917	47
14	. 80105	15	. 19895	. 91198	26	. 08802	. 11094	10	. 88906	46
15	9. 80120	16	10. 19880	9. 91224	26	10. 08776	10. 11104	10	9. 88896	45
16	. 80136	15	. 19864	. 91250	26	. 08750	. 11114	11	. 88886	44
17	. 80151	15	. 19849	. 91276	25	. 08724	. 11125	10	. 88875	43
18	. 80166	16	. 19834	. 91301	26	. 08699	. 11135	10	. 88865	42
19	. 80182	15	. 19818	. 91327	26	. 08673	. 11145	11	. 88855	41
20	9. 80197	16	10. 19803	9. 91353	26	10. 08647	10. 11156	10	9. 88844	40
21	. 80213	15	. 19787	. 91379	25	. 08621	. 11166	10	. 88834	39
22	. 80228	16	. 19772	. 91404	26	. 08596	. 11176	11	. 88824	38
23	. 80244	15	. 19756	. 91430	26	. 08570	. 11187	10	. 88813	37
24	. 80259	15	. 19741	. 91456	26	. 08544	. 11197	10	. 88803	36
25	9. 80274	16	10. 19726	9. 91482	25	10. 08518	10. 11207	11	9. 88793	35
26	. 80290	15	. 19710	. 91507	26	. 08493	. 11218	10	. 88782	34
27	. 80305	15	. 19695	. 91533	26	. 08467	. 11228	11	. 88772	33
28	. 80320	16	. 19680	. 91559	26	. 08441	. 11239	10	. 88761	32
29	. 80336	15	. 19664	. 91585	25	. 08415	. 11249	10	. 88751	31
30	9. 80351	15	10. 19649	9. 91610	26	10. 08390	10. 11259	11	9. 88741	30
31	. 80366	16	. 19634	. 91636	26	. 08364	. 11270	10	. 88730	29
32	. 80382	15	. 19618	. 91662	26	. 08338	. 11280	11	. 88720	28
33	. 80397	15	. 19603	. 91688	25	. 08312	. 11291	10	. 88709	27
34	. 80412	16	. 19588	. 91713	26	. 08287	. 11301	11	. 88699	26
35	9. 80428	15	10. 19572	9. 91739	26	10. 08261	10. 11312	10	9. 88688	25
36	. 80443	15	. 19557	. 91765	26	. 08235	. 11322	10	. 88678	24
37	. 80458	15	. 19542	. 91791	25	. 08209	. 11332	11	. 88668	23
38	. 80473	16	. 19527	. 91816	26	. 08184	. 11343	10	. 88657	22
39	. 80489	15	. 19511	. 91842	26	. 08158	. 11353	11	. 88647	21
40	9. 80504	15	10. 19496	9. 91868	25	10. 08132	10. 11364	10	9. 88636	20
41	. 80519	15	. 19481	. 91893	26	. 08107	. 11374	11	. 88626	19
42	. 80534	16	. 19466	. 91919	26	. 08081	. 11385	10	. 88615	18
43	. 80550	15	. 19450	. 91945	26	. 08055	. 11395	11	. 88605	17
44	. 80565	15	. 19435	. 91971	25	. 08029	. 11406	10	. 88594	16
45	9. 80580	15	10. 19420	9. 91996	26	10. 08004	10. 11416	11	9. 88584	15
46	. 80595	15	. 19405	. 92022	26	. 07978	. 11427	10	. 88573	14
47	. 80610	15	. 19390	. 92048	25	. 07952	. 11437	11	. 88563	13
48	. 80625	16	. 19375	. 92073	26	. 07927	. 11448	10	. 88552	12
49	. 80641	15	. 19359	. 92099	26	. 07901	. 11458	11	. 88542	11
50	9. 80656	15	10. 19344	9. 92125	25	10. 07875	10. 11469	10	9. 88531	10
51	. 80671	15	. 19329	. 92150	26	. 07850	. 11479	11	. 88521	9
52	. 80686	15	. 19314	. 92176	26	. 07824	. 11490	11	. 88510	8
53	. 80701	15	. 19299	. 92202	25	. 07798	. 11501	10	. 88499	7
54	. 80716	15	. 19284	. 92227	26	. 07773	. 11511	11	. 88489	6
55	9. 80731	15	10. 19269	9. 92253	26	10. 07747	10. 11522	10	9. 88478	5
56	. 80746	16	. 19254	. 92279	25	. 07721	. 11532	11	. 88468	4
57	. 80762	15	. 19238	. 92304	26	. 07696	. 11543	10	. 88457	3
58	. 80777	15	. 19223	. 92330	26	. 07670	. 11553	11	. 88447	2
59	. 80792	15	. 19208	. 92356	25	. 07644	. 11564	11	. 88436	1
60	9. 80807		10. 19193	9. 92381		10. 07619	10. 11575		9. 88425	0
↑ 129° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	← 50° ↑

Logarithms of Trigonometric Functions

40° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 139° ↓
′										′
0	9. 80807	15	10. 19193	9. 92381	26	10. 07619	10. 11575	10	9. 88425	60
1	. 80822	15	. 19178	. 92407	26	. 07593	. 11585	11	. 88415	59
2	. 80837	15	. 19163	. 92433	25	. 07567	. 11596	10	. 88404	58
3	. 80852	15	. 19148	. 92458	26	. 07542	. 11606	11	. 88394	57
4	. 80867	15	. 19133	. 92484	26	. 07516	. 11617	11	. 88383	56
5	9. 80882	15	10. 19118	9. 92510	25	10. 07490	10. 11628	10	9. 88372	55
6	. 80897	15	. 19103	. 92535	26	. 07465	. 11638	11	. 88362	54
7	. 80912	15	. 19088	. 92561	26	. 07439	. 11649	11	. 88351	53
8	. 80927	15	. 19073	. 92587	25	. 07413	. 11660	10	. 88340	52
9	. 80942	15	. 19058	. 92612	26	. 07388	. 11670	11	. 88330	51
10	9. 80957	15	10. 19043	9. 92638	25	10. 07362	10. 11681	11	9. 88319	50
11	. 80972	15	. 19028	. 92663	26	. 07337	. 11692	10	. 88308	49
12	. 80987	15	. 19013	. 92689	26	. 07311	. 11702	11	. 88298	48
13	. 81002	15	. 18998	. 92715	25	. 07285	. 11713	11	. 88287	47
14	. 81017	15	. 18983	. 92740	26	. 07260	. 11724	10	. 88276	46
15	9. 81032	15	10. 18968	9. 92766	26	10. 07234	10. 11734	11	9. 88266	45
16	. 81047	14	. 18953	. 92792	25	. 07208	. 11745	11	. 88255	44
17	. 81061	15	. 18939	. 92817	26	. 07183	. 11756	10	. 88244	43
18	. 81076	15	. 18924	. 92843	25	. 07157	. 11766	11	. 88234	42
19	. 81091	15	. 18909	. 92868	26	. 07132	. 11777	11	. 88223	41
20	9. 81106	15	10. 18894	9. 92894	26	10. 07106	10. 11788	11	9. 88212	40
21	. 81121	15	. 18879	. 92920	25	. 07080	. 11799	10	. 88201	39
22	. 81136	15	. 18864	. 92945	26	. 07055	. 11809	11	. 88191	38
23	. 81151	15	. 18849	. 92971	25	. 07029	. 11820	11	. 88180	37
24	. 81166	14	. 18834	. 92996	26	. 07004	. 11831	11	. 88169	36
25	9. 81180	15	10. 18820	9. 93022	26	10. 06978	10. 11842	10	9. 88158	35
26	. 81195	15	. 18805	. 93048	25	. 06952	. 11852	11	. 88148	34
27	. 81210	15	. 18790	. 93073	26	. 06927	. 11863	11	. 88137	33
28	. 81225	15	. 18775	. 93099	25	. 06901	. 11874	11	. 88126	32
29	. 81240	15	. 18760	. 93124	26	. 06876	. 11885	10	. 88115	31
30	9. 81254	14	10. 18746	9. 93150	25	10. 06850	10. 11895	11	9. 88105	30
31	. 81269	15	. 18731	. 93175	26	. 06825	. 11906	11	. 88094	29
32	. 81284	15	. 18716	. 93201	26	. 06799	. 11917	11	. 88083	28
33	. 81299	15	. 18701	. 93227	25	. 06773	. 11928	11	. 88072	27
34	. 81314	15	. 18686	. 93252	26	. 06748	. 11939	10	. 88061	26
35	9. 81328	14	10. 18672	9. 93278	25	10. 06722	10. 11949	11	9. 88051	25
36	. 81343	15	. 18657	. 93303	26	. 06697	. 11960	11	. 88040	24
37	. 81358	15	. 18642	. 93329	25	. 06671	. 11971	11	. 88029	23
38	. 81372	14	. 18628	. 93354	26	. 06646	. 11982	11	. 88018	22
39	. 81387	15	. 18613	. 93380	26	. 06620	. 11993	11	. 88007	21
40	9. 81402	15	10. 18598	9. 93406	25	10. 06594	10. 12004	11	9. 87996	20
41	. 81417	14	. 18583	. 93431	26	. 06569	. 12015	10	. 87985	19
42	. 81431	15	. 18569	. 93457	25	. 06543	. 12025	11	. 87975	18
43	. 81446	15	. 18554	. 93482	26	. 06518	. 12036	11	. 87964	17
44	. 81461	14	. 18539	. 93508	25	. 06492	. 12047	11	. 87953	16
45	9. 81475	15	10. 18525	9. 93533	26	10. 06467	10. 12058	11	9. 87942	15
46	. 81490	15	. 18510	. 93559	25	. 06441	. 12069	11	. 87931	14
47	. 81505	14	. 18495	. 93584	26	. 06416	. 12080	11	. 87920	13
48	. 81519	15	. 18481	. 93610	26	. 06390	. 12091	11	. 87909	12
49	. 81534	15	. 18466	. 93636	25	. 06364	. 12102	11	. 87898	11
50	9. 81549	14	10. 18451	9. 93661	26	10. 06339	10. 12113	10	9. 87887	10
51	. 81563	15	. 18437	. 93687	25	. 06313	. 12123	11	. 87877	9
52	. 81578	14	. 18422	. 93712	26	. 06288	. 12134	11	. 87866	8
53	. 81592	15	. 18408	. 93738	25	. 06262	. 12145	11	. 87855	7
54	. 81607	15	. 18393	. 93763	26	. 06237	. 12156	11	. 87844	6
55	9. 81622	14	10. 18378	9. 93789	25	10. 06211	10. 12167	11	9. 87833	5
56	. 81636	15	. 18364	. 93814	26	. 06186	. 12178	11	. 87822	4
57	. 81651	14	. 18349	. 93840	25	. 06160	. 12189	11	. 87811	3
58	. 81665	15	. 18335	. 93865	26	. 06135	. 12200	11	. 87800	2
59	. 81680	14	. 18320	. 93891	25	. 06109	. 12211	11	. 87789	1
60	9. 81694		10. 18306	9. 93916		10. 06084	10. 12222		9. 87778	0
↑ 130° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 49°

41° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 138° ↓
0	9. 81694	15	10. 18306	9. 93916	26	10. 06084	10. 12222	11	9. 87778	60
1	. 81709	14	. 18291	. 93942	25	. 06058	. 12233	11	. 87767	59
2	. 81723	15	. 18277	. 93967	26	. 06033	. 12244	11	. 87756	58
3	. 81738	14	. 18262	. 93993	25	. 06007	. 12255	11	. 87745	57
4	. 81752	15	. 18248	. 94018	26	. 05982	. 12266	11	. 87734	56
5	9. 81767	14	10. 18233	9. 94044	25	10. 05956	10. 12277	11	9. 87723	55
6	. 81781	15	. 18219	. 94069	26	. 05931	. 12288	11	. 87712	54
7	. 81796	14	. 18204	. 94095	25	. 05905	. 12299	11	. 87701	53
8	. 81810	15	. 18190	. 94120	26	. 05880	. 12310	11	. 87690	52
9	. 81825	14	. 18175	. 94146	25	. 05854	. 12321	11	. 87679	51
10	9. 81839	15	10. 18161	9. 94171	26	10. 05829	10. 12332	11	9. 87668	50
11	. 81854	14	. 18146	. 94197	25	. 05803	. 12343	11	. 87657	49
12	. 81868	14	. 18132	. 94222	26	. 05778	. 12354	11	. 87646	48
13	. 81882	15	. 18118	. 94248	25	. 05752	. 12365	11	. 87635	47
14	. 81897	14	. 18103	. 94273	26	. 05727	. 12376	11	. 87624	46.
15	9. 81911	15	10. 18089	9. 94299	25	10. 05701	10. 12387	12	9. 87613	45
16	. 81926	14	. 18074	. 94324	26	. 05676	. 12399	11	. 87601	44
17	. 81940	15	. 18060	. 94350	25	. 05650	. 12410	11	. 87590	43
18	. 81955	14	. 18045	. 94375	26	. 05625	. 12421	11	. 87579	42
19	. 81969	14	. 18031	. 94401	25	. 05599	. 12432	11	. 87568	41
20	9. 81983	15	10. 18017	9. 94426	26	10. 05574	10. 12443	11	9. 87557	40
21	. 81998	14	. 18002	. 94452	25	. 05548	. 12454	11	. 87546	39
22	. 82012	14	. 17988	. 94477	26	. 05523	. 12465	11	. 87535	38
23	. 82026	15	. 17974	. 94503	25	. 05497	. 12476	11	. 87524	37
24	. 82041	14	. 17959	. 94528	26	. 05472	. 12487	12	. 87513	36
25	9. 82055	14	10. 17945	9. 94554	25	10. 05446	10. 12499	11	9. 87501	35
26	. 82069	15	. 17931	. 94579	25	. 05421	. 12510	11	. 87490	34
27	. 82084	14	. 17916	. 94604	26	. 05396	. 12521	11	. 87479	33
28	. 82098	14	. 17902	. 94630	25	. 05370	. 12532	11	. 87468	32
29	. 82112	14	. 17888	. 94655	26	. 05345	. 12543	11	. 87457	31
30	9. 82126	15	10. 17874	9. 94681	25	10. 05319	10. 12554	12	9. 87446	30
31	. 82141	14	. 17859	. 94706	26	. 05294	. 12566	11	. 87434	29
32	. 82155	14	. 17845	. 94732	25	. 05268	. 12577	11	. 87423	28
33	. 82169	15	. 17831	. 94757	26	. 05243	. 12588	11	. 87412	27
34	. 82184	14	. 17816	. 94783	25	. 05217	. 12599	11	. 87401	26
35	9. 82198	14	10. 17802	9. 94808	26	10. 05192	10. 12610	12	9. 87390	25
36	. 82212	14	. 17788	. 94834	25	. 05166	. 12622	11	. 87378	24
37	. 82226	14	. 17774	. 94859	25	. 05141	. 12633	11	. 87367	23
38	. 82240	15	. 17760	. 94884	26	. 05116	. 12644	11	. 87356	22
39	. 82255	14	. 17745	. 94910	25	. 05090	. 12655	11	. 87345	21
40	9. 82269	14	10. 17731	9. 94935	26	10. 05065	10. 12666	12	9. 87334	20
41	. 82283	14	. 17717	. 94961	25	. 05039	. 12678	11	. 87322	19
42	. 82297	14	. 17703	. 94986	26	. 05014	. 12689	11	. 87311	18
43	. 82311	15	. 17689	. 95012	25	. 04988	. 12700	12	. 87300	17
44	. 82326	14	. 17674	. 95037	25	. 04963	. 12712	11	. 87288	16
45	9. 82340	14	10. 17660	9. 95062	26	10. 04938	10. 12723	11	9. 87277	15
46	. 82354	14	. 17646	. 95088	25	. 04912	. 12734	11	. 87266	14
47	. 82368	14	. 17632	. 95113	26	. 04887	. 12745	12	. 87255	13
48	. 82382	14	. 17618	. 95139	25	. 04861	. 12757	11	. 87243	12
49	. 82396	14	. 17604	. 95164	26	. 04836	. 12768	11	. 87232	11
50	9. 82410	14	10. 17590	9. 95190	25	10. 04810	10. 12779	12	9. 87221	10
51	. 82424	15	. 17576	. 95215	25	. 04785	. 12791	11	. 87209	9
52	. 82439	14	. 17561	. 95240	26	. 04760	. 12802	11	. 87198	8
53	. 82453	14	. 17547	. 95266	25	. 04734	. 12813	12	. 87187	7
54	. 82467	14	. 17533	. 95291	26	. 04709	. 12825	11	. 87175	6
55	9. 82481	14	10. 17519	9. 95317	25	10. 04683	10. 12836	11	9. 87164	5
56	. 82495	14	. 17505	. 95342	26	. 04658	. 12847	12	. 87153	4
57	. 82509	14	. 17491	. 95368	25	. 04632	. 12859	11	. 87141	3
58	. 82523	14	. 17477	. 95393	25	. 04607	. 12870	11	. 87130	2
59	. 82537	14	. 17463	. 95418	26	. 04582	. 12881	12	. 87119	1
60	9. 82551		10. 17449	9. 95444		10. 04556	10. 12893		9. 87107	0
↑ 131° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	← 48° ↑

42°→ ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos ←137° ↓	
′										′
0	9. 82551	14	10. 17449	9. 95444	25	10. 04556	10. 12893	11	9. 87107	60
1	. 82565	14	. 17435	. 95469	26	. 04531	. 12904	11	. 87096	59
2	. 82579	14	. 17421	. 95495	25	. 04505	. 12915	12	. 87085	58
3	. 82593	14	. 17407	. 95520	25	. 04480	. 12927	11	. 87073	57
4	. 82607	14	. 17393	. 95545	26	. 04455	. 12938	12	. 87062	56
5	9. 82621	14	10. 17379	9. 95571	25	10. 04429	10. 12950	11	9. 87050	55
6	. 82635	14	. 17365	. 95596	26	. 04404	. 12961	11	. 87039	54
7	. 82649	14	. 17351	. 95622	25	. 04378	. 12972	12	. 87028	53
8	. 82663	14	. 17337	. 95647	25	. 04353	. 12984	11	. 87016	52
9	. 82677	14	. 17323	. 95672	26	. 04328	. 12995	12	. 87005	51
10	9. 82691	14	10. 17309	9. 95698	25	10. 04302	10. 13007	11	9. 86993	50
11	. 82705	14	. 17295	. 95723	25	. 04277	. 13018	12	. 86982	49
12	. 82719	14	. 17281	. 95748	26	. 04252	. 13030	11	. 86970	48
13	. 82733	14	. 17267	. 95774	25	. 04226	. 13041	12	. 86959	47
14	. 82747	14	. 17253	. 95799	26	. 04201	. 13053	11	. 86947	46
15	9. 82761	14	10. 17239	9. 95825	25	10. 04175	10. 13064	12	9. 86936	45
16	. 82775	13	. 17225	. 95850	25	. 04150	. 13076	11	. 86924	44
17	. 82788	14	. 17212	. 95875	26	. 04125	. 13087	11	. 86913	43
18	. 82802	14	. 17198	. 95901	25	. 04099	. 13098	12	. 86902	42
19	. 82816	14	. 17184	. 95926	26	. 04074	. 13110	11	. 86890	41
20	9. 82830	14	10. 17170	9. 95952	25	10. 04048	10. 13121	12	9. 86879	40
21	. 82844	14	. 17156	. 95977	25	. 04023	. 13133	12	. 86867	39
22	. 82858	14	. 17142	. 96002	26	. 03998	. 13145	11	. 86855	38
23	. 82872	13	. 17128	. 96028	25	. 03972	. 13156	12	. 86844	37
24	. 82885	14	. 17115	. 96053	25	. 03947	. 13168	11	. 86832	36
25	9. 82899	14	10. 17101	9. 96078	26	10. 03922	10. 13179	12	9. 86821	35
26	. 82913	14	. 17087	. 96104	25	. 03896	. 13191	11	. 86809	34
27	. 82927	14	. 17073	. 96129	26	. 03871	. 13202	12	. 86798	33
28	. 82941	14	. 17059	. 96155	25	. 03845	. 13214	11	. 86786	32
29	. 82955	13	. 17045	. 96180	25	. 03820	. 13225	12	. 86775	31
30	9. 82968	14	10. 17032	9. 96205	26	10. 03795	10. 13237	11	9. 86763	30
31	. 82982	14	. 17018	. 96231	25	. 03769	. 13248	12	. 86752	29
32	. 82996	14	. 17004	. 96256	25	. 03744	. 13260	12	. 86740	28
33	. 83010	13	. 16990	. 96281	26	. 03719	. 13272	11	. 86728	27
34	. 83023	14	. 16977	. 96307	25	. 03693	. 13283	12	. 86717	26
35	9. 83037	14	10. 16963	9. 96332	25	10. 03668	10. 13295	11	9. 86705	25
36	. 83051	14	. 16949	. 96357	26	. 03643	. 13306	12	. 86694	24
37	. 83065	13	. 16935	. 96383	25	. 03617	. 13318	12	. 86682	23
38	. 83078	14	. 16922	. 96408	25	. 03592	. 13330	11	. 86670	22
39	. 83092	14	. 16908	. 96433	26	. 03567	. 13341	12	. 86659	21
40	9. 83106	14	10. 16894	9. 96459	25	10. 03541	10. 13353	12	9. 86647	20
41	. 83120	13	. 16880	. 96484	26	. 03516	. 13365	11	. 86635	19
42	. 83133	14	. 16867	. 96510	25	. 03490	. 13376	12	. 86624	18
43	. 83147	14	. 16853	. 96535	25	. 03465	. 13388	12	. 86612	17
44	. 83161	13	. 16839	. 96560	26	. 03440	. 13400	11	. 86600	16
45	9. 83174	14	10. 16826	9. 96586	25	10. 03414	10. 13411	12	9. 86589	15
46	. 83188	14	. 16812	. 96611	25	. 03389	. 13423	12	. 86577	14
47	. 83202	13	. 16798	. 96636	26	. 03364	. 13435	11	. 86565	13
48	. 83215	14	. 16785	. 96662	25	. 03338	. 13446	12	. 86554	12
49	. 83229	13	. 16771	. 96687	25	. 03313	. 13458	12	. 86542	11
50	9. 83242	14	10. 16758	9. 96712	26	10. 03288	10. 13470	12	9. 86530	10
51	. 83256	14	. 16744	. 96738	25	. 03262	. 13482	11	. 86518	9
52	. 83270	13	. 16730	. 96763	25	. 03237	. 13493	12	. 86507	8
53	. 83283	14	. 16717	. 96788	26	. 03212	. 13505	12	. 86495	7
54	. 83297	13	. 16703	. 96814	25	. 03186	. 13517	11	. 86483	6
55	9. 83310	14	10. 16690	9. 96839	25	10. 03161	10. 13528	12	9. 86472	5
56	. 83324	14	. 16676	. 96864	26	. 03136	. 13540	12	. 86460	4
57	. 83338	13	. 16662	. 96890	25	. 03110	. 13552	12	. 86448	3
58	. 83351	14	. 16649	. 96915	25	. 03085	. 13564	11	. 86436	2
59	. 83365	13	. 16635	. 96940	26	. 03060	. 13575	12	. 86425	1
60	9. 83378		10. 16622	9. 96966		10. 03034	10. 13587		9. 86413	0
↑ 132°→	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	←47° ↑

43° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 136° ↓
0	9. 83378	14	10. 16622	9. 96966	25	10. 03034	10. 13587	12	9. 86413	60
1	. 83392	13	. 16608	. 96991	25	. 03009	. 13599	12	. 86401	59
2	. 83405	14	. 16595	. 97016	26	. 02984	. 13611	12	. 86389	58
3	. 83419	13	. 16581	. 97042	25	. 02958	. 13623	11	. 86377	57
4	. 83432	14	. 16568	. 97067	25	. 02933	. 13634	12	. 86366	56
5	9. 83446	13	10. 16554	9. 97092	26	10. 02908	10. 13646	12	9. 86354	55
6	. 83459	14	. 16541	. 97118	25	. 02882	. 13658	12	. 86342	54
7	. 83473	13	. 16527	. 97143	25	. 02857	. 13670	12	. 86330	53
8	. 83486	14	. 16514	. 97168	25	. 02832	. 13682	12	. 86318	52
9	. 83500	13	. 16500	. 97193	26	. 02807	. 13694	11	. 86306	51
10	9. 83513	14	10. 16487	9. 97219	25	10. 02781	10. 13705	12	9. 86295	50
11	. 83527	13	. 16473	. 97244	25	. 02756	. 13717	12	. 86283	49
12	. 83540	14	. 16460	. 97269	26	. 02731	. 13729	12	. 86271	48
13	. 83554	13	. 16446	. 97295	25	. 02705	. 13741	12	. 86259	47
14	. 83567	14	. 16433	. 97320	25	. 02680	. 13753	12	. 86247	46
15	9. 83581	13	10. 16419	9. 97345	26	10. 02655	10. 13765	12	9. 86235	45
16	. 83594	14	. 16406	. 97371	25	. 02629	. 13777	12	. 86223	44
17	. 83608	13	. 16392	. 97396	25	. 02604	. 13789	11	. 86211	43
18	. 83621	13	. 16379	. 97421	26	. 02579	. 13800	12	. 86200	42
19	. 83634	14	. 16366	. 97447	25	. 02553	. 13812	12	. 86188	41
20	9. 83648	13	10. 16352	9. 97472	25	10. 02528	10. 13824	12	9. 86176	40
21	. 83661	13	. 16339	. 97497	26	. 02503	. 13836	12	. 86164	39
22	. 83674	14	. 16326	. 97523	25	. 02477	. 13848	12	. 86152	38
23	. 83688	13	. 16312	. 97548	25	. 02452	. 13860	12	. 86140	37
24	. 83701	14	. 16299	. 97573	25	. 02427	. 13872	12	. 86128	36
25	9. 83715	13	10. 16285	9. 97598	26	10. 02402	10. 13884	12	9. 86116	35
26	. 83728	13	. 16272	. 97624	25	. 02376	. 13896	12	. 86104	34
27	. 83741	14	. 16259	. 97649	25	. 02351	. 13908	12	. 86092	33
28	. 83755	13	. 16245	. 97674	26	. 02326	. 13920	12	. 86080	32
29	. 83768	13	. 16232	. 97700	25	. 02300	. 13932	12	. 86068	31
30	9. 83781	14	10. 16219	9. 97725	25	10. 02275	10. 13944	12	9. 86056	30
31	. 83795	13	. 16205	. 97750	26	. 02250	. 13956	12	. 86044	29
32	. 83808	13	. 16192	. 97776	25	. 02224	. 13968	12	. 86032	28
33	. 83821	13	. 16179	. 97801	25	. 02199	. 13980	12	. 86020	27
34	. 83834	14	. 16166	. 97826	25	. 02174	. 13992	12	. 86008	26
35	9. 83848	13	10. 16152	9. 97851	26	10. 02149	10. 14004	12	9. 85996	25
36	. 83861	13	. 16139	. 97877	25	. 02123	. 14016	12	. 85984	24
37	. 83874	13	. 16126	. 97902	25	. 02098	. 14028	12	. 85972	23
38	. 83887	14	. 16113	. 97927	26	. 02073	. 14040	12	. 85960	22
39	. 83901	13	. 16099	. 97953	25	. 02047	. 14052	12	. 85948	21
40	9. 83914	13	10. 16086	9. 97978	25	10. 02022	10. 14064	12	9. 85936	20
41	. 83927	13	. 16073	. 98003	26	. 01997	. 14076	12	. 85924	19
42	. 83940	14	. 16060	. 98029	25	. 01971	. 14088	12	. 85912	18
43	. 83954	13	. 16046	. 98054	25	. 01946	. 14100	12	. 85900	17
44	. 83967	13	. 16033	. 98079	25	. 01921	. 14112	12	. 85888	16
45	9. 83980	13	10. 16020	9. 98104	26	10. 01896	10. 14124	12	9. 85876	15
46	. 83993	13	. 16007	. 98130	25	. 01870	. 14136	13	. 85864	14
47	. 84006	14	. 15994	. 98155	25	. 01845	. 14149	12	. 85851	13
48	. 84020	13	. 15980	. 98180	26	. 01820	. 14161	12	. 85839	12
49	. 84033	13	. 15967	. 98206	25	. 01794	. 14173	12	. 85827	11
50	9. 84046	13	10. 15954	9. 98231	25	10. 01769	10. 14185	12	9. 85815	10
51	. 84059	13	. 15941	. 98256	25	. 01744	. 14197	12	. 85803	9
52	. 84072	13	. 15928	. 98281	26	. 01719	. 14209	12	. 85791	8
53	. 84085	13	. 15915	. 98307	25	. 01693	. 14221	13	. 85779	7
54	. 84098	14	. 15902	. 98332	25	. 01668	. 14234	12	. 85766	6
55	9. 84112	13	10. 15888	9. 98357	26	10. 01643	10. 14246	12	9. 85754	5
56	. 84125	13	. 15875	. 98383	25	. 01617	. 14258	12	. 85742	4
57	. 84138	13	. 15862	. 98408	25	. 01592	. 14270	12	. 85730	3
58	. 84151	13	. 15849	. 98433	25	. 01567	. 14282	12	. 85718	2
59	. 84164	13	. 15836	. 98458	25	. 01542	. 14294	12	. 85706	1
60	9. 84177	13	10. 15823	9. 98484	26	10. 01516	10. 14307	13	9. 85693	0
↑ 133° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 46°

44° → ↓	sin	Diff. 1′	csc	tan	Diff. 1′	cot	sec	Diff. 1′	cos	← 135° ↓
0	9. 84177	13	10. 15823	9. 98484	25	10. 01516	10. 14307	12	9. 85693	60
1	. 84190	13	. 15810	. 98509	25	. 01491	. 14319	12	. 85681	59
2	. 84203	13	. 15797	. 98534	26	. 01466	. 14331	12	. 85669	58
3	. 84216	13	. 15784	. 98560	25	. 01440	. 14343	12	. 85657	57
4	. 84229	13	. 15771	. 98585	25	. 01415	. 14355	13	. 85645	56
5	9. 84242	13	10. 15758	9. 98610	25	10. 01390	10. 14368	12	9. 85632	55
6	. 84255	14	. 15745	. 98635	26	. 01365	. 14380	12	. 85620	54
7	. 84269	13	. 15731	. 98661	25	. 01339	. 14392	12	. 85608	53
8	. 84282	13	. 15718	. 98686	25	. 01314	. 14404	13	. 85596	52
9	. 84295	13	. 15705	. 98711	26	. 01289	. 14417	12	. 85583	51
10	9. 84308	13	10. 15692	9. 98737	25	10. 01263	10. 14429	12	9. 85571	50
11	. 84321	13	. 15679	. 98762	25	. 01238	. 14441	12	. 85559	49
12	. 84334	13	. 15666	. 98787	25	. 01213	. 14453	13	. 85547	48
13	. 84347	13	. 15653	. 98812	26	. 01188	. 14466	12	. 85534	47
14	. 84360	13	. 15640	. 98838	25	. 01162	. 14478	12	. 85522	46
15	9. 84373	12	10. 15627	9. 98863	25	10. 01137	10. 14490	13	9. 85510	45
16	. 84385	13	. 15615	. 98888	25	. 01112	. 14503	12	. 85497	44
17	. 84398	13	. 15602	. 98913	26	. 01087	. 14515	12	. 85485	43
18	. 84411	13	. 15589	. 98939	25	. 01061	. 14527	13	. 85473	42
19	. 84424	13	. 15576	. 98964	25	. 01036	. 14540	12	. 85460	41
20	9. 84437	13	10. 15563	9. 98989	26	10. 01011	10. 14552	12	9. 85448	40
21	. 84450	13	. 15550	. 99015	25	. 00985	. 14564	13	. 85436	39
22	. 84463	13	. 15537	. 99040	25	. 00960	. 14577	12	. 85423	38
23	. 84476	13	. 15524	. 99065	25	. 00935	. 14589	12	. 85411	37
24	. 84489	13	. 15511	. 99090	26	. 00910	. 14601	13	. 85399	36
25	9. 84502	13	10. 15498	9. 99116	25	10. 00884	10. 14614	12	9. 85386	35
26	. 84515	13	. 15485	. 99141	25	. 00859	. 14626	13	. 85374	34
27	. 84528	12	. 15472	. 99166	25	. 00834	. 14639	12	. 85361	33
28	. 84540	13	. 15460	. 99191	26	. 00809	. 14651	12	. 85349	32
29	. 84553	13	. 15447	. 99217	25	. 00783	. 14663	13	. 85337	31
30	9. 84566	13	10. 15434	9. 99242	25	10. 00758	10. 14676	12	9. 85324	30
31	. 84579	13	. 15421	. 99267	26	. 00733	. 14688	13	. 85312	29
32	. 84592	13	. 15408	. 99293	25	. 00707	. 14701	12	. 85299	28
33	. 84605	13	. 15395	. 99318	25	. 00682	. 14713	13	. 85287	27
34	. 84618	12	. 15382	. 99343	25	. 00657	. 14726	12	. 85274	26
35	9. 84630	13	10. 15370	9. 99368	26	10. 00632	10. 14738	12	9. 85262	25
36	. 84643	13	. 15357	. 99394	25	. 00606	. 14750	13	. 85250	24
37	. 84656	13	. 15344	. 99419	25	. 00581	. 14763	12	. 85237	23
38	. 84669	13	. 15331	. 99444	25	. 00556	. 14775	13	. 85225	22
39	. 84682	12	. 15318	. 99469	26	. 00531	. 14788	12	. 85212	21
40	9. 84694	13	10. 15306	9. 99495	25	10. 00505	10. 14800	13	9. 85200	20
41	. 84707	13	. 15293	. 99520	25	. 00480	. 14813	12	. 85187	19
42	. 84720	13	. 15280	. 99545	25	. 00455	. 14825	13	. 85175	18
43	. 84733	12	. 15267	. 99570	26	. 00430	. 14838	12	. 85162	17
44	. 84745	13	. 15255	. 99596	25	. 00404	. 14850	13	. 85150	16
45	9. 84758	13	10. 15242	9. 99621	25	10. 00379	10. 14863	12	9. 85137	15
46	. 84771	13	. 15229	. 99646	26	. 00354	. 14875	13	. 85125	14
47	. 84784	12	. 15216	. 99672	25	. 00328	. 14888	12	. 85112	13
48	. 84796	13	. 15204	. 99697	25	. 00303	. 14900	13	. 85100	12
49	. 84809	13	. 15191	. 99722	25	. 00278	. 14913	13	. 85087	11
50	9. 84822	13	10. 15178	9. 99747	26	10. 00253	10. 14926	12	9. 85074	10
51	. 84835	12	. 15165	. 99773	25	. 00227	. 14938	13	. 85062	9
52	. 84847	13	. 15153	. 99798	25	. 00202	. 14951	12	. 85049	8
53	. 84860	13	. 15140	. 99823	25	. 00177	. 14963	13	. 85037	7
54	. 84873	12	. 15127	. 99848	26	. 00152	. 14976	12	. 85024	6
55	9. 84885	13	10. 15115	9. 99874	25	10. 00126	10. 14988	13	9. 85012	5
56	. 84898	13	. 15102	. 99899	25	. 00101	. 15001	13	. 84999	4
57	. 84911	12	. 15089	. 99924	25	. 00076	. 15014	12	. 84986	3
58	. 84923	13	. 15077	. 99949	26	. 00051	. 15026	13	. 84974	2
59	. 84936	13	. 15064	9. 99975	25	. 00025	. 15039	12	. 84961	1
60	9. 84949		10. 15051	10. 00000		10. 00000	10. 15051		9. 84949	0
↑ 134° →	cos	Diff. 1′	sec	cot	Diff. 1′	tan	csc	Diff. 1′	sin	↑ ← 45°

Haversines

′	0°		1°		2°		3°		4°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	Inf. Neg.	0. 00000	5. 88168	0. 00008	6. 48371	0. 00030	6. 83584	0. 00069	7. 08564	0. 00122	60
1	2. 32539	. 00000	. 89604	. 00008	. 49092	. 00031	. 84065	. 00069	. 08925	. 00123	59
2	2. 92745	. 00000	. 91016	. 00008	. 49807	. 00031	. 84543	. 00070	. 09284	. 00124	58
3	3. 27963	. 00000	. 92406	. 00008	. 50516	. 00032	. 85019	. 00071	. 09642	. 00125	57
4	. 52951	. 00000	. 93774	. 00009	. 51219	. 00033	. 85492	. 00072	. 09999	. 00126	56
5	3. 72333	0. 00000	5. 95121	0. 00009	6. 51916	0. 00033	6. 85963	0. 00072	7. 10354	0. 00127	55
6	3. 88169	. 00000	. 96447	. 00009	. 52608	. 00034	. 86431	. 00073	. 10708	. 00128	54
7	4. 01559	. 00000	. 97753	. 00009	. 53295	. 00034	. 86897	. 00074	. 11060	. 00129	53
8	. 13157	. 00000	5. 99040	. 00010	. 53976	. 00035	. 87360	. 00075	. 11411	. 00130	52
9	. 23388	. 00000	6. 00308	. 00010	. 54652	. 00035	. 87821	. 00076	. 11760	. 00131	51
10	4. 32539	0. 00000	6. 01557	0. 00010	6. 55323	0. 00036	6. 88279	0. 00076	7. 12108	0. 00132	50
11	. 40818	. 00000	. 02789	. 00011	. 55988	. 00036	. 88735	. 00077	. 12455	. 00133	49
12	. 48375	. 00000	. 04004	. 00011	. 56649	. 00037	. 89188	. 00078	. 12800	. 00134	48
13	. 55328	. 00000	. 05202	. 00011	. 57304	. 00037	. 89639	. 00079	. 13144	. 00135	47
14	. 61765	. 00000	. 06384	. 00012	. 57955	. 00038	. 90088	. 00080	. 13486	. 00136	46
15	4. 67757	0. 00000	6. 07550	0. 00012	6. 58600	0. 00039	6. 90535	0. 00080	7. 13827	0. 00137	45
16	. 73363	. 00001	. 08700	. 00012	. 59241	. 00039	. 90979	. 00081	. 14167	. 00139	44
17	. 78629	. 00001	. 09836	. 00013	. 59878	. 00040	. 91421	. 00082	. 14506	. 00140	43
18	. 83594	. 00001	. 10956	. 00013	. 60509	. 00040	. 91860	. 00083	. 14843	. 00141	42
19	. 88290	. 00001	. 12063	. 00013	. 61136	. 00041	. 92298	. 00084	. 15179	. 00142	41
20	4. 92745	0. 00001	6. 13155	0. 00014	6. 61759	0. 00041	6. 92733	0. 00085	7. 15513	0. 00143	40
21	4. 96983	. 00001	. 14234	. 00014	. 62377	. 00042	. 93166	. 00085	. 15846	. 00144	39
22	5. 01024	. 00001	. 15300	. 00014	. 62991	. 00043	. 93597	. 00086	. 16178	. 00145	38
23	. 04885	. 00001	. 16353	. 00015	. 63600	. 00043	. 94026	. 00087	. 16509	. 00146	37
24	. 08581	. 00001	. 17393	. 00015	. 64205	. 00044	. 94453	. 00088	. 16839	. 00147	36
25	5. 12127	0. 00001	6. 18421	0. 00015	6. 64806	0. 00044	6. 94877	0. 00089	7. 17167	0. 00148	35
26	. 15534	. 00001	. 19437	. 00016	. 65403	. 00045	. 95300	. 00090	. 17494	. 00150	34
27	. 18812	. 00002	. 20441	. 00016	. 65996	. 00046	. 95720	. 00091	. 17820	. 00151	33
28	. 21971	. 00002	. 21433	. 00016	. 66585	. 00046	. 96139	. 00091	. 18144	. 00152	32
29	. 25019	. 00002	. 22415	. 00017	. 67170	. 00047	. 96555	. 00092	. 18468	. 00153	31
30	5. 27963	0. 00002	6. 23385	0. 00017	6. 67751	0. 00048	6. 96970	0. 00093	7. 18790	0. 00154	30
31	. 30811	. 00002	. 24345	. 00018	. 68328	. 00048	. 97382	. 00094	. 19111	. 00155	29
32	. 33569	. 00002	. 25294	. 00018	. 68901	. 00049	. 97793	. 00095	. 19430	. 00156	28
33	. 36242	. 00002	. 26233	. 00018	. 69470	. 00050	. 98201	. 00096	. 19749	. 00158	27
34	. 38835	. 00002	. 27162	. 00019	. 70036	. 00050	. 98608	. 00097	. 20066	. 00159	26
35	5. 41352	0. 00003	6. 28081	0. 00019	6. 70598	0. 00051	6. 99013	0. 00098	7. 20383	0. 00160	25
36	. 43799	. 00003	. 28991	. 00019	. 71157	. 00051	. 99416	. 00099	. 20698	. 00161	24
37	. 46179	. 00003	. 29891	. 00020	. 71712	. 00052	6. 99817	. 00100	. 21012	. 00162	23
38	. 48496	. 00003	. 30781	. 00020	. 72263	. 00053	7. 00216	. 00100	. 21325	. 00163	22
39	. 50752	. 00003	. 31663	. 00021	. 72811	. 00053	. 00613	. 00101	. 21636	. 00165	21
40	5. 52951	0. 00003	6. 32536	0. 00021	6. 73355	0. 00054	7. 01009	0. 00102	7. 21947	0. 00166	20
41	. 55095	. 00004	. 33400	. 00022	. 73896	. 00055	. 01403	. 00103	. 22256	. 00167	19
42	. 57189	. 00004	. 34256	. 00022	. 74434	. 00056	. 01795	. 00104	. 22565	. 00168	18
43	. 59232	. 00004	. 35103	. 00022	. 74969	. 00056	. 02185	. 00105	. 22872	. 00169	17
44	. 61229	. 00004	. 35943	. 00023	. 75500	. 00057	. 02573	. 00106	. 23178	. 00171	16
45	5. 63181	0. 00004	6. 36774	0. 00023	6. 76028	0. 00058	7. 02960	0. 00107	7. 23483	0. 00172	15
46	. 65090	. 00004	. 37597	. 00024	. 76552	. 00058	. 03345	. 00108	. 23787	. 00173	14
47	. 66958	. 00005	. 38412	. 00024	. 77074	. 00059	. 03729	. 00109	. 24090	. 00174	13
48	. 68787	. 00005	. 39220	. 00025	. 77592	. 00060	. 04110	. 00110	. 24392	. 00175	12
49	. 70578	. 00005	. 40021	. 00025	. 78108	. 00060	. 04490	. 00111	. 24693	. 00177	11
50	5. 72332	0. 00005	6. 40814	0. 00026	6. 78620	0. 00061	7. 04869	0. 00112	7. 24993	0. 00178	10
51	. 74052	. 00006	. 41600	. 00026	. 79129	. 00062	. 05245	. 00113	. 25292	. 00179	9
52	. 75739	. 00006	. 42379	. 00027	. 79636	. 00063	. 05620	. 00114	. 25590	. 00180	8
53	. 77394	. 00006	. 43151	. 00027	. 80139	. 00063	. 05994	. 00115	. 25886	. 00181	7
54	. 79017	. 00006	. 43916	. 00027	. 80640	. 00064	. 06366	. 00116	. 26182	. 00183	6
55	5. 80611	0. 00006	6. 44675	0. 00028	6. 81137	0. 00065	7. 06736	0. 00117	7. 26477	0. 00184	5
56	. 82176	. 00007	. 45427	. 00028	. 81632	. 00066	. 07105	. 00118	. 26771	. 00185	4
57	. 83713	. 00007	. 46172	. 00029	. 82124	. 00066	. 07472	. 00119	. 27064	. 00186	3
58	. 85224	. 00007	. 46911	. 00029	. 82614	. 00067	. 07837	. 00120	. 27355	. 00188	2
59	. 86709	. 00007	. 47644	. 00030	. 83100	. 00068	. 08201	. 00121	. 27646	. 00189	1
60	5. 88168	0. 00008	6. 48371	0. 00030	6. 83584	0. 00069	7. 08564	0. 00122	7. 27936	0. 00190	0
	359°		358°		357°		356°		355°		

Haversines

′	5° Log Hav	5° Nat. Hav	6° Log Hav	6° Nat. Hav	7° Log Hav	7° Nat. Hav	8° Log Hav	8° Nat. Hav	9° Log Hav	9° Nat. Hav	′
0	7. 27936	0. 00190	7. 43760	0. 00274	7. 57135	0. 00373	7. 68717	0. 00487	7. 78929	0. 00616	60
1	. 28225	. 00192	. 44001	. 00275	. 57341	. 00374	. 68897	. 00489	. 79089	. 00618	59
2	. 28513	. 00193	. 44241	. 00277	. 57547	. 00376	. 69077	. 00491	. 79249	. 00620	58
3	. 28800	. 00194	. 44480	. 00278	. 57752	. 00378	. 69257	. 00493	. 79409	. 00622	57
4	. 29086	. 00195	. 44719	. 00280	. 57957	. 00380	. 69437	. 00495	. 79568	. 00625	56
5	7. 29371	0. 00197	7. 44957	0. 00282	7. 58162	0. 00382	7. 69616	0. 00497	7. 79728	0. 00627	55
6	. 29655	. 00198	. 45194	. 00283	. 58366	. 00383	. 69794	. 00499	. 79886	. 00629	54
7	. 29938	. 00199	. 45431	. 00285	. 58569	. 00385	. 69972	. 00501	. 80045	. 00632	53
8	. 30220	. 00201	. 45667	. 00286	. 58772	. 00387	. 70150	. 00503	. 80203	. 00634	52
9	. 30502	. 00202	. 45903	. 00288	. 58974	. 00389	. 70328	. 00505	. 80361	. 00636	51
10	7. 30782	0. 00203	7. 46138	0. 00289	7. 59176	0. 00391	7. 70505	0. 00507	7. 80519	0. 00639	50
11	. 31062	. 00204	. 46372	. 00291	. 59378	. 00392	. 70682	. 00509	. 80677	. 00641	49
12	. 31340	. 00206	. 46605	. 00292	. 59579	. 00394	. 70858	. 00511	. 80834	. 00643	48
13	. 31618	. 00207	. 46838	. 00294	. 59779	. 00396	. 71034	. 00513	. 80991	. 00646	47
14	. 31895	. 00208	. 47071	. 00296	. 59979	. 00398	. 71210	. 00515	. 81147	. 00648	46
15	7. 32171	0. 00210	7. 47302	0. 00297	7. 60179	0. 00400	7. 71385	0. 00517	7. 81303	0. 00650	45
16	. 32446	. 00211	. 47533	. 00299	. 60378	. 00402	. 71560	. 00520	. 81459	. 00653	44
17	. 32720	. 00212	. 47764	. 00300	. 60577	. 00403	. 71735	. 00522	. 81615	. 00655	43
18	. 32994	. 00214	. 47994	. 00302	. 60775	. 00405	. 71909	. 00524	. 81771	. 00657	42
19	. 33266	. 00215	. 48223	. 00304	. 60973	. 00407	. 72083	. 00526	. 81926	. 00660	41
20	7. 33538	0. 00216	7. 48452	0. 00305	7. 61170	0. 00409	7. 72257	0. 00528	7. 82081	0. 00662	40
21	. 33809	. 00218	. 48680	. 00307	. 61367	. 00411	. 72430	. 00530	. 82235	. 00664	39
22	. 34079	. 00219	. 48907	. 00308	. 61564	. 00413	. 72603	. 00532	. 82390	. 00667	38
23	. 34348	. 00221	. 49134	. 00310	. 61760	. 00415	. 72775	. 00534	. 82544	. 00669	37
24	. 34616	. 00222	. 49360	. 00312	. 61955	. 00416	. 72948	. 00536	. 82698	. 00671	36
25	7. 34884	0. 00223	7. 49586	0. 00313	7. 62151	0. 00418	7. 73119	0. 00539	7. 82851	0. 00674	35
26	. 35150	. 00225	. 49811	. 00315	. 62345	. 00420	. 73291	. 00541	. 83004	. 00676	34
27	. 35416	. 00226	. 50036	. 00316	. 62540	. 00422	. 73462	. 00543	. 83157	. 00679	33
28	. 35681	. 00227	. 50259	. 00318	. 62733	. 00424	. 73633	. 00545	. 83310	. 00681	32
29	. 35945	. 00229	. 50483	. 00320	. 62927	. 00426	. 73803	. 00547	. 83463	. 00683	31
30	7. 36209	0. 00230	7. 50706	0. 00321	7. 63120	0. 00428	7. 73974	0. 00549	7. 83615	0. 00686	30
31	. 36471	. 00232	. 50928	. 00323	. 63312	. 00430	. 74143	. 00551	. 83767	. 00688	29
32	. 36733	. 00233	. 51149	. 00325	. 63504	. 00432	. 74313	. 00554	. 83918	. 00691	28
33	. 36994	. 00234	. 51370	. 00326	. 63696	. 00433	. 74482	. 00556	. 84070	. 00693	27
34	. 37254	. 00236	. 51591	. 00328	. 63887	. 00435	. 74651	. 00558	. 84221	. 00695	26
35	7. 37514	0. 00237	7. 51811	0. 00330	7. 64078	0. 00437	7. 74819	0. 00560	7. 84372	0. 00698	25
36	. 37773	. 00239	. 52030	. 00331	. 64269	. 00439	. 74988	. 00562	. 84522	. 00700	24
37	. 38030	. 00240	. 52249	. 00333	. 64458	. 00441	. 75155	. 00564	. 84672	. 00703	23
38	. 38288	. 00241	. 52467	. 00335	. 64648	. 00443	. 75323	. 00567	. 84822	. 00705	22
39	. 38544	. 00243	. 52685	. 00336	. 64837	. 00445	. 75490	. 00569	. 84972	. 00707	21
40	7. 38800	0. 00244	7. 52902	0. 00338	7. 65026	0. 00447	7. 75657	0. 00571	7. 85122	0. 00710	20
41	. 39054	. 00246	. 53119	. 00340	. 65214	. 00449	. 75824	. 00573	. 85271	. 00712	19
42	. 39309	. 00247	. 53335	. 00341	. 65402	. 00451	. 75990	. 00575	. 85420	. 00715	18
43	. 39562	. 00249	. 53550	. 00343	. 65590	. 00453	. 76156	. 00578	. 85569	. 00717	17
44	. 39815	. 00250	. 53766	. 00345	. 65777	. 00455	. 76321	. 00580	. 85717	. 00720	16
45	7. 40067	0. 00252	7. 53980	0. 00347	7. 65964	0. 00457	7. 76487	0. 00582	7. 85866	0. 00722	15
46	. 40318	. 00253	. 54194	. 00348	. 66150	. 00459	. 76652	. 00584	. 86014	. 00725	14
47	. 40568	. 00255	. 54407	. 00350	. 66336	. 00461	. 76816	. 00586	. 86161	. 00727	13
48	. 40818	. 00256	. 54620	. 00352	. 66521	. 00463	. 76981	. 00589	. 86309	. 00730	12
49	. 41067	. 00257	. 54833	. 00353	. 66706	. 00465	. 77145	. 00591	. 86456	. 00732	11
50	7. 41315	0. 00259	7. 55045	0. 00355	7. 66891	0. 00467	7. 77308	0. 00593	7. 86603	0. 00735	10
51	. 41563	. 00260	. 55256	. 00357	. 67075	. 00469	. 77472	. 00595	. 86750	. 00737	9
52	. 41810	. 00262	. 55467	. 00359	. 67259	. 00471	. 77635	. 00598	. 86896	. 00740	8
53	. 42056	. 00263	. 55677	. 00360	. 67443	. 00473	. 77798	. 00600	. 87042	. 00742	7
54	. 42301	. 00265	. 55887	. 00362	. 67626	. 00475	. 77960	. 00602	. 87188	. 00745	6
55	7. 42546	0. 00266	7. 56096	0. 00364	7. 67809	0. 00477	7. 78122	0. 00604	7. 87334	0. 00747	5
56	. 42790	. 00268	. 56305	. 00366	. 67991	. 00479	. 78284	. 00607	. 87480	. 00750	4
57	. 43034	. 00269	. 56513	. 00367	. 68173	. 00481	. 78446	. 00609	. 87625	. 00752	3
58	. 43277	. 00271	. 56721	. 00369	. 68355	. 00483	. 78607	. 00611	. 87770	. 00755	2
59	. 43519	. 00272	. 56928	. 00371	. 68536	. 00485	. 78768	. 00613	. 87915	. 00757	1
60	7. 43760	0. 00274	7. 57135	0. 00373	7. 68717	0. 00487	7. 78929	0. 00616	7. 88059	0. 00760	0
	354°		353°		352°		351°		350°		

Haversines

′	10°		11°		12°		13°		14°		
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	7. 88059	0. 00760	7. 96315	0. 00919	8. 03847	0. 01093	8. 10772	0. 01281	8. 17179	0. 01485	60
1	. 88203	. 00762	. 96446	. 00921	. 03967	. 01096	. 10883	. 01285	. 17282	. 01489	59
2	. 88348	. 00765	. 96577	. 00924	. 04087	. 01099	. 10993	. 01288	. 17384	. 01492	58
3	. 88491	. 00767	. 96707	. 00927	. 04207	. 01102	. 11104	. 01291	. 17487	. 01496	57
4	. 88635	. 00770	. 96838	. 00930	. 04326	. 01105	. 11214	. 01295	. 17590	. 01499	56
5	7. 88778	0. 00772	7. 96968	0. 00933	8. 04446	0. 01108	8. 11324	0. 01298	8. 17692	0. 01503	55
6	. 88921	. 00775	. 97098	. 00935	. 04565	. 01111	. 11435	. 01301	. 17794	. 01506	54
7	. 89064	. 00777	. 97228	. 00938	. 04684	. 01114	. 11544	. 01305	. 17896	. 01510	53
8	. 89207	. 00780	. 97358	. 00941	. 04803	. 01117	. 11654	. 01308	. 17998	. 01513	52
9	. 89349	. 00783	. 97487	. 00944	. 04922	. 01120	. 11764	. 01311	. 18100	. 01517	51
10	7. 89491	0. 00785	7. 97617	0. 00947	8. 05041	0. 01123	8. 11873	0. 01314	8. 18202	0. 01521	50
11	. 89633	. 00788	. 97746	. 00949	. 05159	. 01126	. 11983	. 01318	. 18303	. 01524	49
12	. 89775	. 00790	. 97875	. 00952	. 05277	. 01129	. 12092	. 01321	. 18405	. 01528	48
13	. 89916	. 00793	. 98003	. 00955	. 05395	. 01132	. 12201	. 01324	. 18506	. 01531	47
14	. 90057	. 00795	. 98132	. 00958	. 05513	. 01135	. 12310	. 01328	. 18607	. 01535	46
15	7. 90198	0. 00798	7. 98260	0. 00961	8. 05631	0. 01138	8. 12419	0. 01331	8. 18709	0. 01538	45
16	. 90339	. 00801	. 98389	. 00964	. 05749	. 01142	. 12528	. 01334	. 18810	. 01542	44
17	. 90480	. 00803	. 98517	. 00966	. 05866	. 01145	. 12636	. 01338	. 18910	. 01546	43
18	. 90620	. 00806	. 98644	. 00969	. 05984	. 01148	. 12745	. 01341	. 19011	. 01549	42
19	. 90760	. 00808	. 98772	. 00972	. 06101	. 01151	. 12853	. 01344	. 19112	. 01553	41
20	7. 90900	0. 00811	7. 98899	0. 00975	8. 06218	0. 01154	8. 12961	0. 01348	8. 19212	0. 01556	40
21	. 91039	. 00814	. 99027	. 00978	. 06335	. 01157	. 13069	. 01351	. 19313	. 01560	39
22	. 91179	. 00816	. 99154	. 00981	. 06451	. 01160	. 13177	. 01354	. 19413	. 01564	38
23	. 91318	. 00819	. 99281	. 00984	. 06568	. 01163	. 13285	. 01358	. 19513	. 01567	37
24	. 91457	. 00821	. 99407	. 00986	. 06684	. 01166	. 13392	. 01361	. 19613	. 01571	36
25	7. 91596	0. 00824	7. 99534	0. 00989	8. 06800	0. 01170	8. 13500	0. 01365	8. 19713	0. 01574	35
26	. 91734	. 00827	. 99660	. 00992	. 06917	. 01173	. 13607	. 01368	. 19813	. 01578	34
27	. 91872	. 00829	. 99786	. 00995	. 07032	. 01176	. 13714	. 01371	. 19913	. 01582	33
28	. 92010	. 00832	7. 99912	. 00998	. 07148	. 01179	. 13822	. 01375	. 20012	. 01585	32
29	. 92148	. 00835	8. 00038	. 01001	. 07264	. 01182	. 13928	. 01378	. 20112	. 01589	31
30	7. 92286	0. 00837	8. 00163	0. 01004	8. 07379	0. 01185	8. 14035	0. 01382	8. 20211	0. 01593	30
31	. 92423	. 00840	. 00289	. 01007	. 07494	. 01188	. 14142	. 01385	. 20310	. 01596	29
32	. 92560	. 00843	. 00414	. 01010	. 07610	. 01192	. 14248	. 01388	. 20410	. 01600	28
33	. 92697	. 00845	. 00539	. 01012	. 07725	. 01195	. 14355	. 01392	. 20509	. 01604	27
34	. 92834	. 00848	. 00664	. 01015	. 07839	. 01198	. 14461	. 01395	. 20608	. 01607	26
35	7. 92970	0. 00851	8. 00788	0. 01018	8. 07954	0. 01201	8. 14567	0. 01399	8. 20706	0. 01611	25
36	. 93107	. 00853	. 00913	. 01021	. 08069	. 01204	. 14673	. 01402	. 20805	. 01615	24
37	. 93243	. 00856	. 01037	. 01024	. 08183	. 01207	. 14779	. 01405	. 20904	. 01618	23
38	. 93379	. 00859	. 01161	. 01027	. 08297	. 01211	. 14885	. 01409	. 21002	. 01622	22
39	. 93514	. 00861	. 01285	. 01030	. 08411	. 01214	. 14991	. 01412	. 21100	. 01626	21
40	7. 93650	0. 00864	8. 01409	0. 01033	8. 08525	0. 01217	8. 15096	0. 01416	8. 21199	0. 01629	20
41	. 93785	. 00867	. 01532	. 01036	. 08639	. 01220	. 15201	. 01419	. 21297	. 01633	19
42	. 93920	. 00869	. 01656	. 01039	. 08752	. 01223	. 15307	. 01423	. 21395	. 01637	18
43	. 94055	. 00872	. 01779	. 01042	. 08866	. 01226	. 15412	. 01426	. 21493	. 01640	17
44	. 94189	. 00875	. 01902	. 01045	. 08979	. 01230	. 15517	. 01429	. 21590	. 01644	16
45	7. 94324	0. 00877	8. 02025	0. 01048	8. 09092	0. 01233	8. 15622	0. 01433	8. 21688	0. 01648	15
46	. 94458	. 00880	. 02148	. 01051	. 09205	. 01236	. 15726	. 01436	. 21785	. 01651	14
47	. 94592	. 00883	. 02270	. 01054	. 09318	. 01239	. 15831	. 01440	. 21883	. 01655	13
48	. 94726	. 00886	. 02392	. 01057	. 09431	. 01243	. 15935	. 01443	. 21980	. 01659	12
49	. 94859	. 00888	. 02515	. 01060	. 09543	. 01246	. 16040	. 01447	. 22077	. 01663	11
50	7. 94992	0. 00891	8. 02637	0. 01063	8. 09656	0. 01249	8. 16144	0. 01450	8. 22175	0. 01666	10
51	. 95126	. 00894	. 02758	. 01066	. 09768	. 01252	. 16248	. 01454	. 22272	. 01670	9
52	. 95259	. 00897	. 02880	. 01069	. 09880	. 01255	. 16352	. 01457	. 22368	. 01674	8
53	. 95391	. 00899	. 03001	. 01072	. 09992	. 01259	. 16456	. 01461	. 22465	. 01677	7
54	. 95524	. 00902	. 03123	. 01075	. 10104	. 01262	. 16559	. 01464	. 22562	. 01681	6
55	7. 95656	0. 00905	8. 03244	0. 01078	8. 10216	0. 01265	8. 16663	0. 01468	8. 22658	0. 01685	5
56	. 95788	. 00908	. 03365	. 01081	. 10327	. 01268	. 16766	. 01471	. 22755	. 01689	4
57	. 95920	. 00910	. 03486	. 01084	. 10439	. 01272	. 16870	. 01475	. 22851	. 01692	3
58	. 96052	. 00913	. 03606	. 01087	. 10550	. 01275	. 16973	. 01478	. 22947	. 01696	2
59	. 96183	. 00916	. 03727	. 01090	. 10661	. 01278	. 17076	. 01482	. 23044	. 01700	1
60	7. 96315	0. 00919	8. 03847	0. 01093	8. 10772	0. 01281	8. 17179	0. 01485	8. 23140	0. 01704	0
	349°		348°		347°		346°		345°		

Haversines

′	15°		16°		17°		18°		19°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	8. 23140	0. 01704	8. 28711	0. 01937	8. 33940	0. 02185	8. 38867	0. 02447	8. 43522	0. 02724	60
1	. 23235	. 01707	. 28801	. 01941	. 34025	. 02189	. 38946	. 02452	. 43597	. 02729	59
2	. 23331	. 01711	. 28891	. 01945	. 34109	. 02193	. 39026	. 02456	. 43673	. 02734	58
3	. 23427	. 01715	. 28980	. 01949	. 34194	. 02198	. 39105	. 02461	. 43748	. 02738	57
4	. 23523	. 01719	. 29070	. 01953	. 34278	. 02202	. 39185	. 02465	. 43823	. 02743	56
5	8. 23618	0. 01723	8. 29159	0. 01957	8. 34362	0. 02206	8. 39264	0. 02470	8. 43899	0. 02748	55
6	. 23713	. 01726	. 29249	. 01961	. 34446	. 02210	. 39344	. 02474	. 43974	. 02753	54
7	. 23809	. 01730	. 29338	. 01965	. 34539	. 02215	. 39423	. 02479	. 44049	. 02757	53
8	. 23904	. 01734	. 29427	. 01969	. 34614	. 02219	. 39502	. 02483	. 44124	. 02762	52
9	. 23999	. 01738	. 29516	. 01973	. 34698	. 02223	. 39581	. 02488	. 44199	. 02767	51
10	8. 24094	0. 01742	8. 29605	0. 01977	8. 34782	0. 02227	8. 39660	0. 02492	8. 44273	0. 02772	50
11	. 24189	. 01745	. 29694	. 01981	. 34865	. 02232	. 39739	. 02497	. 44348	. 02776	49
12	. 24283	. 01749	. 29783	. 01985	. 34949	. 02236	. 39818	. 02501	. 44423	. 02781	48
13	. 24378	. 01753	. 29872	. 01989	. 35032	. 02240	. 39897	. 02506	. 44498	. 02786	47
14	. 24473	. 01757	. 29960	. 01993	. 35116	. 02245	. 39976	. 02510	. 44572	. 02791	46
15	8. 24567	0. 01761	8. 30049	0. 01998	8. 35199	0. 02249	8. 40055	0. 02515	8. 44647	0. 02796	45
16	. 24661	. 01764	. 30137	. 02002	. 35282	. 02253	. 40133	. 02520	. 44721	. 02800	44
17	. 24755	. 01768	. 30226	. 02006	. 35365	. 02258	. 40212	. 02524	. 44796	. 02805	43
18	. 24850	. 01772	. 30314	. 02010	. 35449	. 02262	. 40290	. 02529	. 44870	. 02810	42
19	. 24944	. 01776	. 30402	. 02014	. 35532	. 02266	. 40369	. 02533	. 44944	. 02815	41
20	8. 25037	0. 01780	8. 30490	0. 02018	8. 35614	0. 02271	8. 40447	0. 02538	8. 45018	0. 02820	40
21	. 25131	. 01784	. 30578	. 02022	. 35697	. 02275	. 40525	. 02542	. 45093	. 02824	39
22	. 25225	. 01788	. 30666	. 02026	. 35780	. 02279	. 40603	. 02547	. 45167	. 02829	38
23	. 25319	. 01791	. 30754	. 02030	. 35863	. 02284	. 40681	. 02552	. 45241	. 02834	37
24	. 25412	. 01795	. 30842	. 02034	. 35945	. 02288	. 40760	. 02556	. 45315	. 02839	36
25	8. 25505	0. 01799	8. 30929	0. 02038	8. 36028	0. 02292	8. 40837	0. 02561	8. 45388	0. 02844	35
26	. 25599	. 01803	. 31017	. 02043	. 36110	. 02297	. 40915	. 02565	. 45462	. 02849	34
27	. 25692	. 01807	. 31104	. 02047	. 36193	. 02301	. 40993	. 02570	. 45536	. 02853	33
28	. 25785	. 01811	. 31192	. 02051	. 36275	. 02305	. 41071	. 02575	. 45610	. 02858	32
29	. 25878	. 01815	. 31279	. 02055	. 36357	. 02310	. 41149	. 02579	. 45683	. 02863	31
30	8. 25971	0. 01818	8. 31366	0. 02059	8. 36439	0. 02314	8. 41226	0. 02584	8. 45757	0. 02868	30
31	. 26064	. 01822	. 31453	. 02063	. 36521	. 02319	. 41304	. 02588	. 45830	. 02873	29
32	. 26156	. 01826	. 31540	. 02067	. 36603	. 02323	. 41381	. 02593	. 45904	. 02878	28
33	. 26249	. 01830	. 31627	. 02071	. 36685	. 02327	. 41459	. 02598	. 45977	. 02883	27
34	. 26341	. 01834	. 31714	. 02076	. 36767	. 02332	. 41536	. 02602	. 46050	. 02887	26
35	8. 26434	0. 01838	8. 31800	0. 02080	8. 36849	0. 02336	8. 41613	0. 02607	8. 46124	0. 02892	25
36	. 26526	. 01842	. 31887	. 02084	. 36930	. 02340	. 41690	. 02612	. 46197	. 02897	24
37	. 26618	. 01846	. 31974	. 02088	. 37012	. 02345	. 41767	. 02616	. 46270	. 02902	23
38	. 26710	. 01850	. 32060	. 02092	. 37093	. 02349	. 41845	. 02621	. 46343	. 02907	22
39	. 26802	. 01854	. 32147	. 02096	. 37175	. 02354	. 41921	. 02626	. 46416	. 02912	21
40	8. 26894	0. 01858	8. 32233	0. 02101	8. 37256	0. 02358	8. 41998	0. 02630	8. 46489	0. 02917	20
41	. 26986	. 01861	. 32319	. 02105	. 37337	. 02363	. 42075	. 02635	. 46562	. 02922	19
42	. 27078	. 01865	. 32405	. 02109	. 37419	. 02367	. 42152	. 02639	. 46634	. 02926	18
43	. 27169	. 01869	. 32491	. 02113	. 37500	. 02371	. 42229	. 02644	. 46707	. 02931	17
44	. 27261	. 01873	. 32577	. 02117	. 37581	. 02376	. 42305	. 02649	. 46780	. 02936	16
45	8. 27352	0. 01877	8. 32663	0. 02121	8. 37662	0. 02380	8. 42382	0. 02653	8. 46852	0. 02941	15
46	. 27443	. 01881	. 32749	. 02126	. 37742	. 02385	. 42458	. 02658	. 46925	. 02946	14
47	. 27534	. 01885	. 32834	. 02130	. 37823	. 02389	. 42535	. 02663	. 46998	. 02951	13
48	. 27626	. 01889	. 32920	. 02134	. 37904	. 02394	. 42611	. 02668	. 47070	. 02956	12
49	. 27717	. 01893	. 33006	. 02138	. 37985	. 02398	. 42687	. 02672	. 47142	. 02961	11
50	8. 27807	0. 01897	8. 33091	0. 02142	8. 38065	0. 02402	8. 42764	0. 02677	8. 47215	0. 02966	10
51	. 27898	. 01901	. 33176	. 02147	. 38146	. 02407	. 42840	. 02682	. 47287	. 02971	9
52	. 27989	. 01905	. 33262	. 02151	. 38226	. 02411	. 42916	. 02686	. 47359	. 02976	8
53	. 28080	. 01909	. 33347	. 02155	. 38306	. 02416	. 42992	. 02691	. 47431	. 02981	7
54	. 28170	. 01913	. 33432	. 02159	. 38387	. 02420	. 43068	. 02696	. 47503	. 02986	6
55	8. 28260	0. 01917	8. 33517	0. 02164	8. 38467	0. 02425	8. 43144	0. 02700	8. 47575	0. 02991	5
56	. 28351	. 01921	. 33602	. 02168	. 38547	. 02429	. 43219	. 02705	. 47647	. 02996	4
57	. 28441	. 01925	. 33686	. 02172	. 38627	. 02434	. 43295	. 02710	. 47719	. 03000	3
58	. 28531	. 01929	. 33771	. 02176	. 38707	. 02438	. 43371	. 02715	. 47791	. 03005	2
59	. 28621	. 01933	. 33856	. 02181	. 38787	. 02443	. 43446	. 02719	. 47862	. 03010	1
60	8. 28711	0. 01937	8. 33940	0. 02185	8. 38867	0. 02447	8. 43522	0. 02724	8. 47934	0. 03015	0
	344°		343°		342°		341°		340°		

Haversines

′	20°		21°		22°		23°		24°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	8. 47934	0. 03015	8. 52127	0. 03321	8. 56120	0. 03641	8. 59931	0. 03975	8. 63576	0. 04323	60
1	. 48006	. 03020	. 52195	. 03326	. 56185	. 03646	. 59993	. 03980	. 63635	. 04329	59
2	. 48077	. 03025	. 52263	. 03331	. 56250	. 03652	. 60055	. 03986	. 63695	. 04335	58
3	. 48149	. 03030	. 52331	. 03337	. 56315	. 03657	. 60117	. 03992	. 63754	. 04340	57
4	. 48220	. 03035	. 52399	. 03342	. 56379	. 03663	. 60179	. 03998	. 63813	. 04346	56
5	8. 48292	0. 03040	8. 52467	0. 03347	8. 56444	0. 03668	8. 60241	0. 04003	8. 63872	0. 04352	55
6	. 48363	. 03045	. 52535	. 03352	. 56509	. 03674	. 60303	. 04009	. 63932	. 04358	54
7	. 48434	. 03050	. 52602	. 03358	. 56574	. 03679	. 60365	. 04015	. 63991	. 04364	53
8	. 48505	. 03055	. 52670	. 03363	. 56638	. 03685	. 60426	. 04020	. 64050	. 04370	52
9	. 48576	. 03060	. 52738	. 03368	. 56703	. 03690	. 60488	. 04026	. 64109	. 04376	51
10	8. 48648	0. 03065	8. 52806	0. 03373	8. 56767	0. 03695	8. 60550	0. 04032	8. 64168	0. 04382	50
11	. 48719	. 03070	. 52873	. 03379	. 56832	. 03701	. 60611	. 04038	. 64227	. 04388	49
12	. 48789	. 03075	. 52941	. 03384	. 56896	. 03706	. 60673	. 04043	. 64286	. 04394	48
13	. 48860	. 03080	. 53008	. 03389	. 56960	. 03712	. 60734	. 04049	. 64345	. 04400	47
14	. 48931	. 03085	. 53076	. 03394	. 57025	. 03717	. 60796	. 04055	. 64404	. 04406	46
15	8. 49002	0. 03090	8. 53143	0. 03400	8. 57089	0. 03723	8. 60857	0. 04060	8. 64463	0. 04412	45
16	. 49073	. 03095	. 53210	. 03405	. 57153	. 03728	. 60919	. 04066	. 64521	. 04418	44
17	. 49143	. 03101	. 53277	. 03410	. 57217	. 03734	. 60980	. 04072	. 64580	. 04424	43
18	. 49214	. 03106	. 53345	. 03415	. 57282	. 03740	. 61041	. 04078	. 64639	. 04430	42
19	. 49284	. 03111	. 53412	. 03421	. 57346	. 03745	. 61103	. 04083	. 64697	. 04436	41
20	8. 49355	0. 03116	8. 53479	0. 03426	8. 57410	0. 03751	8. 61164	0. 04089	8. 64756	0. 04442	40
21	. 49425	. 03121	. 53546	. 03431	. 57474	. 03756	. 61225	. 04095	. 64815	. 04448	39
22	. 49496	. 03126	. 53613	. 03437	. 57538	. 03762	. 61286	. 04101	. 64873	. 04454	38
23	. 49566	. 03131	. 53680	. 03442	. 57601	. 03767	. 61347	. 04106	. 64932	. 04460	37
24	. 49636	. 03136	. 53747	. 03447	. 57665	. 03773	. 61408	. 04112	. 64990	. 04466	36
25	8. 49706	0. 03141	8. 53814	0. 03453	8. 57729	0. 03778	8. 61469	0. 04118	8. 65049	0. 04472	35
26	. 49777	. 03146	. 53880	. 03458	. 57793	. 03784	. 61530	. 04124	. 65107	. 04478	34
27	. 49847	. 03151	. 53947	. 03463	. 57856	. 03789	. 61591	. 04130	. 65165	. 04484	33
28	. 49917	. 03156	. 54014	. 03468	. 57920	. 03795	. 61652	. 04135	. 65224	. 04490	32
29	. 49987	. 03161	. 54080	. 03474	. 57984	. 03800	. 61713	. 04141	. 65282	. 04496	31
30	8. 50056	0. 03166	8. 54147	0. 03479	8. 58047	0. 03806	8. 61773	0. 04147	8. 65340	0. 04502	30
31	. 50126	. 03171	. 54214	. 03484	. 58111	. 03812	. 61834	. 04153	. 65398	. 04508	29
32	. 50196	. 03177	. 54280	. 03490	. 58174	. 03817	. 61895	. 04159	. 65456	. 04514	28
33	. 50266	. 03182	. 54346	. 03495	. 58238	. 03823	. 61955	. 04164	. 65514	. 04520	27
34	. 50335	. 03187	. 54413	. 03500	. 58301	. 03828	. 62016	. 04170	. 65572	. 04526	26
35	8. 50405	0. 03192	8. 54479	0. 03506	8. 58364	0. 03834	8. 62077	0. 04176	8. 65630	0. 04532	25
36	. 50475	. 03197	. 54545	. 03511	. 58427	. 03839	. 62137	. 04182	. 65688	. 04538	24
37	. 50544	. 03202	. 54612	. 03517	. 58491	. 03845	. 62197	. 04188	. 65746	. 04544	23
38	. 50614	. 03207	. 54678	. 03522	. 58554	. 03851	. 62258	. 04194	. 65804	. 04550	22
39	. 50683	. 03212	. 54744	. 03527	. 58617	. 03856	. 62318	. 04199	. 65862	. 04556	21
40	8. 50752	0. 03218	8. 54810	0. 03533	8. 58680	0. 03862	8. 62379	0. 04205	8. 65920	0. 04562	20
41	. 50821	. 03223	. 54876	. 03538	. 58743	. 03867	. 62439	. 04211	. 65978	. 04569	19
42	. 50891	. 03228	. 54942	. 03543	. 58806	. 03873	. 62499	. 04217	. 66035	. 04575	18
43	. 50960	. 03233	. 55008	. 03549	. 58869	. 03879	. 62559	. 04223	. 66093	. 04581	17
44	. 51029	. 03238	. 55073	. 03554	. 58932	. 03884	. 62619	. 04229	. 66151	. 04587	16
45	8. 51098	0. 03243	8. 55139	0. 03560	8. 58994	0. 03890	8. 62680	0. 04234	8. 66208	0. 04593	15
46	. 51167	. 03248	. 55205	. 03565	. 59057	. 03896	. 62740	. 04240	. 66266	. 04599	14
47	. 51236	. 03254	. 55271	. 03570	. 59120	. 03901	. 62800	. 04246	. 66323	. 04605	13
48	. 51305	. 03259	. 55336	. 03576	. 59183	. 03907	. 62860	. 04252	. 66381	. 04611	12
49	. 51374	. 03264	. 55402	. 03581	. 59245	. 03912	. 62919	. 04258	. 66438	. 04617	11
50	8. 51442	0. 03269	8. 55467	0. 03587	8. 59308	0. 03918	8. 62979	0. 04264	8. 66496	0. 04623	10
51	. 51511	. 03274	. 55533	. 03592	. 59370	. 03924	. 63039	. 04270	. 66553	. 04629	9
52	. 51580	. 03279	. 55598	. 03597	. 59433	. 03929	. 63099	. 04276	. 66610	. 04636	8
53	. 51648	. 03285	. 55664	. 03603	. 59495	. 03935	. 63159	. 04281	. 66668	. 04642	7
54	. 51717	. 03290	. 55729	. 03608	. 59558	. 03941	. 63218	. 04287	. 66725	. 04648	6
55	8. 51785	0. 03295	8. 55794	0. 03614	8. 59620	0. 03946	8. 63278	0. 04293	8. 66782	0. 04654	5
56	. 51854	. 03300	. 55859	. 03619	. 59682	. 03952	. 63338	. 04299	. 66839	. 04660	4
57	. 51922	. 03305	. 55925	. 03624	. 59745	. 03958	. 63397	. 04305	. 66896	. 04666	3
58	. 51990	. 03311	. 55990	. 03630	. 59807	. 03963	. 63457	. 04311	. 66953	. 04672	2
59	. 52058	. 03316	. 56055	. 03635	. 59869	. 03969	. 63516	. 04317	. 67010	. 04678	1
60	8. 52127	0. 03321	8. 56120	0. 03641	8. 59931	0. 03975	8. 63576	0. 04323	8. 67067	0. 04685	0
	339°		338°		337°		336°		335°		

Haversines

′	25°		26°		27°		28°		29°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	8. 67067	0. 04685	8. 70418	0. 05060	8. 73637	0. 05450	8. 76735	0. 05853	8. 79720	0. 06269	60
1	. 67124	. 04691	. 70472	. 05067	. 73690	. 05456	. 76786	. 05859	. 79769	. 06276	59
2	. 67181	. 04697	. 70527	. 05073	. 73742	. 05463	. 76836	. 05866	. 79818	. 06283	58
3	. 67238	. 04703	. 70582	. 05079	. 73795	. 05469	. 76887	. 05873	. 79866	. 06290	57
4	. 67295	. 04709	. 70636	. 05086	. 73847	. 05476	. 76938	. 05880	. 79915	. 06297	56
5	8. 67352	0. 04715	8. 70691	0. 05092	8. 73900	0. 05483	8. 76988	0. 05887	8. 79964	0. 06304	55
6	. 67409	. 04722	. 70745	. 05099	. 73952	. 05489	. 77039	. 05894	. 80013	. 06311	54
7	. 67465	. 04728	. 70800	. 05105	. 74005	. 05496	. 77089	. 05901	. 80061	. 06318	53
8	. 67522	. 04734	. 70854	. 05111	. 74057	. 05503	. 77139	. 05907	. 80110	. 06326	52
9	. 67579	. 04740	. 70909	. 05118	. 74109	. 05509	. 77190	. 05914	. 80158	. 06333	51
10	8. 67635	0. 04746	8. 70963	0. 05124	8. 74162	0. 05516	8. 77240	0. 05921	8. 80207	0. 06340	50
11	. 67692	. 04752	. 71017	. 05131	. 74214	. 05523	. 77291	. 05928	. 80256	. 06347	49
12	. 67748	. 04759	. 71072	. 05137	. 74266	. 05529	. 77341	. 05935	. 80304	. 06354	48
13	. 67805	. 04765	. 71126	. 05144	. 74318	. 05536	. 77391	. 05942	. 80353	. 06361	47
14	. 67861	. 04771	. 71180	. 05150	. 74371	. 05542	. 77441	. 05949	. 80401	. 06368	46
15	8. 67918	0. 04777	8. 71234	0. 05156	8. 74423	0. 05549	8. 77492	0. 05955	8. 80449	0. 06375	45
16	. 67974	. 04783	. 71289	. 05163	. 74475	. 05556	. 77542	. 05962	. 80498	. 06382	44
17	. 68030	. 04790	. 71343	. 05169	. 74527	. 05562	. 77592	. 05969	. 80546	. 06389	43
18	. 68087	. 04796	. 71397	. 05176	. 74579	. 05569	. 77642	. 05976	. 80595	. 06397	42
19	. 68143	. 04802	. 71451	. 05182	. 74631	. 05576	. 77692	. 05983	. 80643	. 06404	41
20	8. 68199	0. 04808	8. 71505	0. 05189	8. 74683	0. 05582	8. 77742	0. 05990	8. 80691	0. 06411	40
21	. 68256	. 04815	. 71559	. 05195	. 74735	. 05589	. 77792	. 05997	. 80739	. 06418	39
22	. 68312	. 04821	. 71613	. 05201	. 74787	. 05596	. 77842	. 06004	. 80788	. 06425	38
23	. 68368	. 04827	. 71667	. 05208	. 74839	. 05603	. 77892	. 06011	. 80836	. 06432	37
24	. 68424	. 04833	. 71721	. 05214	. 74890	. 05609	. 77942	. 06018	. 80884	. 06439	36
25	8. 68480	0. 04839	8. 71774	0. 05221	8. 74942	0. 05616	8. 77992	0. 06024	8. 80932	0. 06446	35
26	. 68536	. 04846	. 71828	. 05227	. 74994	. 05623	. 78042	. 06031	. 80980	. 06454	34
27	. 68592	. 04852	. 71882	. 05234	. 75046	. 05629	. 78092	. 06038	. 81028	. 06461	33
28	. 68648	. 04858	. 71930	. 05240	. 75097	. 05636	. 78142	. 06045	. 81076	. 06468	32
29	. 68704	. 04864	. 71989	. 05247	. 75149	. 05643	. 78191	. 06052	. 81124	. 06475	31
30	8. 68760	0. 04871	8. 72043	0. 05253	8. 75201	0. 05649	8. 78241	0. 06059	8. 81172	0. 06482	30
31	. 68815	. 04877	. 72097	. 05260	. 75252	. 05656	. 78291	. 06066	. 81220	. 06489	29
32	. 68871	. 04883	. 72150	. 05266	. 75304	. 05663	. 78341	. 06073	. 81268	. 06497	28
33	. 68927	. 04890	. 72204	. 05273	. 75355	. 05670	. 78390	. 06080	. 81316	. 06504	27
34	. 68983	. 04896	. 72257	. 05279	. 75407	. 05676	. 78440	. 06087	. 81364	. 06511	26
35	8. 69038	0. 04902	8. 72311	0. 05286	8. 75458	0. 05683	8. 78490	0. 06094	8. 81412	0. 06518	25
36	. 69094	. 04908	. 72364	. 05292	. 75510	. 05690	. 78539	. 06101	. 81460	. 06525	24
37	. 69149	. 04915	. 72418	. 05299	. 75561	. 05697	. 78589	. 06108	. 81508	. 06532	23
38	. 69205	. 04921	. 72471	. 05305	. 75613	. 05703	. 78638	. 06115	. 81555	. 06540	22
39	. 69260	. 04927	. 72525	. 05312	. 75664	. 05710	. 78688	. 06122	. 81603	. 06547	21
40	8. 69316	0. 04934	8. 72578	0. 05318	8. 75715	0. 05717	8. 78737	0. 06129	8. 81651	0. 06554	20
41	. 69371	. 04940	. 72631	. 05325	. 75767	. 05724	. 78787	. 06136	. 81699	. 06561	19
42	. 69427	. 04946	. 72684	. 05331	. 75818	. 05730	. 78836	. 06143	. 81746	. 06568	18
43	. 69482	. 04952	. 72738	. 05338	. 75869	. 05737	. 78885	. 06150	. 81794	. 06576	17
44	. 69537	. 04959	. 72791	. 05345	. 75920	. 05744	. 78935	. 06157	. 81841	. 06583	16
45	8. 69593	0. 04965	8. 72844	0. 05351	8. 75972	0. 05751	8. 78984	0. 06164	8. 81889	0. 06590	15
46	. 69648	. 04971	. 72897	. 05358	. 76023	. 05757	. 79033	. 06171	. 81937	. 06597	14
47	. 69703	. 04978	. 72950	. 05364	. 76074	. 05764	. 79082	. 06178	. 81984	. 06605	13
48	. 69758	. 04984	. 73003	. 05371	. 76125	. 05771	. 79132	. 06185	. 82032	. 06612	12
49	. 69814	. 04990	. 73056	. 05377	. 76176	. 05778	. 79181	. 06192	. 82079	. 06619	11
50	8. 69869	0. 04997	8. 73109	0. 05384	8. 76227	0. 05785	8. 79230	0. 06199	8. 82126	0. 06626	10
51	. 69924	. 05003	. 73162	. 05390	. 76278	. 05791	. 79279	. 06206	. 82174	. 06633	9
52	. 69979	. 05009	. 73215	. 05397	. 76329	. 05798	. 79328	. 06213	. 82221	. 06641	8
53	. 70034	. 05016	. 73268	. 05404	. 76380	. 05805	. 79377	. 06220	. 82269	. 06648	7
54	. 70089	. 05022	. 73321	. 05410	. 76431	. 05812	. 79426	. 06227	. 82316	. 06655	6
55	8. 70144	0. 05028	8. 73374	0. 05417	8. 76481	0. 05819	8. 79475	0. 06234	8. 82363	0. 06662	5
56	. 70198	. 05035	. 73426	. 05423	. 76532	. 05825	. 79524	. 06241	. 82410	. 06670	4
57	. 70253	. 05041	. 73479	. 05430	. 76583	. 05832	. 79573	. 06248	. 82458	. 06677	3
58	. 70308	. 05048	. 73532	. 05436	. 76634	. 05839	. 79622	. 06255	. 82505	. 06684	2
59	. 70363	. 05054	. 73584	. 05443	. 76684	. 05846	. 79671	. 06262	. 82552	. 06691	1
60	8. 70418	0. 05060	8. 73637	0. 05450	8. 76735	0. 05853	8. 79720	0. 06269	8. 82599	0. 06699	0
′	334°		333°		332°		331°		330°		′

Haversines

′	30°		31°		32°		33°		34°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	8. 82599	0. 06699	8. 85380	0. 07142	8. 88068	0. 07598	8. 90668	0. 08066	8. 93187	0. 08548	60
1	. 82646	. 06706	. 85425	. 07149	. 88112	. 07605	. 90711	. 08074	. 93228	. 08556	59
2	. 82694	. 06713	. 85471	. 07157	. 88156	. 07613	. 90754	. 08082	. 93270	. 08564	58
3	. 82741	. 06721	. 85516	. 07164	. 88200	. 07621	. 90796	. 08090	. 93311	. 08573	57
4	. 82788	. 06728	. 85562	. 07172	. 88244	. 07628	. 90839	. 08098	. 93352	. 08581	56
5	8. 82835	0. 06735	8. 85607	0. 07179	8. 88288	0. 07636	8. 90881	0. 08106	8. 93393	0. 08589	55
6	. 82882	. 06742	. 85653	. 07187	. 88332	. 07644	. 90924	. 08114	. 93435	. 08597	54
7	. 82929	. 06750	. 85698	. 07194	. 88375	. 07652	. 90966	. 08122	. 93476	. 08605	53
8	. 82976	. 06757	. 85743	. 07202	. 88419	. 07659	. 91009	. 08130	. 93517	. 08613	52
9	. 83023	. 06764	. 85789	. 07209	. 88463	. 07667	. 91051	. 08138	. 93558	. 08621	51
10	8. 83069	0. 06772	8. 85834	0. 07217	8. 88507	0. 07675	8. 91094	0. 08146	8. 93599	0. 08630	50
11	. 83116	. 06779	. 85879	. 07224	. 88551	. 07683	. 91136	. 08154	. 93640	. 08638	49
12	. 83163	. 06786	. 85925	. 07232	. 88595	. 07690	. 91179	. 08162	. 93681	. 08646	48
13	. 83210	. 06794	. 85970	. 07239	. 88638	. 07698	. 91221	. 08170	. 93722	. 08654	47
14	. 83257	. 06801	. 86015	. 07247	. 88682	. 07706	. 91263	. 08178	. 93764	. 08662	46
15	8. 83303	0. 06808	8. 86060	0. 07254	8. 88726	0. 07714	8. 91306	0. 08186	8. 93805	0. 08671	45
16	. 83350	. 06816	. 86105	. 07262	. 88769	. 07721	. 91348	. 08194	. 93846	. 08679	44
17	. 83397	. 06823	. 86151	. 07270	. 88813	. 07729	. 91390	. 08202	. 93886	. 08687	43
18	. 83444	. 06830	. 86196	. 07277	. 88857	. 07737	. 91432	. 08210	. 93927	. 08695	42
19	. 83490	. 06838	. 86241	. 07285	. 88900	. 07745	. 91475	. 08218	. 93968	. 08703	41
20	8. 83537	0. 06845	8. 86286	0. 07292	8. 88944	0. 07752	8. 91517	0. 08226	8. 94009	0. 08711	40
21	. 83583	. 06852	. 86331	. 07300	. 88988	. 07760	. 91559	. 08234	. 94050	. 08720	39
22	. 83630	. 06860	. 86376	. 07307	. 89031	. 07768	. 91601	. 08242	. 94091	. 08728	38
23	. 83676	. 06867	. 86421	. 07315	. 89075	. 07776	. 91643	. 08250	. 94132	. 08736	37
24	. 83723	. 06874	. 86466	. 07322	. 89118	. 07784	. 91685	. 08258	. 94173	. 08744	36
25	8. 83769	0. 06882	8. 86511	0. 07330	8. 89162	0. 07791	8. 91728	0. 08266	8. 94213	0. 08753	35
26	. 83816	. 06889	. 86556	. 07338	. 89205	. 07799	. 91770	. 08274	. 94254	. 08761	34
27	. 83862	. 06896	. 86600	. 07345	. 89248	. 07807	. 91812	. 08282	. 94295	. 08769	33
28	. 83909	. 06904	. 86645	. 07353	. 89292	. 07815	. 91854	. 08290	. 94336	. 08777	32
29	. 83955	. 06911	. 86690	. 07360	. 89335	. 07823	. 91896	. 08298	. 94376	. 08785	31
30	8. 84002	0. 06919	8. 86735	0. 07368	8. 89379	0. 07830	8. 91938	0. 08306	8. 94417	0. 08794	30
31	. 84048	. 06926	. 86780	. 07376	. 89422	. 07838	. 91980	. 08314	. 94458	. 08802	29
32	. 84094	. 06933	. 86825	. 07383	. 89465	. 07846	. 92022	. 08322	. 94498	. 08810	28
33	. 84140	. 06941	. 86869	. 07391	. 89509	. 07854	. 92064	. 08330	. 94539	. 08818	27
34	. 84187	. 06948	. 86914	. 07398	. 89552	. 07862	. 92105	. 08338	. 94580	. 08827	26
35	8. 84233	0. 06955	8. 86959	0. 07406	8. 89595	0. 07870	8. 92147	0. 08346	8. 94620	0. 08835	25
36	. 84279	. 06963	. 87003	. 07414	. 89638	. 07877	. 92189	. 08354	. 94661	. 08843	24
37	. 84325	. 06970	. 87048	. 07421	. 89681	. 07885	. 92231	. 08362	. 94701	. 08851	23
38	. 84371	. 06978	. 87093	. 07429	. 89725	. 07893	. 92273	. 08370	. 94742	. 08860	22
39	. 84417	. 06985	. 87137	. 07437	. 89768	. 07901	. 92315	. 08378	. 94782	. 08868	21
40	8. 84464	0. 06993	8. 87182	0. 07444	8. 89811	0. 07909	8. 92356	0. 08386	8. 94823	0. 08876	20
41	. 84510	. 07000	. 87226	. 07452	. 89854	. 07917	. 92398	. 08394	. 94863	. 08885	19
42	. 84556	. 07007	. 87271	. 07459	. 89897	. 07924	. 92440	. 08402	. 94904	. 08893	18
43	. 84602	. 07015	. 87315	. 07467	. 89940	. 07932	. 92482	. 08410	. 94944	. 08901	17
44	. 84648	. 07022	. 87360	. 07475	. 89983	. 07940	. 92523	. 08418	. 94985	. 08909	16
45	8. 84694	0. 07030	8. 87404	0. 07482	8. 90026	0. 07948	8. 92565	0. 08427	8. 95025	0. 08918	15
46	. 84740	. 07037	. 87448	. 07490	. 90069	. 07956	. 92607	. 08435	. 95065	. 08926	14
47	. 84785	. 07045	. 87493	. 07498	. 90112	. 07964	. 92648	. 08443	. 95106	. 08934	13
48	. 84831	. 07052	. 87537	. 07505	. 90155	. 07972	. 92690	. 08451	. 95146	. 08943	12
49	. 84877	. 07059	. 87582	. 07513	. 90198	. 07980	. 92731	. 08459	. 95186	. 08951	11
50	8. 84923	0. 07067	8. 87626	0. 07521	8. 90241	0. 07987	8. 92773	0. 08467	8. 95227	0. 08959	10
51	. 84969	. 07074	. 87670	. 07528	. 90284	. 07995	. 92814	. 08475	. 95267	. 08967	9
52	. 85015	. 07082	. 87714	. 07536	. 90326	. 08003	. 92856	. 08483	. 95307	. 08976	8
53	. 85060	. 07089	. 87759	. 07544	. 90369	. 08011	. 92897	. 08491	. 95347	. 08984	7
54	. 85106	. 07097	. 87803	. 07551	. 90412	. 08019	. 92939	. 08499	. 95388	. 08992	6
55	8. 85152	0. 07104	8. 87847	0. 07559	8. 90455	0. 08027	8. 92980	0. 08507	8. 95428	0. 09001	5
56	. 85197	. 07112	. 87891	. 07567	. 90498	. 08035	. 93022	. 08516	. 95468	. 09009	4
57	. 85243	. 07119	. 87935	. 07574	. 90540	. 08043	. 93063	. 08524	. 95508	. 09017	3
58	. 85289	. 07127	. 87980	. 07582	. 90583	. 08051	. 93104	. 08532	. 95548	. 09026	2
59	. 85334	. 07134	. 88024	. 07590	. 90626	. 08059	. 93146	. 08540	. 95588	. 09034	1
60	8. 85380	0. 07142	8. 88068	0. 07598	8. 90668	0. 08066	8. 93187	0. 08548	8. 95628	0. 09042	0
	329°		328°		327°		326°		325°		

(2)

Haversines

	35°		36°		37°		38°		39°		
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	′
0	8. 95628	0. 09042	8. 97997	0. 09549	9. 00295	0. 10068	9. 02528	0. 10599	9. 04699	0. 11143	60
1	. 95668	. 09051	. 98035	. 09558	. 00333	. 10077	. 02565	. 10608	. 04735	. 11152	59
2	. 95709	. 09059	. 98074	. 09566	. 00371	. 10086	. 02602	. 10617	. 04770	. 11161	58
3	. 95749	. 09067	. 98113	. 09575	. 00408	. 10094	. 02638	. 10626	. 04806	. 11170	57
4	. 95789	. 09076	. 98152	. 09583	. 00446	. 10103	. 02675	. 10635	. 04842	. 11179	56
5	8. 95828	0. 09084	8. 98191	0. 09592	9. 00484	0. 10112	9. 02712	0. 10644	9. 04877	0. 11189	55
6	. 95868	. 09093	. 98229	. 09601	. 00522	. 10121	. 02748	. 10653	. 04913	. 11198	54
7	. 95908	. 09101	. 98268	. 09609	. 00559	. 10130	. 02785	. 10662	. 04948	. 11207	53
8	. 95948	. 09109	. 98307	. 09618	. 00597	. 10138	. 02821	. 10671	. 04984	. 11216	52
9	. 95988	. 09118	. 98346	. 09626	. 00634	. 10147	. 02858	. 10680	. 05019	. 11225	51
10	8. 96028	0. 09126	8. 98384	0. 09635	9. 00672	0. 10156	9. 02894	0. 10689	9. 05055	0. 11234	50
11	. 96068	. 09134	. 98423	. 09643	. 00710	. 10165	. 02931	. 10698	. 05090	. 11244	49
12	. 96108	. 09143	. 98462	. 09652	. 00747	. 10174	. 02967	. 10707	. 05126	. 11253	48
13	. 96148	. 09151	. 98500	. 09661	. 00785	. 10182	. 03004	. 10716	. 05161	. 11262	47
14	. 96187	. 09160	. 98539	. 09669	. 00822	. 10191	. 03040	. 10725	. 05197	. 11271	46
15	8. 96227	0. 09168	8. 98578	0. 09678	9. 00860	0. 10200	9. 03077	0. 10734	9. 05232	0. 11280	45
16	. 96267	. 09176	. 98616	. 09686	. 00897	. 10209	. 03113	. 10743	. 05268	. 11290	44
17	. 96307	. 09185	. 98655	. 09695	. 00935	. 10218	. 03150	. 10752	. 05303	. 11299	43
18	. 96346	. 09193	. 98693	. 09704	. 00972	. 10226	. 03186	. 10761	. 05339	. 11308	42
19	. 96386	. 09202	. 98732	. 09712	. 01009	. 10235	. 03222	. 10770	. 05374	. 11317	41
20	8. 96426	0. 09210	8. 98770	0. 09721	9. 01047	0. 10244	9. 03259	0. 10779	9. 05409	0. 11326	40
21	. 96465	. 09218	. 98809	. 09729	. 01084	. 10253	. 03295	. 10788	. 05445	. 11336	39
22	. 96505	. 09227	. 98847	. 09738	. 01122	. 10262	. 03331	. 10797	. 05480	. 11345	38
23	. 96545	. 09235	. 98886	. 09747	. 01159	. 10270	. 03368	. 10806	. 05515	. 11354	37
24	. 96584	. 09244	. 98924	. 09755	. 01196	. 10279	. 03404	. 10815	. 05551	. 11363	36
25	8. 96624	0. 09252	8. 98963	0. 09764	9. 01234	0. 10288	9. 03440	0. 10824	9. 05586	0. 11373	35
26	. 96663	. 09260	. 99001	. 09773	. 01271	. 10297	. 03476	. 10833	. 05621	. 11382	34
27	. 96703	. 09269	. 99039	. 09781	. 01308	. 10306	. 03513	. 10842	. 05656	. 11391	33
28	. 96742	. 09277	. 99078	. 09790	. 01345	. 10315	. 03549	. 10851	. 05692	. 11400	32
29	. 96782	. 09286	. 99116	. 09799	. 01383	. 10323	. 03585	. 10861	. 05727	. 11410	31
30	8. 96821	0. 09294	8. 99154	0. 09807	9. 01420	0. 10332	9. 03621	0. 10870	9. 05762	0. 11419	30
31	. 96861	. 09303	. 99193	. 09816	. 01457	. 10341	. 03657	. 10879	. 05797	. 11428	29
32	. 96900	. 09311	. 99231	. 09824	. 01494	. 10350	. 03694	. 10888	. 05832	. 11437	28
33	. 96940	. 09320	. 99269	. 09833	. 01531	. 10359	. 03730	. 10897	. 05867	. 11447	27
34	. 96979	. 09328	. 99307	. 09842	. 01569	. 10368	. 03766	. 10906	. 05903	. 11456	26
35	8. 97018	0. 09336	8. 99346	0. 09850	9. 01606	0. 10377	9. 03802	0. 10915	9. 05938	0. 11465	25
36	. 97058	. 09345	. 99384	. 09859	. 01643	. 10386	. 03838	. 10924	. 05973	. 11474	24
37	. 97097	. 09353	. 99422	. 09868	. 01680	. 10394	. 03874	. 10933	. 06008	. 11484	23
38	. 97136	. 09362	. 99460	. 09876	. 01717	. 10403	. 03910	. 10942	. 06043	. 11493	22
39	. 97176	. 09370	. 99498	. 09885	. 01754	. 10412	. 03946	. 10951	. 06078	. 11502	21
40	8. 97215	0. 09379	8. 99536	0. 09894	9. 01791	0. 10421	9. 03982	0. 10960	9. 06113	0. 11511	20
41	. 97254	. 09387	. 99575	. 09903	. 01828	. 10430	. 04018	. 10969	. 06148	. 11521	19
42	. 97294	. 09396	. 99613	. 09911	. 01865	. 10439	. 04054	. 10978	. 06183	. 11530	18
43	. 97333	. 09404	. 99651	. 09920	. 01902	. 10448	. 04090	. 10988	. 06218	. 11539	17
44	. 97372	. 09413	. 99689	. 09929	. 01939	. 10457	. 04126	. 10997	. 06253	. 11549	16
45	8. 97411	0. 09421	8. 99727	0. 09937	9. 01976	0. 10466	9. 04162	0. 11006	9. 06288	0. 11558	15
46	. 97450	. 09430	. 99765	. 09946	. 02013	. 10474	. 04198	. 11015	. 06323	. 11567	14
47	. 97489	. 09438	. 99803	. 09955	. 02050	. 10483	. 04234	. 11024	. 06358	. 11577	13
48	. 97529	. 09447	. 99841	. 09963	. 02087	. 10492	. 04270	. 11033	. 06393	. 11586	12
49	. 97568	. 09455	. 99879	. 09972	. 02124	. 10501	. 04306	. 11042	. 06428	. 11595	11
50	8. 97607	0. 09464	8. 99917	0. 09981	9. 02161	0. 10510	9. 04341	0. 11051	9. 06462	0. 11604	10
51	. 97646	. 09472	. 99955	. 09990	. 02197	. 10519	. 04377	. 11060	. 06497	. 11614	9
52	. 97685	. 09481	8. 99993	. 09998	. 02234	. 10528	. 04413	. 11070	. 06532	. 11623	8
53	. 97724	. 09489	9. 00031	. 10007	. 02271	. 10537	. 04449	. 11079	. 06567	. 11632	7
54	. 97763	. 09498	. 00068	. 10016	. 02308	. 10546	. 04485	. 11088	. 06602	. 11642	6
55	8. 97802	0. 09506	9. 00106	0. 10025	9. 02345	0. 10555	9. 04520	0. 11097	9. 06637	0. 11651	5
56	. 97841	. 09515	. 00144	. 10033	. 02381	. 10564	. 04556	. 11106	. 06671	. 11660	4
57	. 97880	. 09524	. 00182	. 10042	. 02418	. 10573	. 04592	. 11115	. 06706	. 11670	3
58	. 97919	. 09532	. 00220	. 10051	. 02455	. 10582	. 04628	. 11124	. 06741	. 11679	2
59	. 97958	. 09541	. 00258	. 10059	. 02492	. 10591	. 04663	. 11134	. 06776	. 11688	1
60	8. 97997	0. 09549	9. 00295	0. 10068	9. 02528	0. 10599	9. 04699	0. 11143	9. 06810	0. 11698	0
	324°		323°		322°		321°		320°		

Haversines

′	40°		41°		42°		43°		44°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 06810	0. 11698	9. 08865	0. 12265	9. 10866	0. 12843	9. 12815	0. 13432	9. 14715	0. 14033	60
1	. 06845	. 11707	. 08899	. 12274	. 10899	. 12852	. 12847	. 13442	. 14746	. 14043	59
2	. 06880	. 11716	. 08933	. 12284	. 10932	. 12862	. 12879	. 13452	. 14778	. 14053	58
3	. 06914	. 11726	. 08966	. 12293	. 10965	. 12872	. 12911	. 13462	. 14809	. 14063	57
4	. 06949	. 11735	. 09000	. 12303	. 10997	. 12882	. 12943	. 13472	. 14840	. 14073	56
5	9. 06984	0. 11745	9. 09034	0. 12312	9. 11030	0. 12891	9. 12975	0. 13482	9. 14871	0. 14084	55
6	. 07018	. 11754	. 09068	. 12322	. 11063	. 12901	. 13007	. 13492	. 14902	. 14094	54
7	. 07053	. 11763	. 09101	. 12331	. 11096	. 12911	. 13039	. 13502	. 14934	. 14104	53
8	. 07088	. 11773	. 09135	. 12341	. 11129	. 12921	. 13071	. 13512	. 14965	. 14114	52
9	. 07122	. 11782	. 09169	. 12351	. 11161	. 12930	. 13103	. 13522	. 14996	. 14124	51
10	9. 07157	0. 11791	9. 09202	0. 12360	9. 11194	0. 12940	9. 13135	0. 13532	9. 15027	0. 14134	50
11	. 07191	. 11801	. 09236	. 12370	. 11227	. 12950	. 13167	. 13542	. 15058	. 14144	49
12	. 07226	. 11810	. 09269	. 12379	. 11260	. 12960	. 13199	. 13552	. 15089	. 14154	48
13	. 07260	. 11820	. 09303	. 12389	. 11292	. 12970	. 13231	. 13562	. 15120	. 14165	47
14	. 07295	. 11829	. 09337	. 12398	. 11325	. 12979	. 13263	. 13571	. 15152	. 14175	46
15	9. 07329	0. 11838	9. 09370	0. 12408	9. 11358	0. 12989	9. 13295	0. 13581	9. 15183	0. 14185	45
16	. 07364	. 11848	. 09404	. 12418	. 11391	. 12999	. 13326	. 13591	. 15214	. 14195	44
17	. 07398	. 11857	. 09437	. 12427	. 11423	. 13009	. 13358	. 13601	. 15245	. 14205	43
18	. 07433	. 11867	. 09471	. 12437	. 11456	. 13018	. 13390	. 13611	. 15276	. 14215	42
19	. 07467	. 11876	. 09504	. 12446	. 11489	. 13028	. 13422	. 13621	. 15307	. 14226	41
20	9. 07501	0. 11885	9. 09538	0. 12456	9. 11521	0. 13038	9. 13454	0. 13631	9. 15338	0. 14236	40
21	. 07536	. 11895	. 09571	. 12466	. 11554	. 13048	. 13486	. 13641	. 15369	. 14246	39
22	. 07570	. 11904	. 09605	. 12475	. 11586	. 13058	. 13517	. 13651	. 15400	. 14256	38
23	. 07605	. 11914	. 09638	. 12485	. 11619	. 13067	. 13549	. 13661	. 15431	. 14266	37
24	. 07639	. 11923	. 09672	. 12494	. 11652	. 13077	. 13581	. 13671	. 15462	. 14276	36
25	9. 07673	0. 11933	9. 09705	0. 12504	9. 11684	0. 13087	9. 13613	0. 13681	9. 15493	0. 14287	35
26	. 07708	. 11942	. 09739	. 12514	. 11717	. 13097	. 13644	. 13691	. 1552 4	. 14297	34
27	. 07742	. 11951	. 09772	. 12523	. 11749	. 13107	. 13676	. 13701	. 15555	. 14307	33
28	. 07776	. 11961	. 09805	. 12533	. 11782	. 13116	. 13708	. 13711	. 15585	. 14317	32
29	. 07810	. 11970	. 09839	. 12543	. 11814	. 13126	. 13739	. 13721	. 15616	. 14327	31
30	9. 07845	0. 11980	9. 09872	0. 12552	9. 11847	0. 13136	9. 13771	0. 13731	9. 15647	0. 14337	30
31	. 07879	. 11989	. 09905	. 12562	. 11879	. 13146	. 13803	. 13741	. 15678	. 14348	29
32	. 07913	. 11999	. 09939	. 12571	. 11912	. 13156	. 13834	. 13751	. 15709	. 14358	28
33	. 07947	. 12008	. 09972	. 12581	. 11944	. 13166	. 13866	. 13761	. 15740	. 14368	27
34	. 07981	. 12018	. 10005	. 12591	. 11977	. 13175	. 13898	. 13771	. 15771	. 14378	26
35	9. 08016	0. 12027	9. 10039	0. 12600	9. 12009	0. 13185	9. 13929	0. 13781	9. 15802	0. 14388	25
36	. 08050	. 12036	. 10072	. 12610	. 12041	. 13195	. 13961	. 13791	. 15832	. 14399	24
37	. 08084	. 12046	. 10105	. 12620	. 12074	. 13205	. 13992	. 13801	. 15863	. 14409	23
38	. 08118	. 12055	. 10138	. 12629	. 12106	. 13215	. 14024	. 13811	. 15894	. 14419	22
39	. 08152	. 12065	. 10172	. 12639	. 12139	. 13225	. 14056	. 13822	. 15925	. 14429	21
40	9. 08186	0. 12074	9. 10205	0. 12649	9. 12171	0. 13235	9. 14087	0. 13832	9. 15955	0. 14440	20
41	. 08220	. 12084	. 10238	. 12658	. 12203	. 13244	. 14119	. 13842	. 15986	. 14450	19
42	. 08254	. 12093	. 10271	. 12668	. 12236	. 13254	. 14150	. 13852	. 16017	. 14460	18
43	. 08288	. 12103	. 10304	. 12678	. 12268	. 13264	. 14182	. 13862	. 16048	. 14470	17
44	. 08323	. 12112	. 10337	. 12687	. 12300	. 13274	. 14213	. 13872	. 16078	. 14480	16
45	9. 08357	0. 12122	9. 10371	0. 12697	9. 12332	0. 13284	9. 14245	0. 13882	9. 16109	0. 14491	15
46	. 08391	. 12131	. 10404	. 12707	. 12365	. 18294	. 14276	. 13892	. 16140	. 14501	14
47	. 08425	. 12141	. 10437	. 12717	. 12397	. 13304	. 14307	. 13902	. 16170	. 14511	13
48	. 08459	. 12150	. 10470	. 12726	. 12429	. 13314	. 14339	. 13912	. 16201	. 14521	12
49	. 08492	. 12160	. 10503	. 12736	. 12461	. 13323	. 14370	. 13922	. 16232	. 14532	11
50	9. 08526	0. 12169	9. 10536	0. 12746	9. 12494	0. 13333	9. 14402	0. 13932	9. 16262	0. 14542	10
51	. 08560	. 12179	. 10569	. 12755	. 12526	. 13343	. 14433	. 13942	. 16293	. 14552	9
52	. 08594	. 12188	. 10602	. 12765	. 12558	. 13353	. 14465	. 13952	. 16324	. 14562	8
53	. 08628	. 12198	. 10635	. 12775	. 12590	. 13363	. 14496	. 13962	. 16354	. 14573	7
54	. 08662	. 12207	. 10668	. 12784	. 12622	. 13373	. 14527	. 13972	. 16385	. 14583	6
55	9. 08696	0. 12217	9. 10701	0. 12794	9. 12655	0. 13383	9. 14559	0. 13983	9. 16415	0. 14593	5
56	. 08730	. 12226	. 10734	. 12804	. 12687	. 13393	. 14590	. 13993	. 16446	. 14604	4
57	. 08764	. 12236	. 10767	. 12814	. 12719	. 13403	. 14621	. 14003	. 16476	. 14614	3
58	. 08797	. 12245	. 10800	. 12823	. 12751	. 13412	. 14653	. 14013	. 16507	. 14624	2
59	. 08831	. 12255	. 10833	. 12833	. 12783	. 13422	. 14684	. 14023	. 16537	. 14634	1
60	9. 08865	0. 12265	9. 10866	0. 12843	9. 12815	0. 13432	9. 14715	0. 14033	9. 16568	0. 14645	0
	319°		318°		317°		316°		315°		

Haversines

′	45°		46°		47°		48°		49°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 16568	0. 14645	9. 18376	0. 15267	9. 20140	0. 15900	9. 21863	0. 16543	9. 23545	0. 17197	60
1	. 16598	. 14655	. 18405	. 15278	. 20169	. 15911	. 21891	. 16554	. 23573	. 17208	59
2	. 16629	. 14665	. 18435	. 15288	. 20198	. 15921	. 21919	. 16565	. 23601	. 17219	58
3	. 16659	. 14676	. 18465	. 15298	. 20227	. 15932	. 21948	. 16576	. 23629	. 17230	57
4	. 16690	. 14686	. 18495	. 15309	. 20256	. 15943	. 21976	. 16587	. 23656	. 17241	56
5	9. 16720	0. 14696	9. 18524	0. 15319	9. 20285	0. 15953	9. 22004	0. 16598	9. 23684	0. 17252	55
6	. 16751	. 14706	. 18554	. 15330	. 20314	. 15964	. 22033	. 16608	. 23712	. 17263	54
7	. 16781	. 14717	. 18584	. 15340	. 20343	. 15975	. 22061	. 16619	. 23739	. 17274	53
8	. 16812	. 14727	. 18613	. 15351	. 20372	. 15985	. 22089	. 16630	. 23767	. 17285	52
9	. 16842	. 14737	. 18643	. 15361	. 20401	. 15996	. 22118	. 16641	. 23794	. 17296	51
10	9. 16872	0. 14748	9. 18673	0. 15372	9. 20430	0. 16007	9. 22146	0. 16652	9. 23822	0. 17307	50
11	. 16903	. 14758	. 18702	. 15382	. 20459	. 16017	. 22174	. 16663	. 23850	. 17318	49
12	. 16933	. 14768	. 18732	. 15393	. 20488	. 16028	. 22202	. 16673	. 23877	. 17329	48
13	. 16963	. 14779	. 18762	. 15403	. 20517	. 16039	. 22231	. 16684	. 23905	. 17340	47
14	. 16994	. 14789	. 18791	. 15414	. 20546	. 16049	. 22259	. 16695	. 23932	. 17351	46
15	9. 17024	0. 14799	9. 18821	0. 15424	9. 20574	0. 16060	9. 22287	0. 16706	9. 23960	0. 17362	45
16	. 17054	. 14810	. 18850	. 15435	. 20603	. 16071	. 22315	. 16717	. 23988	. 17373	44
17	. 17085	. 14820	. 18880	. 15445	. 20632	. 16081	. 22343	. 16728	. 24015	. 17384	43
18	. 17115	. 14830	. 18909	. 15456	. 20661	. 16092	. 22372	. 16738	. 24043	. 17395	42
19	. 17145	. 14841	. 18939	. 15466	. 20690	. 16103	. 22400	. 16749	. 24070	. 17406	41
20	9. 17175	0. 14851	9. 18968	0. 15477	9. 20719	0. 16113	9. 22428	0. 16760	9. 24098	0. 17417	40
21	. 17206	. 14861	. 18998	. 15487	. 20748	. 16124	. 22456	. 16771	. 24125	. 17428	39
22	. 17236	. 14872	. 19027	. 15498	. 20776	. 16135	. 22484	. 16782	. 24153	. 17439	38
23	. 17266	. 14882	. 19057	. 15508	. 20805	. 16145	. 22512	. 16793	. 24180	. 17450	37
24	. 17296	. 14892	. 19086	. 15519	. 20834	. 16156	. 22540	. 16804	. 24208	. 17461	36
25	9. 17327	0. 14903	9. 19116	0. 15530	9. 20863	0. 16167	9. 22569	0. 16815	9. 24235	0. 17472	35
26	. 17357	. 14913	. 19145	. 15540	. 20891	. 16178	. 22597	. 16825	. 24263	. 17483	34
27	. 17387	. 14923	. 19175	. 15551	. 20920	. 16188	. 22625	. 16836	. 24290	. 17494	33
28	. 17417	. 14934	. 19204	. 15561	. 20949	. 16199	. 22653	. 16847	. 24317	. 17505	32
29	. 17447	. 14944	. 19234	. 15572	. 20978	. 16210	. 22681	. 16858	. 24345	. 17517	31
30	9. 17477	0. 14955	9. 19263	0. 15582	9. 21006	0. 16220	9. 22709	0. 16869	9. 24372	0. 17528	30
31	. 17507	. 14965	. 19292	. 15593	. 21035	. 16231	. 22737	. 16880	. 24400	. 17539	29
32	. 17538	. 14975	. 19322	. 15603	. 21064	. 16242	. 22765	. 16891	. 24427	. 17550	28
33	. 17568	. 14986	. 19351	. 15614	. 21092	. 16253	. 22793	. 16902	. 24454	. 17561	27
34	. 17598	. 14996	. 19381	. 15624	. 21121	. 16263	. 22821	. 16913	. 24482	. 17572	26
35	9. 17628	0. 15006	9. 19410	0. 15635	9. 21150	0. 16274	9. 22849	0. 16923	9. 24509	0. 17583	25
36	. 17658	. 15017	. 19439	. 15646	. 21178	. 16285	. 22877	. 16934	. 24536	. 17594	24
37	. 17688	. 15027	. 19469	. 15656	. 21207	. 16296	. 22905	. 16945	. 24564	. 17605	23
38	. 17718	. 15038	. 19498	. 15667	. 21236	. 16306	. 22933	. 16956	. 24591	. 17616	22
39	. 17748	. 15048	. 19527	. 15677	. 21264	. 16317	. 22961	. 16967	. 24618	. 17627	21
40	9. 17778	0. 15058	9. 19557	0. 15688	9. 21293	0. 16328	9. 22989	0. 16978	9. 24646	0. 17638	20
41	. 17808	. 15069	. 19586	. 15698	. 21322	. 16339	. 23017	. 16989	. 24673	. 17649	19
42	. 17838	. 15079	. 19615	. 15709	. 21350	. 16349	. 23045	. 17000	. 24700	. 17661	18
43	. 17868	. 15090	. 19644	. 15720	. 21379	. 16360	. 23073	. 17011	. 24728	. 17672	17
44	. 17898	. 15100	. 19674	. 15730	. 21407	. 16371	. 23100	. 17022	. 24755	. 17683	16
45	9. 17928	0. 15110	9. 19703	0. 15741	9. 21436	0. 16382	9. 23128	0. 17033	9. 24782	0. 17694	15
46	. 17958	. 15121	. 19732	. 15751	. 21464	. 16392	. 23156	. 17044	. 24809	. 17705	14
47	. 17988	. 15131	. 19761	. 15762	. 21493	. 16403	. 23184	. 17055	. 24837	. 17716	13
48	. 18018	. 15142	. 19790	. 15773	. 21521	. 16414	. 23212	. 17066	. 24864	. 17727	12
49	. 18048	. 15152	. 19820	. 15783	. 21550	. 16425	. 23240	. 17076	. 24891	. 17738	11
50	9. 18077	0. 15163	9. 19849	0. 15794	9. 21578	0. 16436	9. 23268	0. 17087	9. 24918	0. 17749	10
51	. 18107	. 15173	. 19878	. 15804	. 21607	. 16446	. 23295	. 17098	. 24945	. 17760	9
52	. 18137	. 15183	. 19907	. 15815	. 21635	. 16457	. 23323	. 17109	. 24973	. 17772	8
53	. 18167	. 15194	. 19936	. 15826	. 21664	. 16468	. 23351	. 17120	. 25000	. 17783	7
54	. 18197	. 15204	. 19965	. 15836	. 21692	. 16479	. 23379	. 17131	. 25027	. 17794	6
55	9. 18227	0. 15215	9. 19995	0. 15847	9. 21721	0. 16489	9. 23407	0. 17142	9. 25054	0. 17805	5
56	. 18256	. 15225	. 20024	. 15858	. 21749	. 16500	. 23434	. 17153	. 25081	. 17816	4
57	. 18286	. 15236	. 20053	. 15868	. 21778	. 16511	. 23462	. 17164	. 25108	. 17827	3
58	. 18316	. 15246	. 20082	. 15879	. 21806	. 16522	. 23490	. 17175	. 25135	. 17838	2
59	. 18346	. 15257	. 20111	. 15889	. 21834	. 16533	. 23518	. 17186	. 25163	. 17849	1
60	9. 18376	0. 15267	9. 20140	0. 15900	9. 21863	0. 16543	9. 23545	0. 17197	9. 25190	0. 17861	0
′	314°		313°		312°		311°		310°		′

Haversines

′	50°		51°		52°		53°		54°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 25190	0. 17861	9. 26797	0. 18534	9. 28368	0. 19217	9. 29906	0. 19909	9. 31409	0. 20611	60
1	. 25217	. 17872	. 26823	. 18545	. 28394	. 19228	. 29931	. 19921	. 31434	. 20623	59
2	. 25244	. 17883	. 26850	. 18557	. 28420	. 19240	. 29956	. 19932	. 31459	. 20634	58
3	. 25271	. 17894	. 26876	. 18568	. 28446	. 19251	. 29981	. 19944	. 31484	. 20646	57
4	. 25298	. 17905	. 26903	. 18579	. 28472	. 19263	. 30007	. 19956	. 31508	. 20658	56
5	9. 25325	0. 17916	9. 26929	0. 18591	9. 28498	0. 19274	9. 30032	0. 19967	9. 31533	0. 20670	55
6	. 25352	. 17928	. 26956	. 18602	. 28524	. 19286	. 30057	. 19979	. 31558	. 20681	54
7	. 25379	. 17939	. 26982	. 18613	. 28549	. 19297	. 30083	. 19991	. 31583	. 20693	53
8	. 25406	. 17950	. 27008	. 18624	. 28575	. 19309	. 30108	. 20002	. 31607	. 20705	52
9	. 25433	. 17961	. 27035	. 18636	. 28601	. 19320	. 30133	. 20014	. 31632	. 20717	51
10	9. 25460	0. 17972	9. 27061	0. 18647	9. 28627	0. 19332	9. 30158	0. 20026	9. 31657	0. 20729	50
11	. 25487	. 17983	. 27088	. 18658	. 28653	. 19343	. 30184	. 20037	. 31682	. 20740	49
12	. 25514	. 17995	. 27114	. 18670	. 28679	. 19355	. 30209	. 20049	. 31706	. 20752	48
13	. 25541	. 18006	. 27140	. 18681	. 28704	. 19366	. 30234	. 20060	. 31731	. 20764	47
14	. 25568	. 18017	. 27167	. 18692	. 28730	. 19378	. 30259	. 20072	. 31756	. 20776	46
15	9. 25595	0. 18028	9. 27193	0. 18704	9. 28756	0. 19389	9. 30285	0. 20084	9. 31780	0. 20788	45
16	. 25622	. 18039	. 27219	. 18715	. 28782	. 19401	. 30310	. 20095	. 31805	. 20799	44
17	. 25649	. 18050	. 27246	. 18727	. 28807	. 19412	. 30335	. 20107	. 31830	. 20811	43
18	. 25676	. 18062	. 27272	. 18738	. 28833	. 19424	. 30360	. 20119	. 31854	. 20823	42
19	. 25703	. 18073	. 27298	. 18749	. 28859	. 19435	. 30385	. 20130	. 31879	. 20835	41
20	9. 25729	0. 18084	9. 27325	0. 18761	9. 28885	0. 19447	9. 30410	0. 20142	9. 31903	0. 20847	40
21	. 25756	. 18095	. 27351	. 18772	. 28910	. 19458	. 30436	. 20154	. 31928	. 20858	39
22	. 25783	. 18106	. 27377	. 18783	. 28936	. 19470	. 30461	. 20165	. 31953	. 20870	38
23	. 25810	. 18118	. 27403	. 18795	. 28962	. 19481	. 30486	. 20177	. 31977	. 20882	37
24	. 25837	. 18129	. 27430	. 18806	. 28987	. 19493	. 30511	. 20189	. 32002	. 20894	36
25	9. 25864	0. 18140	9. 27456	0. 18817	9. 29013	0. 19504	9. 30536	0. 20200	9. 32026	0. 20906	35
26	. 25891	. 18151	. 27482	. 18829	. 29039	. 19516	. 30561	. 20212	. 32051	. 20918	34
27	. 25917	. 18162	. 27508	. 18840	. 29064	. 19527	. 30586	. 20224	. 32076	. 20929	33
28	. 25944	. 18174	. 27535	. 18852	. 29090	. 19539	. 30611	. 20235	. 32100	. 20941	32
29	. 25971	. 18185	. 27561	. 18863	. 29116	. 19550	. 30636	. 20247	. 32125	. 20953	31
30	9. 25998	0. 18196	9. 27587	0. 18874	9. 29141	0. 19562	9. 30662	0. 20259	9. 32149	0. 20965	30
31	. 26025	. 18207	. 27613	. 18886	. 29167	. 19573	. 30687	. 20271	. 32174	. 20977	29
32	. 26051	. 18219	. 27639	. 18897	. 29192	. 19585	. 30712	. 20282	. 32198	. 20989	28
33	. 26078	. 18230	. 27666	. 18908	. 29218	. 19597	. 30737	. 20294	. 32223	. 21000	27
34	. 26105	. 18241	. 27692	. 18920	. 29244	. 19608	. 30762	. 20306	. 32247	. 21012	26
35	9. 26132	0. 18252	9. 27718	0. 18931	9. 29269	0. 19620	9. 30787	0. 20317	9. 32272	0. 21024	25
36	. 26158	. 18263	. 27744	. 18943	. 29295	. 19631	. 30812	. 20329	. 32296	. 21036	24
37	. 26185	. 18275	. 27770	. 18954	. 29320	. 19643	. 30837	. 20341	. 32321	. 21048	23
38	. 26212	. 18286	. 27796	. 18965	. 29346	. 19654	. 30862	. 20352	. 32345	. 21060	22
39	. 26238	. 18297	. 27822	. 18977	. 29371	. 19666	. 30887	. 20364	. 32370	. 21072	21
40	9. 26265	0. 18308	9. 27848	0. 18988	9. 29397	0. 19677	9. 30912	0. 20376	9. 32394	0. 21083	20
41	. 26292	. 18320	. 27875	. 19000	. 29422	. 19689	. 30937	. 20388	. 32418	. 21095	19
42	. 26319	. 18331	. 27901	. 19011	. 29448	. 19701	. 30962	. 20399	. 32443	. 21107	18
43	. 26345	. 18343	. 27927	. 19022	. 29473	. 19712	. 30987	. 20411	. 32467	. 21119	17
44	. 26372	. 18353	. 27953	. 19034	. 29499	. 19724	. 31012	. 20423	. 32492	. 21131	16
45	9. 26398	0. 18365	9. 27979	0. 19045	9. 29524	0. 19735	9. 31036	0. 20435	9. 32516	0. 21143	15
46	. 26425	. 18376	. 28005	. 19057	. 29550	. 19747	. 31061	. 20446	. 32541	. 21155	14
47	. 26452	. 18387	. 28031	. 19068	. 29575	. 19758	. 31086	. 20458	. 32565	. 21167	13
48	. 26478	. 18399	. 28057	. 19080	. 29601	. 19770	. 31111	. 20470	. 32589	. 21178	12
49	. 26505	. 18410	. 28083	. 19091	. 29626	. 19782	. 31136	. 20481	. 32614	. 21190	11
50	9. 26532	0. 18421	9. 28109	0. 19102	9. 29652	0. 19793	9. 31161	0. 20493	9. 32638	0. 21202	10
51	. 26558	. 18432	. 28135	. 19114	. 29677	. 19805	. 31186	. 20505	. 32662	. 21214	9
52	. 26585	. 18444	. 28161	. 19125	. 29703	. 19816	. 31211	. 20517	. 32687	. 21226	8
53	. 26611	. 18455	. 28187	. 19137	. 29728	. 19828	. 31236	. 20528	. 32711	. 21238	7
54	. 26638	. 18466	. 28213	. 19148	. 29753	. 19840	. 31260	. 20540	. 32735	. 21250	6
55	9. 26664	0. 18477	9. 28239	0. 19160	9. 29779	0. 19851	9. 31285	0. 20552	9. 32760	0. 21262	5
56	. 26691	. 18489	. 28265	. 19171	. 29804	. 19863	. 31310	. 20564	. 32784	. 21274	4
57	. 26717	. 18500	. 28291	. 19183	. 29829	. 19874	. 31335	. 20575	. 32808	. 21285	3
58	. 26744	. 18511	. 28317	. 19194	. 29855	. 19886	. 31360	. 20587	. 32833	. 21297	2
59	. 26770	. 18523	. 28342	. 19205	. 29880	. 19898	. 31385	. 20599	. 32857	. 21309	1
60	9. 26797	0. 18534	9. 28368	0. 19217	9. 29906	0. 19909	9. 31409	0. 20611	9. 32881	0. 21321	0
	309°		308°		307°		306°		305°		

Haversines

′	55° Log Hav	55° Nat. Hav	56° Log Hav	56° Nat. Hav	57° Log Hav	57° Nat. Hav	58° Log Hav	58° Nat. Hav	59° Log Hav	59° Nat. Hav	′
0	9. 32881	0. 21321	9. 34322	0. 22040	9. 35733	0. 22768	9. 37114	0. 23504	9. 38468	0. 24248	60
1	. 32905	. 21333	. 34346	. 22052	. 35756	. 22780	. 37137	. 23516	. 38490	. 24261	59
2	. 32930	. 21345	. 34369	. 22064	. 35779	. 22792	. 37160	. 23529	. 38512	. 24273	58
3	. 32954	. 21357	. 34393	. 22077	. 35802	. 22805	. 37183	. 23541	. 38535	. 24286	57
4	. 32978	. 21369	. 34417	. 22089	. 35826	. 22817	. 37205	. 23553	. 38557	. 24298	56
5	9. 33002	0. 21381	9. 34441	0. 22101	9. 35849	0. 22829	9. 37228	0. 23566	9. 38579	0. 24310	55
6	. 33027	. 21393	. 34464	. 22113	. 35872	. 22841	. 37251	. 23578	. 38602	. 24323	54
7	. 33051	. 21405	. 34488	. 22125	. 35895	. 22853	. 37274	. 23590	. 38624	. 24335	53
8	. 33075	. 21417	. 34512	. 22137	. 35918	. 22866	. 37296	. 23603	. 38646	. 24348	52
9	. 33099	. 21429	. 34535	. 22149	. 35942	. 22878	. 37319	. 23615	. 38668	. 24360	51
10	9. 33123	0. 21440	9. 34559	0. 22161	9. 35965	0. 22890	9. 37342	0. 23627	9. 38691	0. 24373	50
11	. 33148	. 21452	. 34583	. 22173	. 35988	. 22902	. 37364	. 23640	. 38713	. 24385	49
12	. 33172	. 21464	. 34606	. 22185	. 36011	. 22915	. 37387	. 23652	. 38735	. 24398	48
13	. 33196	. 21476	. 34630	. 22197	. 36034	. 22927	. 37410	. 23665	. 38757	. 24410	47
14	. 33220	. 21488	. 34654	. 22209	. 36058	. 22939	. 37433	. 23677	. 38780	. 24423	46
15	9. 33244	0. 21500	9. 34677	0. 22221	9. 36081	0. 22951	9. 37455	0. 23689	9. 38802	0. 24435	45
16	. 33268	. 21512	. 34701	. 22234	. 36104	. 22964	. 37478	. 23702	. 38824	. 24448	44
17	. 33292	. 21524	. 34725	. 22246	. 36127	. 22976	. 37501	. 23714	. 38846	. 24460	43
18	. 33317	. 21536	. 34748	. 22258	. 36150	. 22988	. 37523	. 23726	. 38868	. 24473	42
19	. 33341	. 21548	. 34772	. 22270	. 36173	. 23000	. 37546	. 23739	. 38891	. 24485	41
20	9. 33365	0. 21560	9. 34795	0. 22282	9. 36196	0. 23012	9. 37569	0. 23751	9. 38913	0. 24498	40
21	. 33389	. 21572	. 34819	. 22294	. 36219	. 23025	. 37591	. 23764	. 38935	. 24510	39
22	. 33413	. 21584	. 34843	. 22306	. 36243	. 23037	. 37614	. 23776	. 38957	. 24523	38
23	. 33437	. 21596	. 34866	. 22318	. 36266	. 23049	. 37636	. 23788	. 38979	. 24535	37
24	. 33461	. 21608	. 34890	. 22330	. 36289	. 23061	. 37659	. 23801	. 39002	. 24548	36
25	9. 33485	0. 21620	9. 34913	0. 22343	9. 36312	0. 23074	9. 37682	0. 23813	9. 39024	0. 24560	35
26	. 33509	. 21632	. 34937	. 22355	. 36335	. 23086	. 37704	. 23825	. 39046	. 24573	34
27	. 33533	. 21644	. 34960	. 22367	. 36358	. 23098	. 37727	. 23838	. 39068	. 24585	33
28	. 33557	. 21656	. 34984	. 22379	. 36381	. 23110	. 37749	. 23850	. 39090	. 24598	32
29	. 33581	. 21668	. 35007	. 22391	. 36404	. 23123	. 37772	. 23863	. 39112	. 24611	31
30	9. 33605	0. 21680	9. 35031	0. 22403	9. 36427	0. 23135	9. 37794	0. 23875	9. 39134	0. 24623	30
31	. 33629	. 21692	. 35054	. 22415	. 36450	. 23147	. 37817	. 23887	. 39156	. 24636	29
32	. 33653	. 21704	. 35078	. 22427	. 36473	. 23160	. 37840	. 23900	. 39178	. 24648	28
33	. 33677	. 21716	. 35101	. 22440	. 36496	. 23172	. 37862	. 23912	. 39201	. 24661	27
34	. 33701	. 21728	. 35125	. 22452	. 36519	. 23184	. 37885	. 23925	. 39223	. 24673	26
35	9. 33725	0. 21740	9. 35148	0. 22464	9. 36542	0. 23196	9. 37907	0. 23937	9. 39245	0. 24686	25
36	. 33749	. 21752	. 35172	. 22476	. 36565	. 23209	. 37930	. 23950	. 39267	. 24698	24
37	. 33773	. 21764	. 35195	. 22488	. 36588	. 23221	. 37952	. 23962	. 39289	. 24711	23
38	. 33797	. 21776	. 35219	. 22500	. 36611	. 23233	. 37975	. 23974	. 39311	. 24723	22
39	. 33821	. 21788	. 35242	. 22512	. 36634	. 23246	. 37997	. 23987	. 39333	. 24736	21
40	9. 33845	0. 21800	9. 35266	0. 22525	9. 36657	0. 23258	9. 38020	0. 23999	9. 39355	0. 24749	20
41	. 33869	. 21812	. 35289	. 22537	. 36680	. 23270	. 38042	. 24012	. 39377	. 24761	19
42	. 33893	. 21824	. 35312	. 22549	. 36703	. 23282	. 38065	. 24024	. 39399	. 24774	18
43	. 33917	. 21836	. 35336	. 22561	. 36726	. 23295	. 38087	. 24036	. 39421	. 24786	17
44	. 33941	. 21848	. 35359	. 22573	. 36749	. 23307	. 38110	. 24049	. 39443	. 24799	16
45	9. 33965	0. 21860	9. 35383	0. 22585	9. 36772	0. 23319	9. 38132	0. 24061	9. 39465	0. 24811	15
46	. 33988	. 21872	. 35406	. 22598	. 36794	. 23332	. 38154	. 24074	. 39487	. 24824	14
47	. 34012	. 21884	. 35429	. 22610	. 36817	. 23344	. 38177	. 24086	. 39509	. 24836	13
48	. 34036	. 21896	. 35453	. 22622	. 36840	. 23356	. 38199	. 24099	. 39531	. 24849	12
49	. 34060	. 21908	. 35476	. 22634	. 36863	. 23368	. 38222	. 24111	. 39553	. 24862	11
50	9. 34084	0. 21920	9. 35500	0. 22646	9. 36886	0. 23381	9. 38244	0. 24124	9. 39575	0. 24874	10
51	. 34108	. 21932	. 35523	. 22658	. 36909	. 23393	. 38267	. 24136	. 39597	. 24887	9
52	. 34132	. 21944	. 35546	. 22671	. 36932	. 23405	. 38289	. 24148	. 39619	. 24899	8
53	. 34155	. 21956	. 35570	. 22683	. 36955	. 23418	. 38311	. 24161	. 39641	. 24912	7
54	. 34179	. 21968	. 35593	. 22695	. 36977	. 23430	. 38334	. 24173	. 39663	. 24924	6
55	9. 34203	0. 21980	9. 35616	0. 22707	9. 37000	0. 23442	9. 38356	0. 24186	9. 39685	0. 24937	5
56	. 34227	. 21992	. 35639	. 22719	. 37023	. 23455	. 38378	. 24198	. 39706	. 24950	4
57	. 34251	. 22004	. 35663	. 22731	. 37046	. 23467	. 38401	. 24211	. 39728	. 24962	3
58	. 34274	. 22016	. 35686	. 22744	. 37069	. 23479	. 38423	. 24223	. 39750	. 24975	2
59	. 34298	. 22028	. 35709	. 22756	. 37091	. 23492	. 38445	. 24236	. 39772	. 24987	1
60	9. 34322	0. 22040	9. 35733	0. 22768	9. 37114	0. 23504	9. 38468	0. 24248	9. 39794	0. 25000	0
	304°		303°		302°		301°		300°		

Haversines

′	60°		61°		62°		63°		64°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 39794	0. 25000	9. 41094	0. 25760	9. 42368	0. 26526	9. 43617	0. 27300	9. 44842	0. 28081	60
1	. 39816	. 25013	. 41115	. 25772	. 42389	. 26539	. 43638	. 27313	. 44862	. 28095	59
2	. 39838	. 25025	. 41137	. 25785	. 42410	. 26552	. 43658	. 27326	. 44882	. 28108	58
3	. 39860	. 25038	. 41158	. 25798	. 42431	. 26565	. 43679	. 27339	. 44903	. 28121	57
4	. 39881	. 25050	. 41180	. 25810	. 42452	. 26578	. 43699	. 27352	. 44923	. 28134	56
5	9. 39903	0. 25063	9. 41201	0. 25823	9. 42473	0. 26591	9. 43720	0. 27365	9. 44943	0. 28147	55
6	. 39925	. 25076	. 41222	. 25836	. 42494	. 26604	. 43741	. 27378	. 44963	. 28160	54
7	. 39947	. 25088	. 41244	. 25849	. 42515	. 26616	. 43761	. 27391	. 44983	. 28173	53
8	. 39969	. 25101	. 41265	. 25861	. 42536	. 26629	. 43782	. 27404	. 45003	. 28186	52
9	. 39991	. 25113	. 41287	. 25874	. 42557	. 26642	. 43802	. 27417	. 45024	. 28199	51
10	9. 40012	0. 25126	9. 41308	0. 25887	9. 42578	0. 26655	9. 43823	0. 27430	9. 45044	0. 28212	50
11	. 40034	. 25139	. 41329	. 25900	. 42599	. 26668	. 43843	. 27443	. 45064	. 28225	49
12	. 40056	. 25151	. 41351	. 25912	. 42620	. 26681	. 43864	. 27456	. 45084	. 28238	48
13	. 40078	. 25164	. 41372	. 25925	. 42641	. 26694	. 43884	. 27469	. 45104	. 28252	47
14	. 40100	. 25177	. 41393	. 25938	. 42662	. 26706	. 43905	. 27482	. 45124	. 28265	46
15	9. 40121	0. 25189	9. 41415	0. 25951	9. 42682	0. 26719	9. 43926	0. 27495	9. 45144	0. 28278	45
16	. 40143	. 25202	. 41436	. 25963	. 42703	. 26732	. 43946	. 27508	. 45165	. 28291	44
17	. 40165	. 25214	. 41457	. 25976	. 42724	. 26745	. 43967	. 27521	. 45185	. 28304	43
18	. 40187	. 25227	. 41479	. 25989	. 42745	. 26758	. 43987	. 27534	. 45205	. 28317	42
19	. 40208	. 25240	. 41500	. 26002	. 42766	. 26771	. 44008	. 27547	. 45225	. 28330	41
20	9. 40230	0. 25252	9. 41521	0. 26014	9. 42787	0. 26784	9. 44028	0. 27560	9. 45245	0. 28343	40
21	. 40252	. 25265	. 41543	. 26027	. 42808	. 26797	. 44048	. 27573	. 45265	. 28356	39
22	. 40274	. 25278	. 41564	. 26040	. 42829	. 26809	. 44069	. 27586	. 45285	. 28369	38
23	. 40295	. 25290	. 41585	. 26053	. 42850	. 26822	. 44089	. 27599	. 45305	. 28383	37
24	. 40317	. 25303	. 41606	. 26065	. 42870	. 26835	. 44110	. 27612	. 45325	. 28396	36
25	9. 40339	0. 25316	9. 41628	0. 26078	9. 42891	0. 26848	9. 44130	0. 27625	9. 45345	0. 28409	35
26	. 40360	. 25328	. 41649	. 26091	. 42912	. 26861	. 44151	. 27638	. 45365	. 28422	34
27	. 40382	. 25341	. 41670	. 26104	. 42933	. 26874	. 44171	. 27651	. 45385	. 28435	33
28	. 40404	. 25354	. 41692	. 26117	. 42954	. 26887	. 44192	. 27664	. 45405	. 28448	32
29	. 40425	. 25366	. 41713	. 26129	. 42975	. 26900	. 44212	. 27677	. 45426	. 28461	31
30	9. 40447	0. 25379	9. 41734	0. 26142	9. 42996	0. 26913	9. 44232	0. 27690	9. 45446	0. 28474	30
31	. 40469	. 25391	. 41755	. 26155	. 43016	. 26925	. 44253	. 27703	. 45466	. 28488	29
32	. 40490	. 25404	. 41776	. 26168	. 43037	. 26938	. 44273	. 27716	. 45486	. 28501	28
33	. 40512	. 25417	. 41798	. 26180	. 43058	. 26951	. 44294	. 27729	. 45506	. 28514	27
34	. 40534	. 25429	. 41819	. 26193	. 43079	. 26964	. 44314	. 27742	. 45526	. 28527	26
35	9. 40555	0. 25442	9. 41840	0. 26206	9. 43100	0. 26977	9. 44334	0. 27755	9. 45546	0. 28540	25
36	. 40577	. 25455	. 41861	. 26219	. 43120	. 26990	. 44355	. 27768	. 45566	. 28553	24
37	. 40599	. 25467	. 41882	. 26232	. 43141	. 27003	. 44375	. 27781	. 45586	. 28566	23
38	. 40620	. 25480	. 41904	. 26244	. 43162	. 27016	. 44396	. 27794	. 45606	. 28580	22
39	. 40642	. 25493	. 41925	. 26257	. 43183	. 27029	. 44416	. 27807	. 45625	. 28593	21
40	9. 40663	0. 25506	9. 41946	0. 26270	9. 43203	0. 27042	9. 44436	0. 27820	9. 45645	0. 28606	20
41	. 40685	. 25518	. 41967	. 26283	. 43224	. 27055	. 44457	. 27833	. 45665	. 28619	19
42	. 40707	. 25531	. 41988	. 26296	. 43245	. 27068	. 44477	. 27846	. 45685	. 28632	18
43	. 40728	. 25544	. 42009	. 26308	. 43266	. 27080	. 44497	. 27859	. 45705	. 28645	17
44	. 40750	. 25556	. 42031	. 26321	. 43286	. 27093	. 44518	. 27873	. 45725	. 28658	16
45	9. 40771	0. 25569	9. 42052	0. 26334	9. 43307	0. 27106	9. 44538	0. 27886	9. 45745	0. 28672	15
46	. 40793	. 25582	. 42073	. 26347	. 43328	. 27119	. 44558	. 27899	. 45765	. 28685	14
47	. 40814	. 25594	. 42094	. 26360	. 43348	. 27132	. 44579	. 27912	. 45785	. 28698	13
48	. 40836	. 25607	. 42115	. 26372	. 43369	. 27145	. 44599	. 27925	. 45805	. 28711	12
49	. 40858	. 25620	. 42136	. 26385	. 43390	. 27158	. 44619	. 27938	. 45825	. 28724	11
50	9. 40879	0. 25632	9. 42157	0. 26398	9. 43411	0. 27171	9. 44639	0. 27951	9. 45845	0. 28737	10
51	. 40900	. 25645	. 42178	. 26411	. 43431	. 27184	. 44660	. 27964	. 45865	. 28751	9
52	. 40922	. 25658	. 42199	. 26424	. 43452	. 27197	. 44680	. 27977	. 45884	. 28764	8
53	. 40943	. 25671	. 42221	. 26437	. 43473	. 27210	. 44700	. 27990	. 45904	. 28777	7
54	. 40965	. 25683	. 42242	. 26449	. 43493	. 27223	. 44721	. 28003	. 45924	. 28790	6
55	9. 40986	0. 25696	9. 42263	0. 26462	9. 43514	0. 27236	9. 44741	0. 28016	9. 45944	0. 28803	5
56	. 41008	. 25709	. 42284	. 26475	. 43535	. 27249	. 44761	. 28029	. 45964	. 28816	4
57	. 41029	. 25721	. 42305	. 26488	. 43555	. 27262	. 44781	. 28042	. 45984	. 28830	3
58	. 41051	. 25734	. 42326	. 26501	. 43576	. 27275	. 44801	. 28055	. 46004	. 28843	2
59	. 41072	. 25747	. 42347	. 26514	. 43596	. 27288	. 44822	. 28068	. 46023	. 28856	1
60	9. 41094	0. 25760	9. 42368	0. 26526	9. 43617	0. 27300	9. 44842	0. 28081	9. 46043	0. 28869	0
	299°		298°		297°		296°		295°		

(2)

Haversines

′	65°		66°		67°		68°		69°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 46043	0. 28869	9. 47222	0. 29663	9. 48378	0. 30463	9. 49512	0. 31270	9. 50626	0. 32082	60
1	. 46063	. 28882	. 47241	. 29676	. 48397	. 30477	. 49531	. 31283	. 50644	. 32095	59
2	. 46083	. 28895	. 47261	. 29690	. 48416	. 30490	. 49550	. 31297	. 50662	. 32109	58
3	. 46103	. 28909	. 47280	. 29703	. 48435	. 30504	. 49568	. 31310	. 50681	. 32122	57
4	. 46123	. 28922	. 47300	. 29716	. 48454	. 30517	. 49587	. 31324	. 50699	. 32136	56
5	9. 46142	0. 28935	9. 47319	0. 29730	9. 48473	0. 30530	9. 49606	0. 31337	9. 50717	0. 32150	55
6	. 46162	. 28948	. 47338	. 29743	. 48492	. 30544	. 49625	. 31351	. 50736	. 32163	54
7	. 46182	. 28961	. 47358	. 29756	. 48511	. 30557	. 49643	. 31364	. 50754	. 32177	53
8	. 46202	. 28975	. 47377	. 29770	. 48530	. 30571	. 49662	. 31378	. 50772	. 32190	52
9	. 46222	. 28988	. 47397	. 29783	. 48549	. 30584	. 49681	. 31391	. 50791	. 32204	51
10	9. 46241	0. 29001	9. 47416	0. 29796	9. 48568	0. 30597	9. 49699	0. 31405	9. 50809	0. 32217	50
11	. 46261	. 29014	. 47435	. 29809	. 48587	. 30611	. 49718	. 31418	. 50827	. 32231	49
12	. 46281	. 29027	. 47455	. 29823	. 48607	. 30624	. 49737	. 31432	. 50846	. 32245	48
13	. 46301	. 29041	. 47474	. 29836	. 48626	. 30638	. 49755	. 31445	. 50864	. 32258	47
14	. 46320	. 29054	. 47493	. 29849	. 48645	. 30651	. 49774	. 31459	. 50882	. 32272	46
15	9. 46340	0. 29067	9. 47513	0. 29863	9. 48664	0. 30664	9. 49793	0. 31472	9. 50901	0. 32285	45
16	. 46360	. 29080	. 47532	. 29876	. 48683	. 30678	. 49811	. 31486	. 50919	. 32299	44
17	. 46380	. 29093	. 47552	. 29889	. 48702	. 30691	. 49830	. 31499	. 50937	. 32313	43
18	. 46399	. 29107	. 47571	. 29903	. 48720	. 30705	. 49849	. 31513	. 50956	. 32326	42
19	. 46419	. 29120	. 47590	. 29916	. 48739	. 30718	. 49867	. 31526	. 50974	. 32340	41
20	9. 46439	0. 29133	9. 47610	0. 29929	9. 48758	0. 30732	9. 49886	0. 31540	9. 50992	0. 32353	40
21	. 46458	. 29146	. 47629	. 29943	. 48777	. 30745	. 49904	. 31553	. 51010	. 32367	39
22	. 46478	. 29160	. 47648	. 29956	. 48796	. 30758	. 49923	. 31567	. 51029	. 32381	38
23	. 46498	. 29173	. 47668	. 29969	. 48815	. 30772	. 49942	. 31580	. 51047	. 32394	37
24	. 46517	. 29186	. 47687	. 29983	. 48834	. 30785	. 49960	. 31594	. 51065	. 32408	36
25	9. 46537	0. 29199	9. 47706	0. 29996	9. 48853	0. 30799	9. 49979	0. 31607	9. 51083	0. 32422	35
26	. 46557	. 29212	. 47725	. 30009	. 48872	. 30812	. 49997	. 31621	. 51102	. 32435	34
27	. 46576	. 29226	. 47745	. 30023	. 48891	. 30826	. 50016	. 31634	. 51120	. 32449	33
28	. 46596	. 29239	. 47764	. 30036	. 48910	. 30839	. 50034	. 31648	. 51138	. 32462	32
29	. 46616	. 29252	. 47783	. 30049	. 48929	. 30852	. 50053	. 31661	. 51156	. 32476	31
30	9. 46635	0. 29265	9. 47803	0. 30063	9. 48948	0. 30866	9. 50072	0. 31675	9. 51174	0. 32490	30
31	. 46655	. 29279	. 47822	. 30076	. 48967	. 30879	. 50090	. 31688	. 51193	. 32503	29
32	. 46675	. 29292	. 47841	. 30089	. 48986	. 30893	. 50109	. 31702	. 51211	. 32517	28
33	. 46694	. 29305	. 47860	. 30103	. 49004	. 30906	. 50127	. 31716	. 51229	. 32531	27
34	. 46714	. 29318	. 47880	. 30116	. 49023	. 30920	. 50146	. 31729	. 51247	. 32544	26
35	9. 46733	0. 29332	9. 47899	0. 30129	9. 49042	0. 30933	9. 50164	0. 31743	9. 51265	0. 32558	25
36	. 46753	. 29345	. 47918	. 30143	. 49061	. 30946	. 50183	. 31756	. 51284	. 32571	24
37	. 46773	. 29358	. 47937	. 30156	. 49080	. 30960	. 50201	. 31770	. 51302	. 32585	23
38	. 46792	. 29371	. 47957	. 30169	. 49099	. 30973	. 50220	. 31783	. 51320	. 32599	22
39	. 46812	. 29385	. 47976	. 30183	. 49118	. 30987	. 50238	. 31797	. 51338	. 32612	21
40	9. 46831	0. 29398	9. 47995	0. 30196	9. 49137	0. 31000	9. 50257	0. 31810	9. 51356	0. 32626	20
41	. 46851	. 29411	. 48014	. 30209	. 49155	. 31014	. 50275	. 31824	. 51374	. 32640	19
42	. 46871	. 29424	. 48033	. 30223	. 49174	. 31027	. 50294	. 31837	. 51393	. 32653	18
43	. 46890	. 29438	. 48053	. 30236	. 49193	. 31041	. 50312	. 31851	. 51411	. 32667	17
44	. 46910	. 29451	. 48072	. 30249	. 49212	. 31054	. 50331	. 31865	. 51429	. 32681	16
45	9. 46929	0. 29464	9. 48091	0. 30263	9. 49231	0. 31068	9. 50349	0. 31878	9. 51447	0. 32694	15
46	. 46949	. 29477	. 48110	. 30276	. 49250	. 31081	. 50368	. 31892	. 51465	. 32708	14
47	. 46968	. 29491	. 48129	. 30290	. 49268	. 31094	. 50386	. 31905	. 51483	. 32721	13
48	. 46988	. 29504	. 48148	. 30303	. 49287	. 31108	. 50405	. 31919	. 51501	. 32735	12
49	. 47007	. 29517	. 48168	. 30316	. 49306	. 31121	. 50423	. 31932	. 51519	. 32749	11
50	9. 47027	0. 29530	9. 48187	0. 30330	9. 49325	0. 31135	9. 50442	0. 31946	9. 51538	0. 32762	10
51	. 47046	. 29544	. 48206	. 30343	. 49344	. 31148	. 50460	. 31959	. 51556	. 32776	9
52	. 47066	. 29557	. 48225	. 30356	. 49362	. 31162	. 50478	. 31973	. 51574	. 32790	8
53	. 47085	. 29570	. 48244	. 30370	. 49381	. 31175	. 50497	. 31987	. 51592	. 32803	7
54	. 47105	. 29583	. 48263	. 30383	. 49400	. 31189	. 50515	. 32000	. 51610	. 32817	6
55	9. 47124	0. 29597	9. 48282	0. 30397	9. 49419	0. 31202	9. 50534	0. 32014	9. 51628	0. 32831	5
56	. 47144	. 29610	. 48302	. 30410	. 49437	. 31216	. 50552	. 32027	. 51646	. 32844	4
57	. 47163	. 29623	. 48321	. 30423	. 49456	. 31229	. 50570	. 32041	. 51664	. 32858	3
58	. 47183	. 29637	. 48340	. 30437	. 49475	. 31243	. 50589	. 32054	. 51682	. 32872	2
59	. 47202	. 29650	. 48359	. 30450	. 49494	. 31256	. 50607	. 32068	. 51700	. 32885	1
60	9. 47222	0. 29663	9. 48378	0. 30463	9. 49512	0. 31270	9. 50626	0. 32082	9. 51718	0. 32899	0
	294°		293°		292°		291°		290°		

Haversines

′	70°		71°		72°		73°		74°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 51718	0. 32899	9. 52791	0. 33722	9. 53844	0. 34549	9. 54878	0. 35381	9. 55893	0. 36218	60
1	. 51736	. 32913	. 52809	. 33735	. 53861	. 34563	. 54895	. 35395	. 55909	. 36232	59
2	. 51754	. 32926	. 52826	. 33749	. 53879	. 34577	. 54912	. 35409	. 55926	. 36246	58
3	. 51772	. 32940	. 52844	. 33763	. 53896	. 34591	. 54929	. 35423	. 55943	. 36260	57
4	. 51790	. 32954	. 52862	. 33777	. 53913	. 34604	. 54946	. 35437	. 55960	. 36274	56
5	9. 51808	0. 32967	9. 52879	0. 33790	9. 53931	0. 34618	9. 54963	0. 35451	9. 55976	0. 36288	55
6	. 51826	. 32981	. 52897	. 33804	. 53948	. 34632	. 54980	. 35465	. 55993	. 36302	54
7	. 51844	. 32995	. 52915	. 33818	. 53966	. 34646	. 54997	. 35479	. 56010	. 36316	53
8	. 51862	. 33008	. 52932	. 33832	. 53983	. 34660	. 55014	. 35493	. 56027	. 36330	52
9	. 51880	. 33022	. 52950	. 33845	. 54000	. 34674	. 55031	. 35507	. 56043	. 36344	51
10	9. 51898	0. 33036	9. 52968	0. 33859	9. 54017	0. 34688	9. 55048	0. 35521	9. 56060	0. 36358	50
11	. 51916	. 33049	. 52985	. 33873	. 54035	. 34701	. 55065	. 35534	. 56077	. 36372	49
12	. 51934	. 33063	. 53003	. 33887	. 54052	. 34715	. 55082	. 35548	. 56093	. 36386	48
13	. 51952	. 33077	. 53021	. 33900	. 54069	. 34729	. 55099	. 35562	. 56110	. 36400	47
14	. 51970	. 33090	. 53038	. 33914	. 54087	. 34743	. 55116	. 35576	. 56127	. 36414	46
15	9. 51988	0. 33104	9. 53056	0. 33928	9. 54104	0. 34757	9. 55133	0. 35590	9. 56144	0. 36428	45
16	. 52006	. 33118	. 53073	. 33942	. 54121	. 34771	. 55150	. 35604	. 56160	. 36442	44
17	. 52024	. 33132	. 53091	. 33956	. 54139	. 34784	. 55167	. 35618	. 56177	. 36456	43
18	. 52042	. 33145	. 53109	. 33969	. 54156	. 34798	. 55184	. 35632	. 56194	. 36470	42
19	. 52060	. 33159	. 53126	. 33983	. 54173	. 34812	. 55201	. 35646	. 56210	. 36484	41
20	9. 52078	0. 33173	9. 53144	0. 33997	9. 54190	0. 34826	9. 55218	0. 35660	9. 56227	0. 36498	40
21	. 52096	. 33186	. 53162	. 34011	. 54208	. 34840	. 55235	. 35674	. 56244	. 36512	39
22	. 52114	. 33200	. 53179	. 34024	. 54225	. 34854	. 55252	. 35688	. 56260	. 36526	38
23	. 52132	. 33214	. 53197	. 34038	. 54242	. 34868	. 55269	. 35702	. 56277	. 36540	37
24	. 52150	. 33227	. 53214	. 34052	. 54260	. 34882	. 55286	. 35716	. 56294	. 36554	36
25	9. 52168	0. 33241	9. 53232	0. 34066	9. 54277	0. 34895	9. 55303	0. 35730	9. 56310	0. 36568	35
26	. 52185	. 33255	. 53249	. 34080	. 54294	. 34909	. 55320	. 35743	. 56327	. 36582	34
27	. 52203	. 33269	. 53267	. 34093	. 54311	. 34923	. 55337	. 35757	. 56343	. 36596	33
28	. 52221	. 33282	. 53285	. 34107	. 54329	. 34937	. 55354	. 35771	. 56360	. 36610	32
29	. 52239	. 33296	. 53302	. 34121	. 54346	. 34951	. 55370	. 35785	. 56377	. 36624	31
30	9. 52257	0. 33310	9. 53320	0. 34135	9. 54363	0. 34965	9. 55387	0. 35799	9. 56393	0. 36638	30
31	. 52275	. 33323	. 53337	. 34149	. 54380	. 34979	. 55404	. 35813	. 56410	. 36652	29
32	. 52293	. 33337	. 53355	. 34162	. 54397	. 34992	. 55421	. 35827	. 56426	. 36666	28
33	. 52311	. 33351	. 53372	. 34176	. 54415	. 35006	. 55438	. 35841	. 56443	. 36680	27
34	. 52328	. 33365	. 53390	. 34190	. 54432	. 35020	. 55455	. 35855	. 56460	. 36694	26
35	9. 52346	0. 33378	9. 53407	0. 34204	9. 54449	0. 35034	9. 55472	0. 35869	9. 56476	0. 36708	25
36	. 52364	. 33392	. 53425	. 34218	. 54466	. 35048	. 55489	. 35883	. 56493	. 36722	24
37	. 52382	. 33406	. 53442	. 34231	. 54483	. 35062	. 55506	. 35897	. 56509	. 36736	23
38	. 52400	. 33419	. 53460	. 34245	. 54501	. 35076	. 55523	. 35911	. 56526	. 36750	22
39	. 52418	. 33433	. 53477	. 34259	. 54518	. 35090	. 55539	. 35925	. 56543	. 36764	21
40	9. 52436	0. 33447	9. 53495	0. 34273	9. 54535	0. 35103	9. 55556	0. 35939	9. 56559	0. 36778	20
41	. 52453	. 33461	. 53512	. 34287	. 54552	. 35117	. 55573	. 35953	. 56576	. 36792	19
42	. 52471	. 33474	. 53530	. 34300	. 54569	. 35131	. 55590	. 35967	. 56592	. 36806	18
43	. 52489	. 33488	. 53547	. 34314	. 54587	. 35145	. 55607	. 35981	. 56609	. 36820	17
44	. 52507	. 33502	. 53565	. 34328	. 54604	. 35159	. 55624	. 35995	. 56625	. 36834	16
45	9. 52525	0. 33515	9. 53582	0. 34342	9. 54621	0. 35173	9. 55641	0. 36009	9. 56642	0. 36848	15
46	. 52542	. 33529	. 53600	. 34356	. 54638	. 35187	. 55657	. 36023	. 56658	. 36862	14
47	. 52560	. 33543	. 53617	. 34369	. 54655	. 35201	. 55674	. 36036	. 56675	. 36877	13
48	. 52578	. 33557	. 53635	. 34383	. 54672	. 35215	. 55691	. 36050	. 56692	. 36891	12
49	. 52596	. 33570	. 53652	. 34397	. 54689	. 35228	. 55708	. 36064	. 56708	. 36905	11
50	9. 52613	0. 33584	9. 53670	0. 34411	9. 54707	0. 35242	9. 55725	0. 36078	9. 56725	0. 36919	10
51	. 52631	. 33598	. 53687	. 34425	. 54724	. 35256	. 55742	. 36092	. 56741	. 36933	9
52	. 52649	. 33612	. 53704	. 34439	. 54741	. 35270	. 55758	. 36106	. 56758	. 36947	8
53	. 52667	. 33625	. 53722	. 34452	. 54758	. 35284	. 55775	. 36120	. 56774	. 36961	7
54	. 52684	. 33639	. 53739	. 34466	. 54775	. 35298	. 55792	. 36134	. 56791	. 36975	6
55	9. 52702	0. 33653	9. 53757	0. 34480	9. 54792	0. 35312	9. 55809	0. 36148	9. 56807	0. 36989	5
56	. 52720	. 33667	. 53774	. 34494	. 54809	. 35326	. 55826	. 36162	. 56824	. 37003	4
57	. 52738	. 33680	. 53792	. 34508	. 54826	. 35340	. 55842	. 36176	. 56840	. 37017	3
58	. 52755	. 33694	. 53809	. 34521	. 54843	. 35354	. 55859	. 36190	. 56856	. 37031	2
59	. 52773	. 33708	. 53826	. 34535	. 54860	. 35368	. 55876	. 36204	. 56873	. 37045	1
60	9. 52791	0. 33722	9. 53844	0. 34549	9. 54878	0. 35381	9. 55893	0. 36218	9. 56889	0. 37059	0
	289°		288°		287°		286°		285°		

Haversines

′	75°		76°		77°		78°		79°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 56889	0. 37059	9. 57868	0. 37904	9. 58830	0. 38752	9. 59774	0. 39604	9. 60702	0. 40460	60
1	. 56906	. 37073	. 57885	. 37918	. 58846	. 38767	. 59790	. 39619	. 60717	. 40474	59
2	. 56922	. 37087	. 57901	. 37932	. 58862	. 38781	. 59806	. 39633	. 60733	. 40488	58
3	. 56939	. 37101	. 57917	. 37946	. 58878	. 38795	. 59821	. 39647	. 60748	. 40502	57
4	. 56955	. 37115	. 57933	. 37960	. 58893	. 38809	. 59837	. 39661	. 60763	. 40517	56
5	9. 56972	0. 37129	9. 57949	0. 37974	9. 58909	0. 38823	9. 59852	0. 39676	9. 60779	0. 40531	55
6	. 56988	. 37143	. 57965	. 37989	. 58925	. 38837	. 59868	. 39690	. 60794	. 40545	54
7	. 57005	. 37157	. 57981	. 38003	. 58941	. 38852	. 59883	. 39704	. 60809	. 40560	53
8	. 57021	. 37171	. 57998	. 38017	. 58957	. 38866	. 59899	. 39718	. 60825	. 40574	52
9	. 57037	. 37186	. 58014	. 38031	. 58973	. 38880	. 59915	. 39732	. 60840	. 40588	51
10	9. 57054	0. 37200	9. 58030	0. 38045	9. 58989	0. 38894	9. 59930	0. 39747	9. 60855	0. 40602	50
11	. 57070	. 37214	. 58046	. 38059	. 59004	. 38908	. 59946	. 39761	. 60870	. 40617	49
12	. 57087	. 37228	. 58062	. 38073	. 59020	. 38923	. 59961	. 39775	. 60886	. 40631	48
13	. 57103	. 37242	. 58078	. 38087	. 59036	. 38937	. 59977	. 39789	. 60901	. 40645	47
14	. 57119	. 37256	. 58094	. 38102	. 59052	. 38951	. 59992	. 39804	. 60916	. 40660	46
15	9. 57136	0. 37270	9. 58110	0. 38116	9. 59068	0. 38965	9. 60008	0. 39818	9. 60931	0. 40674	45
16	. 57152	. 37284	. 58126	. 38130	. 59083	. 38979	. 60023	. 39832	. 60947	. 40688	44
17	. 57169	. 37298	. 58143	. 38144	. 59099	. 38994	. 60039	. 39846	. 60962	. 40702	43
18	. 57185	. 37312	. 58159	. 38158	. 59115	. 39008	. 60054	. 39861	. 60977	. 40717	42
19	. 57201	. 37326	. 58175	. 38172	. 59131	. 39022	. 60070	. 39875	. 60992	. 40731	41
20	9. 57218	0. 37340	9. 58191	0. 38186	9. 59147	0. 39036	9. 60085	0. 39889	9. 61008	0. 40745	40
21	. 57234	. 37354	. 58207	. 38200	. 59162	. 39050	. 60101	. 39903	. 61023	. 40760	39
22	. 57250	. 37368	. 58223	. 38215	. 59178	. 39064	. 60116	. 39918	. 61038	. 40774	38
23	. 57267	. 37382	. 58239	. 38229	. 59194	. 39079	. 60132	. 39932	. 61053	. 40788	37
24	. 57283	. 37397	. 58255	. 38243	. 59210	. 39093	. 60147	. 39946	. 61069	. 40802	36
25	9. 57299	0. 37411	9. 58271	0. 38257	9. 59225	0. 39107	9. 60163	0. 39960	9. 61084	0. 40817	35
26	. 57316	. 37425	. 58287	. 38271	. 59241	. 39121	. 60178	. 39975	. 61099	. 40831	34
27	. 57332	. 37439	. 58303	. 38285	. 59257	. 39135	. 60194	. 39989	. 61114	. 40845	33
28	. 57348	. 37453	. 58319	. 38299	. 59273	. 39150	. 60209	. 40003	. 61129	. 40860	32
29	. 57365	. 37467	. 58335	. 38314	. 59289	. 39164	. 60225	. 40017	. 61145	. 40874	31
30	9. 57381	0. 37481	9. 58351	0. 38328	9. 59304	0. 39178	9. 60240	0. 40032	9. 61160	0. 40888	30
31	. 57397	. 37495	. 58367	. 38342	. 59320	. 39192	. 60256	. 40046	. 61175	. 40903	29
32	. 57414	. 37509	. 58383	. 38356	. 59336	. 39206	. 60271	. 40060	. 61190	. 40917	28
33	. 57430	. 37523	. 58399	. 38370	. 59351	. 39221	. 60287	. 40074	. 61205	. 40931	27
34	. 57446	. 37537	. 58415	. 38384	. 59367	. 39235	. 60302	. 40089	. 61221	. 40945	26
35	9. 57463	0. 37551	9. 58431	0. 38398	9. 59383	0. 39249	9. 60318	0. 40103	9. 61236	0. 40960	25
36	. 57479	. 37566	. 58447	. 38413	. 59399	. 39263	. 60333	. 40117	. 61251	. 40974	24
37	. 57495	. 37580	. 58463	. 38427	. 59414	. 39277	. 60348	. 40131	. 61266	. 40988	23
38	. 57511	. 37594	. 58479	. 38441	. 59430	. 39292	. 60364	. 40146	. 61281	. 41003	22
39	. 57528	. 37608	. 58495	. 38455	. 59446	. 39306	. 60379	. 40160	. 61296	. 41017	21
40	9. 57544	0. 37622	9. 58511	0. 38469	9. 59461	0. 39320	9. 60395	0. 40174	9. 61312	0. 41031	20
41	. 57560	. 37636	. 58527	. 38483	. 59477	. 39334	. 60410	. 40188	. 61327	. 41046	19
42	. 57577	. 37650	. 58543	. 38498	. 59493	. 39348	. 60426	. 40203	. 61342	. 41060	18
43	. 57593	. 37664	. 58559	. 38512	. 59508	. 39363	. 60441	. 40217	. 61357	. 41074	17
44	. 57609	. 37678	. 58575	. 38526	. 59524	. 39377	. 60456	. 40231	. 61372	. 41089	16
45	9. 57625	0. 37692	9. 58591	0. 38540	9. 59540	0. 39391	9. 60472	0. 40245	9. 61387	0. 41103	15
46	. 57642	. 37706	. 58607	. 38554	. 59556	. 39405	. 60487	. 40260	. 61402	. 41117	14
47	. 57658	. 37721	. 58623	. 38568	. 59571	. 39420	. 60502	. 40274	. 61417	. 41131	13
48	. 57674	. 37735	. 58639	. 38582	. 59587	. 39434	. 60518	. 40288	. 61433	. 41146	12
49	. 57690	. 37749	. 58655	. 38597	. 59602	. 39448	. 60533	. 40303	. 61448	. 41160	11
50	9. 57706	0. 37763	9. 58671	0. 38611	9. 59618	0. 39462	9. 60549	0. 40317	9. 61463	0. 41174	10
51	. 57723	. 37777	. 58687	. 38625	. 59634	. 39476	. 60564	. 40331	. 61478	. 41189	9
52	. 57739	. 37791	. 58703	. 38639	. 59649	. 39491	. 60579	. 40345	. 61493	. 41203	8
53	. 57755	. 37805	. 58719	. 38653	. 59665	. 39505	. 60595	. 40360	. 61508	. 41217	7
54	. 57771	. 37819	. 58735	. 38667	. 59681	. 39519	. 60610	. 40374	. 61523	. 41232	6
55	9. 57787	0. 37833	9. 58750	0. 38682	9. 59696	0. 39533	9. 60625	0. 40388	9. 61538	0. 41246	5
56	. 57804	. 37847	. 58766	. 38696	. 59712	. 39548	. 60641	. 40402	. 61553	. 41260	4
57	. 57820	. 37862	. 58782	. 38710	. 59728	. 39562	. 60656	. 40417	. 61568	. 41275	3
58	. 57836	. 37876	. 58798	. 38724	. 59743	. 39576	. 60671	. 40431	. 61583	. 41289	2
59	. 57852	. 37890	. 58814	. 38738	. 59759	. 39590	. 60687	. 40445	. 61598	. 41303	1
60	9. 57868	0. 37904	9. 58830	0. 38752	9. 59774	0. 39604	9. 60702	0. 40460	9. 61614	0. 41318	0
	284°		283°		282°		281°		280°		

Haversines

′	80°		81°		82°		83°		84°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 61614	0. 41318	9. 62509	0. 42178	9. 63389	0. 43041	9. 64253	0. 43907	9. 65102	0. 44774	60
1	. 61629	. 41332	. 62524	. 42193	. 63403	. 43056	. 64267	. 43921	. 65116	. 44788	59
2	. 61644	. 41346	. 62538	. 42207	. 63418	. 43070	. 64281	. 43935	. 65130	. 44803	58
3	. 61659	. 41361	. 62553	. 42221	. 63432	. 43085	. 64296	. 43950	. 65144	. 44817	57
4	. 61674	. 41375	. 62568	. 42236	. 63447	. 43099	. 64310	. 43964	. 65158	. 44831	56
5	9. 61689	0. 41389	9. 62583	0. 42250	9. 63461	0. 43113	9. 64324	0. 43979	9. 65172	0. 44846	55
6	. 61704	. 41404	. 62598	. 42264	. 63476	. 43128	. 64339	. 43993	. 65186	. 44860	54
7	. 61719	. 41418	. 62612	. 42279	. 63490	. 43142	. 64353	. 44008	. 65200	. 44875	53
8	. 61734	. 41432	. 62627	. 42293	. 63505	. 43157	. 64367	. 44022	. 65214	. 44889	52
9	. 61749	. 41447	. 62642	. 42308	. 63519	. 43171	. 64381	. 44036	. 65228	. 44904	51
10	9. 61764	0. 41461	9. 62657	0. 42322	9. 63534	0. 43185	9. 64396	0. 44051	9. 65242	0. 44918	50
11	. 61779	. 41475	. 62671	. 42336	. 63548	. 43200	. 64410	. 44065	. 65256	. 44933	49
12	. 61794	. 41490	. 62686	. 42351	. 63563	. 43214	. 64424	. 44080	. 65270	. 44947	48
13	. 61809	. 41504	. 62701	. 42365	. 63577	. 43229	. 64438	. 44094	. 65284	. 44962	47
14	. 61824	. 41518	. 62716	. 42379	. 63592	. 43243	. 64452	. 44109	. 65298	. 44976	46
15	9. 61839	0. 41533	9. 62730	0. 42394	9. 63606	0. 43257	9. 64467	0. 44123	9. 65312	0. 44991	45
16	. 61854	. 41547	. 62745	. 42408	. 63621	. 43272	. 64481	. 44138	. 65326	. 45005	44
17	. 61869	. 41561	. 62760	. 42423	. 63635	. 43286	. 64495	. 44152	. 65340	. 45020	43
18	. 61884	. 41576	. 62774	. 42437	. 63649	. 43301	. 64509	. 44166	. 65354	. 45034	42
19	. 61899	. 41590	. 62789	. 42451	. 63664	. 43315	. 64523	. 44181	. 65368	. 45048	41
20	9. 61914	0. 41604	9. 62804	0. 42466	9. 63678	0. 43330	9. 64538	0. 44195	9. 65382	0. 45063	40
21	. 61929	. 41619	. 62819	. 42480	. 63693	. 43344	. 64552	. 44210	. 65396	. 45077	39
22	. 61944	. 41633	. 62833	. 42494	. 63707	. 43358	. 64566	. 44224	. 65410	. 45092	38
23	. 61959	. 41647	. 62848	. 42509	. 63722	. 43373	. 64580	. 44239	. 65424	. 45106	37
24	. 61974	. 41662	. 62863	. 42523	. 63736	. 43387	. 64594	. 44253	. 65438	. 45121	36
25	9. 61989	0. 41676	9. 62877	0. 42538	9. 63751	0. 43402	9. 64609	0. 44268	9. 65452	0. 45135	35
26	. 62003	. 41690	. 62892	. 42552	. 63765	. 43416	. 64623	. 44282	. 65466	. 45150	34
27	. 62018	. 41705	. 62907	. 42566	. 63779	. 43430	. 64637	. 44296	. 65480	. 45164	33
28	. 62033	. 41719	. 62921	. 42581	. 63794	. 43445	. 64651	. 44311	. 65493	. 45179	32
29	. 62048	. 41733	. 62936	. 42595	. 63808	. 43459	. 64665	. 44325	. 65507	. 45193	31
30	9. 62063	0. 41748	9. 62951	0. 42610	9. 63823	0. 43474	9. 64679	0. 44340	9. 65521	0. 45208	30
31	. 62078	. 41762	. 62965	. 42624	. 63837	. 43488	. 64694	. 44354	. 65535	. 45222	29
32	. 62093	. 41776	. 62980	. 42638	. 63851	. 43503	. 64708	. 44369	. 65549	. 45237	28
33	. 62108	. 41791	. 62995	. 42653	. 63866	. 43517	. 64722	. 44383	. 65563	. 45251	27
34	. 62123	. 41805	. 63009	. 42667	. 63880	. 43531	. 64736	. 44398	. 65577	. 45266	26
35	9. 62138	0. 41819	9. 63024	0. 42681	9. 63895	0. 43546	9. 64750	0. 44412	9. 65591	0. 45280	25
36	. 62153	. 41834	. 63039	. 42696	. 63909	. 43560	. 64764	. 44427	. 65605	. 45295	24
37	. 62168	. 41848	. 63053	. 42710	. 63923	. 43575	. 64778	. 44441	. 65619	. 45309	23
38	. 62182	. 41862	. 63068	. 42725	. 63938	. 43589	. 64793	. 44455	. 65632	. 45324	22
39	. 62197	. 41877	. 63082	. 42739	. 63952	. 43603	. 64807	. 44470	. 65646	. 45338	21
40	9. 62212	0. 41891	9. 63097	0. 42753	9. 63966	0. 43618	9. 64821	0. 44484	9. 65660	0. 45353	20
41	. 62227	. 41905	. 63112	. 42768	. 63981	. 43632	. 64835	. 44499	. 65674	. 45367	19
42	. 62242	. 41920	. 63126	. 42782	. 63995	. 43647	. 64849	. 44513	. 65688	. 45381	18
43	. 62257	. 41934	. 63141	. 42797	. 64010	. 43661	. 64863	. 44528	. 65702	. 45396	17
44	. 62272	. 41949	. 63156	. 42811	. 64024	. 43676	. 64877	. 44542	. 65716	. 45410	16
45	9. 62287	0. 41963	9. 63170	0. 42825	9. 64038	0. 43690	9. 64891	0. 44557	9. 65729	0. 45425	15
46	. 62301	. 41977	. 63185	. 42840	. 64053	. 43704	. 64905	. 44571	. 65743	. 45439	14
47	. 62316	. 41992	. 63199	. 42854	. 64067	. 43719	. 64919	. 44586	. 65757	. 45454	13
48	. 62331	. 42006	. 63214	. 42869	. 64081	. 43733	. 64934	. 44600	. 65771	. 45468	12
49	. 62346	. 42020	. 63228	. 42883	. 64096	. 43748	. 64948	. 44614	. 65785	. 45483	11
50	9. 62361	0. 42035	9. 63243	0. 42897	9. 64110	0. 43762	9. 64962	0. 44629	9. 65799	0. 45497	10
51	. 62376	. 42049	. 63258	. 42912	. 64124	. 43777	. 64976	. 44643	. 65812	. 45512	9
52	. 62390	. 42063	. 63272	. 42926	. 64139	. 43791	. 64990	. 44658	. 65826	. 45526	8
53	. 62405	. 42078	. 63287	. 42941	. 64153	. 43805	. 65004	. 44672	. 65840	. 45541	7
54	. 62420	. 42092	. 63301	. 42955	. 64167	. 43820	. 65018	. 44687	. 65854	. 45555	6
55	9. 62435	0. 42106	9. 63316	0. 42969	9. 64181	0. 43834	9. 65032	0. 44701	9. 65868	0. 45570	5
56	. 62450	. 42121	. 63330	. 42984	. 64196	. 43849	. 65046	. 44716	. 65881	. 45584	4
57	. 62464	. 42135	. 63345	. 42998	. 64210	. 43863	. 65060	. 44730	. 65895	. 45599	3
58	. 62479	. 42150	. 63360	. 43013	. 64224	. 43878	. 65074	. 44745	. 65909	. 45613	2
59	. 62494	. 42164	. 63374	. 43027	. 64239	. 43892	. 65088	. 44759	. 65923	. 45628	1
60	9. 62509	0. 42178	9. 63389	0. 43041	9. 64253	0. 43907	9. 65102	0. 44774	9. 65937	0. 45642	0
	279°		278°		277°		276°		275°		

Haversines

′	85°		86°		87°		88°		89°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 65937	0. 45642	9. 66757	0. 46512	9. 67562	0. 47383	9. 68354	0. 48255	9. 69132	0. 49127	60
1	. 65950	. 45657	. 66770	. 46527	. 67576	. 47398	. 68367	. 48270	. 69145	. 49142	59
2	. 65964	. 45671	. 66784	. 46541	. 67589	. 47412	. 68380	. 48284	. 69158	. 49156	58
3	. 65978	. 45686	. 66797	. 46556	. 67602	. 47427	. 68393	. 48299	. 69171	. 49171	57
4	. 65992	. 45700	. 66811	. 46570	. 67616	. 47441	. 68407	. 48313	. 69184	. 49186	56
5	9. 66006	0. 45715	9. 66824	0. 46585	9. 67629	0. 47456	9. 68420	0. 48328	9. 69197	0. 49200	55
6	. 66019	. 45729	. 66838	. 46599	. 67642	. 47470	. 68433	. 48342	. 69209	. 49215	54
7	. 66033	. 45744	. 66851	. 46614	. 67656	. 47485	. 68446	. 48357	. 69222	. 49229	53
8	. 66047	. 45758	. 66865	. 46628	. 67669	. 47499	. 68459	. 48371	. 69235	. 49244	52
9	. 66061	. 45773	. 66878	. 46643	. 67682	. 47514	. 68472	. 48386	. 69248	. 49258	51
10	9. 66074	0. 45787	9. 66892	0. 46657	9. 67695	0. 47528	9. 68485	0. 48400	9. 69261	0. 49273	50
11	. 66088	. 45802	. 66905	. 46672	. 67709	. 47543	. 68498	. 48415	. 69274	. 49287	49
12	. 66102	. 45816	. 66919	. 46686	. 67722	. 47558	. 68511	. 48429	. 69286	. 49302	48
13	. 66116	. 45831	. 66932	. 46701	. 67735	. 47572	. 68524	. 48444	. 69299	. 49316	47
14	. 66129	. 45845	. 66946	. 46715	. 67748	. 47587	. 68537	. 48459	. 69312	. 49331	46
15	9. 66143	0. 45860	9. 66959	0. 46730	9. 67762	0. 47601	9. 68550	0. 48473	9. 69325	0. 49346	45
16	. 66157	. 45874	. 66973	. 46744	. 67775	. 47616	. 68563	. 48488	. 69338	. 49360	44
17	. 66170	. 45889	. 66986	. 46759	. 67788	. 47630	. 68576	. 48502	. 69350	. 49375	43
18	. 66184	. 45903	. 67000	. 46773	. 67801	. 47645	. 68589	. 48517	. 69363	. 49389	42
19	. 66198	. 45918	. 67013	. 46788	. 67815	. 47659	. 68602	. 48531	. 69376	. 49404	41
20	9. 66212	0. 45932	9. 67027	0. 46802	9. 67828	0. 47674	9. 68615	0. 48546	9. 69389	0. 49418	40
21	. 66225	. 45947	. 67040	. 46817	. 67841	. 47688	. 68628	. 48560	. 69402	. 49433	39
22	. 66239	. 45961	. 67054	. 46831	. 67854	. 47703	. 68641	. 48575	. 69414	. 49447	38
23	. 66253	. 45976	. 67067	. 46846	. 67868	. 47717	. 68654	. 48589	. 69427	. 49462	37
24	. 66266	. 45990	. 67081	. 46860	. 67881	. 47732	. 68667	. 48604	. 69440	. 49476	36
25	9. 66280	0. 46005	9. 67094	0. 46875	9. 67894	0. 47746	9. 68680	0. 48618	9. 69453	0. 49491	35
26	. 66294	. 46019	. 67108	. 46890	. 67907	. 47761	. 68693	. 48633	. 69465	. 49505	34
27	. 66307	. 46034	. 67121	. 46904	. 67920	. 47775	. 68706	. 48648	. 69478	. 49520	33
28	. 66321	. 46048	. 67134	. 46919	. 67934	. 47790	. 68719	. 48662	. 69491	. 49535	32
29	. 66335	. 46063	. 67148	. 46933	. 67947	. 47804	. 68732	. 48677	. 69504	. 49549	31
30	9. 66348	0. 46077	9. 67161	0. 46948	9. 67960	0. 47819	9. 68745	0. 48691	9. 69516	0. 49564	30
31	. 66362	. 46092	. 67175	. 46962	. 67973	. 47834	. 68758	. 48706	. 69529	. 49578	29
32	. 66376	. 46106	. 67188	. 46977	. 67986	. 47848	. 68771	. 48720	. 69542	. 49593	28
33	. 66389	. 46121	. 67202	. 46991	. 68000	. 47863	. 68784	. 48735	. 69555	. 49607	27
34	. 66403	. 46135	. 67215	. 47006	. 68013	. 47877	. 68797	. 48749	. 69567	. 49622	26
35	9. 66417	0. 46150	9. 67228	0. 47020	9. 68026	0. 47892	9. 68810	0. 48764	9. 69580	0. 49636	25
36	. 66430	. 46164	. 67242	. 47035	. 68039	. 47906	. 68823	. 48778	. 69593	. 49651	24
37	. 66444	. 46179	. 67255	. 47049	. 68052	. 47921	. 68836	. 48793	. 69605	. 49665	23
38	. 66458	. 46193	. 67269	. 47064	. 68066	. 47935	. 68849	. 48807	. 69618	. 49680	22
39	. 66471	. 46208	. 67282	. 47078	. 68079	. 47950	. 68862	. 48822	. 69631	. 49695	21
40	9. 66485	0. 46222	9. 67295	0. 47093	9. 68092	0. 47964	9. 68875	0. 48837	9. 69644	0. 49709	20
41	. 66499	. 46237	. 67309	. 47107	. 68105	. 47979	. 68887	. 48851	. 69656	. 49724	19
42	. 66512	. 46251	. 67322	. 47122	. 68118	. 47993	. 68900	. 48866	. 69669	. 49738	18
43	. 66526	. 46266	. 67336	. 47136	. 68131	. 48008	. 68913	. 48880	. 69682	. 49753	17
44	. 66539	. 46280	. 67349	. 47151	. 68144	. 48022	. 68926	. 48895	. 69694	. 49767	16
45	9. 66553	0. 46295	9. 67362	0. 47165	9. 68158	0. 48037	9. 68939	0. 48909	9. 69707	0. 49782	15
46	. 66567	. 46309	. 67376	. 47180	. 68171	. 48052	. 68952	. 48924	. 69720	. 49796	14
47	. 66580	. 46324	. 67389	. 47194	. 68184	. 48066	. 68965	. 48938	. 69732	. 49811	13
48	. 66594	. 46338	. 67402	. 47209	. 68197	. 48081	. 68978	. 48953	. 69745	. 49825	12
49	. 66607	. 46353	. 67416	. 47223	. 68210	. 48095	. 68991	. 48967	. 69758	. 49840	11
50	9. 66621	0. 46367	9. 67429	0. 47238	9. 68223	0. 48110	9. 69004	0. 48982	9. 69770	0. 49855	10
51	. 66635	. 46382	. 67443	. 47252	. 68236	. 48124	. 69017	. 48997	. 69783	. 49869	9
52	. 66648	. 46396	. 67456	. 47267	. 68249	. 48139	. 69029	. 49011	. 69796	. 49884	8
53	. 66662	. 46411	. 67469	. 47282	. 68263	. 48153	. 69042	. 49026	. 69808	. 49898	7
54	. 66675	. 46425	. 67483	. 47296	. 68276	. 48168	. 69055	. 49040	. 69821	. 49913	6
55	9. 66689	0. 46440	9. 67496	0. 47311	9. 68289	0. 48182	9. 69068	0. 49055	9. 69834	0. 49927	5
56	. 66702	. 46454	. 67509	. 47325	. 68302	. 48197	. 69081	. 49069	. 69846	. 49942	4
57	. 66716	. 46469	. 67522	. 47340	. 68315	. 48211	. 69094	. 49084	. 69859	. 49956	3
58	. 66730	. 46483	. 67536	. 47354	. 68328	. 48226	. 69107	. 49098	. 69872	. 49971	2
59	. 66743	. 46498	. 67549	. 47369	. 68341	. 48240	. 69120	. 49113	. 69884	. 49985	1
60	9. 66757	0. 46512	9. 67562	0. 47383	9. 68354	0. 48255	9. 69132	0. 49127	9. 69897	0. 50000	0
	274°		273°		272°		271°		270°		

Haversines

′	90°		91°		92°		93°		94°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 69897	0. 50000	9. 70648	0. 50873	9. 71387	0. 51745	9. 72112	0. 52617	9. 72825	0. 53488	60
1	. 69910	. 50015	. 70661	. 50887	. 71399	. 51760	. 72124	. 52631	. 72837	. 53502	59
2	. 69922	. 50029	. 70673	. 50902	. 71411	. 51774	. 72136	. 52646	. 72849	. 53517	58
3	. 69935	. 50044	. 70686	. 50916	. 71423	. 51789	. 72148	. 52660	. 72861	. 53531	57
4	. 69948	. 50058	. 70698	. 50931	. 71436	. 51803	. 72160	. 52675	. 72873	. 53546	56
5	9. 69960	0. 50073	9. 70710	0. 50945	9. 71448	0. 51818	9. 72172	0. 52689	9. 72884	0. 53560	55
6	. 69973	. 50087	. 70723	. 50960	. 71460	. 51832	. 72184	. 52704	. 72896	. 53575	54
7	. 69985	. 50102	. 70735	. 50974	. 71472	. 51847	. 72196	. 52718	. 72908	. 53589	53
8	. 69998	. 50116	. 70748	. 50989	. 71484	. 51861	. 72208	. 52733	. 72920	. 53604	52
9	. 70011	. 50131	. 70760	. 51003	. 71496	. 51876	. 72220	. 52748	. 72931	. 53618	51
10	9. 70023	0. 50145	9. 70772	0. 51018	9. 71509	0. 51890	9. 72232	0. 52762	9. 72943	0. 53633	50
11	. 70036	. 50160	. 70785	. 51033	. 71521	. 51905	. 72244	. 52777	. 72955	. 53647	49
12	. 70048	. 50175	. 70797	. 51047	. 71533	. 51919	. 72256	. 52791	. 72967	. 53662	48
13	. 70061	. 50189	. 70809	. 51062	. 71545	. 51934	. 72268	. 52806	. 72978	. 53676	47
14	. 70074	. 50204	. 70822	. 51076	. 71557	. 51948	. 72280	. 52820	. 72990	. 53691	46
15	9. 70086	0. 50218	9. 70834	0. 51091	9. 71569	0. 51963	9. 72292	0. 52835	9. 73002	0. 53705	45
16	. 70099	. 50233	. 70847	. 51105	. 71582	. 51978	. 72304	. 52849	. 73014	. 53720	44
17	. 70111	. 50247	. 70859	. 51120	. 71594	. 51992	. 72316	. 52864	. 73025	. 53734	43
18	. 70124	. 50262	. 70871	. 51134	. 71606	. 52007	. 72328	. 52878	. 73037	. 53749	42
19	. 70136	. 50276	. 70884	. 51149	. 71618	. 52021	. 72340	. 52893	. 73049	. 53763	41
20	9. 70149	0. 50291	9. 70896	0. 51163	9. 71630	0. 52036	9. 72352	0. 52907	9. 73060	0. 53778	40
21	. 70161	. 50305	. 70908	. 51178	. 71642	. 52050	. 72363	. 52922	. 73072	. 53792	39
22	. 70174	. 50320	. 70921	. 51193	. 71654	. 52065	. 72375	. 52936	. 73084	. 53807	38
23	. 70187	. 50335	. 70933	. 51207	. 71666	. 52079	. 72387	. 52951	. 73096	. 53821	37
24	. 70199	. 50349	. 70945	. 51222	. 71679	. 52094	. 72399	. 52965	. 73107	. 53836	36
25	9. 70212	0. 50364	9. 70958	0. 51236	9. 71691	0. 52108	9. 72411	0. 52980	9. 73119	0. 53850	35
26	. 70224	. 50378	. 70970	. 51251	. 71703	. 52123	. 72423	. 52994	. 73131	. 53865	34
27	. 70237	. 50393	. 70982	. 51265	. 71715	. 52137	. 72435	. 53009	. 73142	. 53879	33
28	. 70249	. 50407	. 70995	. 51280	. 71727	. 52152	. 72447	. 53023	. 73154	. 53894	32
29	. 70262	. 50422	. 71007	. 51294	. 71739	. 52166	. 72459	. 53038	. 73166	. 53908	31
30	9. 70274	0. 50436	9. 71019	0. 51309	9. 71751	0. 52181	9. 72471	0. 53052	9. 73177	0. 53923	30
31	. 70287	. 50451	. 71032	. 51323	. 71763	. 52195	. 72482	. 53067	. 73189	. 53937	29
32	. 70299	. 50465	. 71044	. 51338	. 71775	. 52210	. 72494	. 53081	. 73201	. 53952	28
33	. 70312	. 50480	. 71056	. 51352	. 71787	. 52225	. 72506	. 53096	. 73212	. 53966	27
34	. 70324	. 50495	. 71068	. 51367	. 71800	. 52239	. 72518	. 53110	. 73224	. 53981	26
35	9. 70337	0. 50509	9. 71081	0. 51382	9. 71812	0. 52254	9. 72530	0. 53125	9. 73236	0. 53995	25
36	. 70349	. 50524	. 71093	. 51396	. 71824	. 52268	. 72542	. 53140	. 73247	. 54010	24
37	. 70362	. 50538	. 71105	. 51411	. 71836	. 52283	. 72554	. 53154	. 73259	. 54024	23
38	. 70374	. 50553	. 71118	. 51425	. 71848	. 52297	. 72565	. 53169	. 73271	. 54039	22
39	. 70387	. 50567	. 71130	. 51440	. 71860	. 52312	. 72577	. 53183	. 73282	. 54053	21
40	9. 70399	0. 50582	9. 71142	0. 51454	9. 71872	0. 52326	9. 72589	0. 53198	9. 73294	0. 54068	20
41	. 70412	. 50596	. 71154	. 51469	. 71884	. 52341	. 72601	. 53212	. 73306	. 54082	19
42	. 70424	. 50611	. 71167	. 51483	. 71896	. 52355	. 72613	. 53227	. 73317	. 54097	18
43	. 70437	. 50625	. 71179	. 51498	. 71908	. 52370	. 72625	. 53241	. 73329	. 54111	17
44	. 70449	. 50640	. 71191	. 51512	. 71920	. 52384	. 72637	. 53256	. 73341	. 54126	16
45	9. 70462	0. 50654	9. 71203	0. 51527	9. 71932	0. 52399	9. 72648	0. 53270	9. 73352	0. 54140	15
46	. 70474	. 50669	. 71216	. 51541	. 71944	. 52413	. 72660	. 53285	. 73364	. 54155	14
47	. 70487	. 50684	. 71228	. 51556	. 71956	. 52428	. 72672	. 53299	. 73375	. 54169	13
48	. 70499	. 50698	. 71240	. 51571	. 71968	. 52442	. 72684	. 53314	. 73387	. 54184	12
49	. 70512	. 50713	. 71252	. 51585	. 71980	. 52457	. 72696	. 53328	. 73399	. 54198	11
50	9. 70524	0. 50727	9. 71265	0. 51600	9. 71992	0. 52472	9. 72708	0. 53343	9. 73410	0. 54213	10
51	. 70537	. 50742	. 71277	. 51614	. 72004	. 52486	. 72719	. 53357	. 73422	. 54227	9
52	. 70549	. 50756	. 71289	. 51629	. 72016	. 52501	. 72731	. 53372	. 73433	. 54242	8
53	. 70561	. 50771	. 71301	. 51643	. 72028	. 52515	. 72743	. 53386	. 73445	. 54256	7
54	. 70574	. 50785	. 71314	. 51658	. 72040	. 52530	. 72755	. 53401	. 73457	. 54271	6
55	9. 70586	0. 50800	9. 71326	0. 51672	9. 72052	0. 52544	9. 72767	0. 53415	9. 73468	0. 54285	5
56	. 70599	. 50814	. 71338	. 51687	. 72064	. 52559	. 72778	. 53430	. 73480	. 54300	4
57	. 70611	. 50829	. 71350	. 51701	. 72076	. 52573	. 72790	. 53444	. 73491	. 54314	3
58	. 70624	. 50844	. 71362	. 51716	. 72088	. 52588	. 72802	. 53459	. 73503	. 54329	2
59	. 70636	. 50858	. 71375	. 51730	. 72100	. 52602	. 72814	. 53473	. 73515	. 54343	1
60	9. 70648	0. 50873	9. 71387	0. 51745	9. 72112	0. 52617	9. 72825	0. 53488	9. 73526	0. 54358	0
	269°		268°		267°		266°		265°		

(2)

Haversines

	95°		96°		97°		98°		99°		
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	′
0	9. 73526	0. 54358	9. 74215	0. 55226	9. 74891	0. 56093	9. 75556	0. 56959	9. 76209	0. 57822	60
1	. 73538	. 54372	. 74226	. 55241	. 74902	. 56108	. 75567	. 56973	. 76220	. 57836	59
2	. 73549	. 54387	. 74237	. 55255	. 74914	. 56122	. 75578	. 56987	. 76231	. 57850	58
3	. 73561	. 54401	. 74249	. 55270	. 74925	. 56137	. 75589	. 57002	. 76241	. 57865	57
4	. 73572	. 54416	. 74260	. 55284	. 74936	. 56151	. 75600	. 57016	. 76252	. 57879	56
5	9. 73584	0. 54430	9. 74272	0. 55299	9. 74947	0. 56166	9. 75611	0. 57031	9. 76263	0. 57894	55
6	. 73596	. 54445	. 74283	. 55313	. 74958	. 56180	. 75622	. 57045	. 76274	. 57908	54
7	. 73607	. 54459	. 74294	. 55328	. 74969	. 56195	. 75633	. 57059	. 76285	. 57922	53
8	. 73619	. 54474	. 74306	. 55342	. 74981	. 56209	. 75644	. 57074	. 76296	. 57937	52
9	. 73630	. 54488	. 74317	. 55357	. 74992	. 56223	. 75655	. 57088	. 76306	. 57951	51
10	9. 73642	0. 54503	9. 74328	0. 55371	9. 75003	0. 56238	9. 75666	0. 57103	9. 76317	0. 57965	50
11	. 73653	. 54517	. 74340	. 55386	. 75014	. 56252	. 75677	. 57117	. 76328	. 57980	49
12	. 73665	. 54532	. 74351	. 55400	. 75025	. 56267	. 75688	. 57131	. 76338	. 57994	48
13	. 73676	. 54546	. 74362	. 55414	. 75036	. 56281	. 75698	. 57146	. 76349	. 58008	47
14	. 73688	. 54561	. 74374	. 55429	. 75047	. 56296	. 75709	. 57160	. 76360	. 58023	46
15	9. 73699	0. 54575	9. 74385	0. 55443	9. 75059	0. 56310	9. 75720	0. 57175	9. 76371	0. 58037	45
16	. 73711	. 54590	. 74396	. 55458	. 75070	. 56324	. 75731	. 57189	. 76381	. 58051	44
17	. 73722	. 54604	. 74408	. 55472	. 75081	. 56339	. 75742	. 57203	. 76392	. 58066	43
18	. 73734	. 54619	. 74419	. 55487	. 75092	. 56353	. 75753	. 57218	. 76403	. 58080	42
19	. 73746	. 54633	. 74430	. 55501	. 75103	. 56368	. 75764	. 57232	. 76414	. 58095	41
20	9. 73757	0. 54647	9. 74442	0. 55516	9. 75114	0. 56382	9. 75775	0. 57247	9. 76424	0. 58109	40
21	. 73769	. 54662	. 74453	. 55530	. 75125	. 56397	. 75786	. 57261	. 76435	. 58123	39
22	. 73780	. 54676	. 74464	. 55545	. 75136	. 56411	. 75797	. 57275	. 76446	. 58138	38
23	. 73792	. 54691	. 74475	. 55559	. 75147	. 56425	. 75808	. 57290	. 76456	. 58152	37
24	. 73803	. 54705	. 74487	. 55573	. 75159	. 56440	. 75819	. 57304	. 76467	. 58166	36
25	9. 73815	0. 54720	9. 74498	0. 55588	9. 75170	0. 56454	9. 75830	0. 57319	9. 76478	0. 58181	35
26	. 73826	. 54734	. 74509	. 55602	. 75181	. 56469	. 75840	. 57333	. 76489	. 58195	34
27	. 73838	. 54749	. 74521	. 55617	. 75192	. 56483	. 75851	. 57347	. 76499	. 58209	33
28	. 73849	. 54763	. 74532	. 55631	. 75203	. 56497	. 75862	. 57362	. 76510	. 58224	32
29	. 73860	. 54778	. 74543	. 55646	. 75214	. 56512	. 75873	. 57376	. 76521	. 58238	31
30	9. 73872	0. 54792	9. 74554	0. 55660	9. 75225	0. 56526	9. 75884	0. 57390	9. 76531	0. 58252	30
31	. 73883	. 54807	. 74566	. 55675	. 75236	. 56541	. 75895	. 57405	. 76542	. 58267	29
32	. 73895	. 54821	. 74577	. 55689	. 75247	. 56555	. 75906	. 57419	. 76553	. 58281	28
33	. 73906	. 54836	. 74588	. 55704	. 75258	. 56570	. 75917	. 57434	. 76563	. 58295	27
34	. 73918	. 54850	. 74600	. 55718	. 75269	. 56584	. 75927	. 57448	. 76574	. 58310	26
35	9. 73929	0. 54865	9. 74611	0. 55732	9. 75280	0. 56598	9. 75938	0. 57462	9. 76585	0. 58324	25
36	. 73941	. 54879	. 74622	. 55747	. 75291	. 56613	. 75949	. 57477	. 76595	. 58338	24
37	. 73952	. 54894	. 74633	. 55761	. 75303	. 56627	. 75960	. 57491	. 76606	. 58353	23
38	. 73964	. 54908	. 74645	. 55776	. 75314	. 56642	. 75971	. 57506	. 76617	. 58367	22
39	. 73975	. 54923	. 74656	. 55790	. 75325	. 56656	. 75982	. 57520	. 76627	. 58381	21
40	9. 73987	0. 54937	9. 74667	0. 55805	9. 75336	0. 56670	9. 75993	0. 57534	9. 76638	0. 58396	20
41	. 73998	. 54952	. 74678	. 55819	. 75347	. 56685	. 76004	. 57549	. 76649	. 58410	19
42	. 74009	. 54966	. 74690	. 55834	. 75358	. 56699	. 76014	. 57563	. 76659	. 58424	18
43	. 74021	. 54980	. 74701	. 55848	. 75369	. 56714	. 76025	. 57577	. 76670	. 58439	17
44	. 74032	. 54995	. 74712	. 55862	. 75380	. 56728	. 76036	. 57592	. 76681	. 58453	16
45	9. 74044	0. 55009	9. 74723	0. 55877	9. 75391	0. 56743	9. 76047	0. 57606	9. 76691	0. 58467	15
46	. 74055	. 55024	. 74734	. 55891	. 75402	. 56757	. 76058	. 57621	. 76702	. 58482	14
47	. 74067	. 55038	. 74746	. 55906	. 75413	. 56771	. 76069	. 57635	. 76713	. 58496	13
48	. 74078	. 55053	. 74757	. 55920	. 75424	. 56786	. 76079	. 57649	. 76723	. 58510	12
49	. 74089	. 55067	. 74768	. 55935	. 75435	. 56800	. 76090	. 57664	. 76734	. 58525	11
50	9. 74101	0. 55082	9. 74779	0. 55949	9. 75446	0. 56815	9. 76101	0. 57678	9. 76745	0. 58539	10
51	. 74112	. 55096	. 74791	. 55964	. 75457	. 56829	. 76112	. 57692	. 76755	. 58553	9
52	. 74124	. 55111	. 74802	. 55978	. 75468	. 56843	. 76123	. 57707	. 76766	. 58568	8
53	. 74135	. 55125	. 74813	. 55992	. 75479	. 56858	. 76134	. 57721	. 76777	. 58582	7
54	. 74146	. 55140	. 74824	. 56007	. 75490	. 56872	. 76144	. 57736	. 76787	. 58596	6
55	9. 74158	0. 55154	9. 74835	0. 56021	9. 75501	0. 56887	9. 76155	0. 57750	9. 76798	0. 58611	5
56	. 74169	. 55169	. 74846	. 56036	. 75512	. 56901	. 76166	. 57764	. 76808	. 58625	4
57	. 74181	. 55183	. 74858	. 56050	. 75523	. 56915	. 76177	. 57779	. 76819	. 58639	3
58	. 74192	. 55197	. 74869	. 56065	. 75534	. 56930	. 76188	. 57793	. 76830	. 58654	2
59	. 74203	. 55212	. 74880	. 56079	. 75545	. 56944	. 76198	. 57807	. 76840	. 58668	1
60	9. 74215	0. 55226	9. 74891	0. 56093	9. 75556	0. 56959	9. 76209	0. 57822	9. 76851	0. 58682	0
	264°		263°		262°		261°		260°		

Haversines

′	100°		101°		102°		103°		104°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 76851	0. 58682	9. 77481	0. 59540	9. 78101	0. 60396	9. 78709	0. 61248	9. 79306	0. 62096	60
1	. 76861	. 58697	. 77492	. 59555	. 78111	. 60410	. 78719	. 61262	. 79316	. 62110	59
2	. 76872	. 58711	. 77502	. 59569	. 78121	. 60424	. 78729	. 61276	. 79326	. 62124	58
3	. 76883	. 58725	. 77512	. 59583	. 78131	. 60438	. 78739	. 61290	. 79336	. 62138	57
4	. 76893	. 58740	. 77523	. 59598	. 78141	. 60452	. 78749	. 61304	. 79346	. 62153	56
5	9. 76904	0. 58754	9. 77533	0. 59612	9. 78152	0. 60467	9. 78759	0. 61318	9. 79356	0. 62167	55
6	. 76914	. 58768	. 77544	. 59626	. 78162	. 60481	. 78769	. 61333	. 79366	. 62181	54
7	. 76925	. 58783	. 77554	. 59640	. 78172	. 60495	. 78779	. 61347	. 79376	. 62195	53
8	. 76936	. 58797	. 77564	. 59655	. 78182	. 60509	. 78789	. 61361	. 79385	. 62209	52
9	. 76946	. 58811	. 77575	. 59669	. 78192	. 60524	. 78799	. 61375	. 79395	. 62223	51
10	9. 76957	0. 58826	9. 77585	0. 59683	9. 78203	0. 60538	9. 78809	0. 61389	9. 79405	0. 62237	50
11	. 76967	. 58840	. 77596	. 59697	. 78213	. 60552	. 78819	. 61403	. 79415	. 62251	49
12	. 76978	. 58854	. 77606	. 59712	. 78223	. 60566	. 78829	. 61418	. 79425	. 62265	48
13	. 76988	. 58869	. 77616	. 59726	. 78233	. 60580	. 78839	. 61432	. 79434	. 62279	47
14	. 76999	. 58883	. 77627	. 59740	. 78243	. 60595	. 78849	. 61446	. 79444	. 62294	46
15	9. 77009	0. 58897	9. 77637	0. 59755	9. 78254	0. 60609	9. 78859	0. 61460	9. 79454	0. 62308	45
16	. 77020	. 58911	. 77647	. 59769	. 78264	. 60623	. 78869	. 61474	. 79464	. 62322	44
17	. 77031	. 58926	. 77658	. 59783	. 78274	. 60637	. 78879	. 61488	. 79474	. 62336	43
18	. 77041	. 58940	. 77608	. 59797	. 78284	. 60652	. 78889	. 61502	. 79484	. 62350	42
19	. 77052	. 58954	. 77679	. 59812	. 78294	. 60666	. 78899	. 61517	. 79493	. 62364	41
20	9. 77062	0. 58969	9. 77689	0. 59826	9. 78305	0. 60680	9. 78909	0. 61531	9. 79503	0. 62378	40
21	. 77073	. 58983	. 77699	. 59840	. 78315	. 60694	. 78919	. 61545	. 79513	. 62392	39
22	. 77083	. 58997	. 77710	. 59854	. 78325	. 60708	. 78929	. 61559	. 79523	. 62406	38
23	. 77094	. 59012	. 77720	. 59869	. 78335	. 60723	. 78939	. 61573	. 79533	. 62420	37
24	. 77104	. 59026	. 77730	. 59883	. 78345	. 60737	. 78949	. 61587	. 79542	. 62434	36
25	9. 77115	0. 59040	9. 77741	0. 59897	9. 78355	0. 60751	9. 78959	0. 61602	9. 79552	0. 62449	35
26	. 77125	. 59055	. 77751	. 59911	. 78365	. 60765	. 78969	. 61616	. 79562	. 62463	34
27	. 77136	. 59069	. 77761	. 59926	. 78376	. 60779	. 78979	. 61630	. 79572	. 62477	33
28	. 77146	. 59083	. 77772	. 59940	. 78386	. 60794	. 78989	. 61644	. 79582	. 62491	32
29	. 77157	. 59097	. 77782	. 59954	. 78396	. 60808	. 78999	. 61658	. 79591	. 62505	31
30	9. 77167	0. 59112	9. 77792	0. 59968	9. 78406	0. 60822	9. 79009	0. 61672	9. 79601	0. 62519	30
31	. 77178	. 59126	. 77803	. 59983	. 78416	. 60836	. 79019	. 61686	. 79611	. 62533	29
32	. 77188	. 59140	. 77813	. 59997	. 78426	. 60850	. 79029	. 61701	. 79621	. 62547	28
33	. 77199	. 59155	. 77823	. 60011	. 78436	. 60865	. 79039	. 61715	. 79631	. 62561	27
34	. 77209	. 59169	. 77834	. 60025	. 78447	. 60879	. 79049	. 61729	. 79640	. 62575	26
35	9. 77220	0. 59183	9. 77844	0. 60040	9. 78457	0. 60893	9. 79059	0. 61743	9. 79650	0. 62589	25
36	. 77230	. 59198	. 77854	. 60054	. 78467	. 60907	. 79069	. 61757	. 79660	. 62603	24
37	. 77241	. 59212	. 77864	. 60068	. 78477	. 60921	. 79079	. 61771	. 79670	. 62618	23
38	. 77251	. 59226	. 77875	. 60082	. 78487	. 60936	. 79089	. 61785	. 79679	. 62632	22
39	. 77262	. 59240	. 77885	. 60097	. 78497	. 60950	. 79099	. 61800	. 79689	. 62646	21
40	9. 77272	0. 59255	9. 77895	0. 60111	9. 78507	0. 60964	9. 79108	0. 61814	9. 79699	0. 62660	20
41	. 77283	. 59269	. 77906	. 60125	. 78517	. 60978	. 79118	. 61828	. 79709	. 62674	19
42	. 77293	. 59283	. 77916	. 60139	. 78528	. 60992	. 79128	. 61842	. 79718	. 62688	18
43	. 77304	. 59298	. 77926	. 60154	. 78538	. 61006	. 79138	. 61856	. 79728	. 62702	17
44	. 77314	. 59312	. 77936	. 60168	. 78548	. 61021	. 79148	. 61870	. 79738	. 62716	16
45	9. 77325	0. 59326	9. 77947	0. 60182	9. 78558	0. 61035	9. 79158	0. 61884	9. 79748	0. 62730	15
46	. 77335	. 59340	. 77957	. 60196	. 78568	. 61049	. 79168	. 61898	. 79757	. 62744	14
47	. 77346	. 59355	. 77967	. 60211	. 78578	. 61063	. 79178	. 61913	. 79767	. 62758	13
48	. 77356	. 59369	. 77978	. 60225	. 78588	. 61077	. 79188	. 61927	. 79777	. 62772	12
49	. 77366	. 59383	. 77988	. 60239	. 78598	. 61092	. 79198	. 61941	. 79787	. 62786	11
50	9. 77377	0. 59398	9. 77998	0. 60253	9. 78608	0. 61106	9. 79208	0. 61955	9. 79796	0. 62800	10
51	. 77387	. 59412	. 78008	. 60268	. 78618	. 61120	. 79217	. 61969	. 79806	. 62814	9
52	. 77398	. 59426	. 78019	. 60282	. 78628	. 61134	. 79227	. 61983	. 79816	. 62829	8
53	. 77408	. 59440	. 78029	. 60296	. 78638	. 61148	. 79237	. 61997	. 79825	. 62843	7
54	. 77419	. 59455	. 78039	. 60310	. 78649	. 61163	. 79247	. 62011	. 79835	. 62857	6
55	9. 77429	0. 59469	9. 78049	0. 60324	9. 78659	0. 61177	9. 79257	0. 62026	9. 79845	0. 62871	5
56	. 77440	. 59483	. 78060	. 60339	. 78669	. 61191	. 79267	. 62040	. 79855	. 62885	4
57	. 77450	. 59498	. 78070	. 60353	. 78679	. 61205	. 79277	. 62054	. 79864	. 62899	3
58	. 77460	. 59512	. 78080	. 60367	. 78689	. 61219	. 79287	. 62068	. 79874	. 62913	2
59	. 77471	. 59526	. 78090	. 60381	. 78699	. 61233	. 79297	. 62082	. 79884	. 62927	1
60	9. 77481	0. 59540	9. 78101	0. 60396	9. 78709	0. 61248	9. 79306	0. 62096	9. 79893	0. 62941	0
	259°		258°		257°		256°		255°		

Haversines

′	105°		106°		107°		108°		109°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 79893	0. 62941	9. 80470	0. 63782	9. 81036	0. 64619	9. 81592	0. 65451	9. 82137	0. 66278	60
1	. 79903	. 62955	. 80479	. 63796	. 81045	. 64632	. 81601	. 65465	. 82146	. 66292	59
2	. 79913	. 62969	. 80489	. 63810	. 81054	. 64646	. 81610	. 65479	. 82155	. 66306	58
3	. 79922	. 62983	. 80498	. 63824	. 81064	. 64660	. 81619	. 65492	. 82164	. 66320	57
4	. 79932	. 62997	. 80508	. 63838	. 81073	. 64674	. 81628	. 65506	. 82173	. 66333	56
5	9. 79942	0. 63011	9. 80517	0. 63852	9. 81082	0. 64688	9. 81637	0. 65520	9. 82182	0. 66347	55
6	. 79951	. 63025	. 80527	. 63866	. 81092	. 64702	. 81647	. 65534	. 82191	. 66361	54
7	. 79961	. 63039	. 80536	. 63880	. 81101	. 64716	. 81656	. 65548	. 82200	. 66375	53
8	. 79971	. 63053	. 80546	. 63894	. 81110	. 64730	. 81665	. 65561	. 82209	. 66388	52
9	. 79980	. 63067	. 80555	. 63908	. 81120	. 64744	. 81674	. 65575	. 82218	. 66402	51
10	9. 79990	0. 63081	9. 80565	0. 63922	9. 81129	0. 64758	9. 81683	0. 65589	9. 82227	0. 66416	50
11	. 80000	. 63095	. 80574	. 63936	. 81138	. 64772	. 81692	. 65603	. 82236	. 66430	49
12	. 80009	. 63109	. 80584	. 63950	. 81148	. 64785	. 81701	. 65617	. 82245	. 66443	48
13	. 80019	. 63123	. 80593	. 63964	. 81157	. 64799	. 81711	. 65631	. 82254	. 66457	47
14	. 80029	. 63138	. 80603	. 63977	. 81166	. 64813	. 81720	. 65644	. 82263	. 66471	46
15	9. 80038	0. 63152	9. 80612	0. 63991	9. 81176	0. 64827	9. 81729	0. 65658	9. 82272	0. 66485	45
16	. 80048	. 63166	. 80622	. 64005	. 81185	. 64841	. 81738	. 65672	. 82281	. 66498	44
17	. 80058	. 63180	. 80631	. 64019	. 81194	. 64855	. 81747	. 65686	. 82290	. 66512	43
18	. 80067	. 63194	. 80641	. 64033	. 81204	. 64869	. 81756	. 65700	. 82299	. 66526	42
19	. 80077	. 63208	. 80650	. 64047	. 81213	. 64883	. 81765	. 65713	. 82308	. 66539	41
20	9. 80087	0. 63222	9. 80660	0. 64061	9. 81222	0. 64897	9. 81775	0. 65727	9. 82317	0. 66553	40
21	. 80096	. 63236	. 80669	. 64075	. 81231	. 64910	. 81784	. 65741	. 82326	. 66567	39
22	. 80106	. 63250	. 80678	. 64089	. 81241	. 64924	. 81793	. 65755	. 82335	. 66581	38
23	. 80116	. 63264	. 80688	. 64103	. 81250	. 64938	. 81802	. 65769	. 82344	. 66594	37
24	. 80125	. 63278	. 80697	. 64117	81259	. 64952	. 81811	. 65782	. 82353	. 66608	36
25	9. 80135	0. 63292	9. 80707	0. 64131	9. 81269	0. 64966	9. 81820	0. 65796	9. 82362	0. 66622	35
26	. 80144	. 63306	. 80716	. 64145	. 81278	. 64980	. 81829	. 65810	. 82371	. 66635	34
27	. 80154	. 63320	. 80726	. 64159	. 81287	. 64994	. 81838	. 65824	. 82380	. 66649	33
28	. 80164	. 63334	. 80735	. 64173	. 81296	. 65008	. 81847	. 65838	. 82388	. 66663	32
29	. 80173	. 63348	. 80745	. 64187	. 81306	. 65021	. 81857	. 65851	. 82397	. 66677	31
30	9. 80183	0. 63362	9. 80754	0. 64201	9. 81315	0. 65035	9. 81866	0. 65865	9. 82406	0. 66690	30
31	. 80192	. 63376	. 80763	. 64215	. 81324	. 65049	. 81875	. 65879	. 82415	. 66704	29
32	. 80202	. 63390	. 80773	. 64229	. 81333	. 65063	. 81884	. 65893	. 82424	. 66718	28
33	. 80212	. 63404	. 80782	. 64243	. 81343	. 65077	. 81893	. 65907	. 82433	. 66731	27
34	. 80221	. 63418	. 80792	. 64257	. 81352	. 65091	. 81902	. 65920	. 82442	. 66745	26
35	9. 80231	0. 63432	9. 80801	0. 64270	9. 81361	0. 65105	9. 81911	0. 65934	9. 82451	0. 66759	25
36	. 80240	. 63446	. 80811	. 64284	. 81370	. 65118	. 81920	. 65948	. 82460	. 66773	24
37	. 80250	. 63460	. 80820	. 64298	. 81380	. 65132	. 81929	. 65962	. 82469	. 66786	23
38	. 80260	. 63474	. 80829	. 64312	. 81389	. 65146	. 81938	. 65976	. 82478	. 66800	22
39	. 80269	. 63488	. 80839	. 64326	. 81398	. 65160	. 81947	. 65989	. 82487	. 66814	21
40	9. 80279	0. 63502	9. 80848	0. 64340	9. 81407	0. 65174	9. 81956	0. 66003	9. 82495	0. 66827	20
41	. 80288	. 63516	. 80858	. 64354	. 81417	. 65188	. 81965	. 66017	. 82504	. 66841	19
42	. 80298	. 63530	. 80867	. 64368	. 81426	. 65202	. 81975	. 66031	. 82513	. 66855	18
43	. 80307	. 63544	. 80876	. 64382	. 81435	. 65216	. 81984	. 66044	. 82522	. 66868	17
44	. 80317	. 63558	. 80886	. 64396	. 81444	. 65229	. 81993	. 66058	. 82531	. 66882	16
45	9. 80327	0. 63572	9. 80895	0. 64410	9. 81454	0. 65243	9. 82002	0. 66072	9. 82540	0. 66896	15
46	. 80336	. 63586	. 80905	. 64424	. 81463	. 65257	. 82011	. 66086	. 82549	. 66910	14
47	. 80346	. 63600	. 80914	. 64438	. 81472	. 65271	. 82020	. 66100	. 82558	. 66923	13
48	. 80355	. 63614	. 80923	. 64452	. 81481	. 65285	. 82029	. 66113	. 82567	. 66937	12
49	. 80365	. 63628	. 80933	. 64466	. 81490	. 65299	. 82038	. 66127	. 82576	. 66951	11
50	9. 80374	0. 63642	9. 80942	0. 64479	9. 81500	0. 65312	9. 82047	0. 66141	9. 82584	0. 66964	10
51	. 80384	. 63656	. 80952	. 64493	. 81509	. 65326	. 82056	. 66155	. 82593	. 66978	9
52	. 80393	. 63670	. 80961	. 64507	. 81518	. 65340	. 82065	. 66168	. 82602	. 66992	8
53	. 80403	. 63684	. 80970	. 64521	. 81527	. 65354	. 82074	. 66182	. 82611	. 67005	7
54	. 80413	. 63698	. 80980	. 64535	. 81536	. 65368	. 82083	. 66196	. 82620	. 67019	6
55	9. 80422	0. 63712	9. 80989	0. 64549	9. 81546	0. 65382	9. 82092	0. 66210	9. 82629	0. 67033	5
56	. 80432	. 63726	. 80998	. 64563	. 81555	. 65396	. 82101	. 66223	. 82638	. 67046	4
57	. 80441	. 63740	. 81008	. 64577	. 81564	. 65409	. 82110	. 66237	. 82646	. 67060	3
58	. 80451	. 63754	. 81017	. 64591	. 81573	. 65423	. 82119	. 66251	. 82655	. 67074	2
59	. 80460	. 63768	. 81026	. 64605	. 81582	. 65437	. 82128	. 66265	. 82664	. 67087	1
60	9. 80470	0. 63782	9. 81036	0. 64619	9. 81592	0. 65451	9. 82137	0. 66278	9. 82673	0. 67101	0
	254°		253°		252°		251°		250°		

Haversines

′	110°		111°		112°		113°		114°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 82673	0. 67101	9. 83199	0. 67918	9. 83715	0. 68730	9. 84221	0. 69537	9. 84718	0. 70337	60
1	. 82682	. 67115	. 83207	. 67932	. 83723	. 68744	. 84230	. 69550	. 84726	. 70350	59
2	. 82691	. 67128	. 83216	. 67946	. 83732	. 68757	. 84238	. 69563	. 84735	. 70363	58
3	. 82699	. 67142	. 83225	. 67959	. 83740	. 68771	. 84246	. 69577	. 84743	. 70377	57
4	. 82708	. 67156	. 83233	. 67973	. 83749	. 68784	. 84255	. 69590	. 84751	. 70390	56
5	9. 82717	0. 67169	9. 83242	0. 67986	9. 83757	0. 68798	9. 84263	0. 69603	9. 84759	0. 70403	55
6	. 82726	. 67183	. 83251	. 68000	. 83766	. 68811	. 84271	. 69617	. 84767	. 70417	54
7	. 82735	. 67197	. 83259	. 68013	. 83774	. 68825	. 84280	. 69630	. 84776	. 70430	53
8	. 82744	. 67210	. 83268	. 68027	. 83783	. 68838	. 84288	. 69644	. 84784	. 70443	52
9	. 82752	. 67224	. 83277	. 68041	. 83791	. 68852	. 84296	. 69657	. 84792	. 70456	51
10	9. 82761	0. 67238	9. 83285	0. 68054	9. 83800	0. 68865	9. 84305	0. 69670	9. 84800	0. 70470	50
11	. 82770	. 67251	. 83294	. 68068	. 83808	. 68879	. 84313	. 69684	. 84808	. 70483	49
12	. 82779	. 67265	. 83303	. 68081	. 83817	. 68892	. 84321	. 69697	. 84817	. 70496	48
13	. 82788	. 67279	. 83311	. 68095	. 83825	. 68906	. 84330	. 69710	. 84825	. 70509	47
14	. 82796	. 67292	. 83320	. 68108	. 83834	. 68919	. 84338	. 69724	. 84833	. 70523	46
15	9. 82805	0. 67306	9. 83329	0. 68122	9. 83842	0. 68932	9. 84346	0. 69737	9. 84841	0. 70536	45
16	. 82814	. 67319	. 83337	. 68135	. 83851	. 68946	. 84355	. 69751	. 84849	. 70549	44
17	. 82823	. 67333	. 83346	. 68149	. 83859	. 68959	. 84363	. 69764	. 84857	. 70562	43
18	. 82832	. 67347	. 83355	. 68163	. 83868	. 68973	. 84371	. 69777	. 84866	. 70576	42
19	. 82840	. 67360	. 83363	. 68176	. 83876	. 68986	. 84380	. 69791	. 84874	. 70589	41
20	9. 82849	0. 67374	9. 83372	0. 68190	9. 83885	0. 69000	9. 84388	0. 69804	9. 84882	0. 70602	40
21	. 82858	. 67388	. 83380	. 68203	. 83893	. 69013	. 84396	. 69817	. 84890	. 70615	39
22	. 82867	. 67401	. 83389	. 68217	. 83902	. 69027	. 84405	. 69831	. 84898	. 70629	38
23	. 82876	. 67415	. 83398	. 68230	. 83910	. 69040	. 84413	. 69844	. 84906	. 70642	37
24	. 82884	. 67429	. 83406	. 68244	. 83919	. 69054	. 84421	. 69857	. 84914	. 70655	36
25	9. 82893	0. 67442	9. 83415	0. 68257	9. 83927	0. 69067	9. 84430	0. 69871	9. 84923	0. 70668	35
26	. 82902	. 67456	. 83424	. 68271	. 83935	. 69080	. 84438	. 69884	. 84931	. 70682	34
27	. 82911	. 67469	. 83432	. 68284	. 83944	. 69094	. 84446	. 69897	. 84939	. 70695	33
28	. 82920	. 67483	. 83441	. 68298	. 83952	. 69107	. 84454	. 69911	. 84947	. 70708	32
29	. 82928	. 67497	. 83449	. 68312	. 83961	. 69121	. 84463	. 69924	. 84955	. 70721	31
30	9. 82937	0. 67510	9. 83458	0. 68325	9. 83969	0. 69134	9. 84471	0. 69937	9. 84963	0. 70735	30
31	. 82946	. 67524	. 83467	. 68339	. 83978	. 69148	. 84479	. 69951	. 84971	. 70748	29
32	. 82955	. 67538	. 83475	. 68352	. 83986	. 69161	. 84488	. 69964	. 84979	. 70761	28
33	. 82963	. 67551	. 83484	. 68366	. 83995	. 69174	. 84496	. 69977	. 84988	. 70774	27
34	. 82972	. 67565	. 83492	. 68379	. 84003	. 69188	. 84504	. 69991	. 84996	. 70788	26
35	9. 82981	0. 67578	9. 83501	0. 68393	9. 84011	0. 69201	9. 84512	0. 70004	9. 85004	0. 70801	25
36	. 82990	. 67592	. 83510	. 68406	. 84020	. 69215	. 84521	. 70017	. 85012	. 70814	24
37	. 82998	. 67606	. 83518	. 68420	. 84028	. 69228	. 84529	. 70031	. 85020	. 70827	23
38	. 83007	. 67619	. 83527	. 68433	. 84037	. 69242	. 84537	. 70044	. 85028	. 70840	22
39	. 83016	. 67633	. 83535	. 68447	. 84045	. 69255	. 84545	. 70057	. 85036	. 70854	21
40	9. 83025	0. 67647	9. 83544	0. 68460	9. 84054	0. 69268	9. 84554	0. 70071	9. 85044	0. 70867	20
41	. 83033	. 67660	. 83552	. 68474	. 84062	. 69282	. 84562	. 70084	. 85052	. 70880	19
42	. 83042	. 67674	. 83561	. 68487	. 84070	. 69295	. 84570	. 70097	. 85061	. 70893	18
43	. 83051	. 67687	. 83570	. 68501	. 84079	. 69309	. 84578	. 70111	. 85069	. 70907	17
44	. 83059	. 67701	. 83578	. 68514	. 84087	. 69322	. 84587	. 70124	. 85077	. 70920	16
45	9. 83068	0. 67715	9. 83587	0. 68528	9. 84096	0. 69336	9. 84595	0. 70137	9. 85085	0. 70933	15
46	. 83077	. 67728	. 83595	. 68541	. 84104	. 69349	. 84603	. 70151	. 85093	. 70946	14
47	. 83086	. 67742	. 83604	. 68555	. 84112	. 69362	. 84611	. 70164	. 85101	. 70959	13
48	. 83094	. 67755	. 83612	. 68568	. 84121	. 69376	. 84620	. 70177	. 85109	. 70973	12
49	. 83103	. 67769	. 83621	. 68582	. 84129	. 69389	. 84628	. 70191	. 85117	. 70986	11
50	9. 83112	0. 67783	9. 83630	0. 68595	9. 84138	0. 69403	9. 84636	0. 70204	9. 85125	0. 70999	10
51	. 83120	. 67796	. 83638	. 68609	. 84146	. 69416	. 84644	. 70217	. 85133	. 71012	9
52	. 83129	. 67810	. 83647	. 68622	. 84154	. 69429	. 84653	. 70230	. 85141	. 71025	8
53	. 83138	. 67823	. 83655	. 68636	. 84163	. 69443	. 84661	. 70244	. 85149	. 71039	7
54	. 83147	. 67837	. 83664	. 68649	. 84171	. 69456	. 84669	. 70257	. 85158	. 71052	6
55	9. 83155	0. 67850	9. 83672	0. 68663	9. 84179	0. 69470	9. 84677	0. 70270	9. 85166	0. 71065	5
56	. 83164	. 67864	. 83681	. 68676	. 84188	. 69483	. 84685	. 70284	. 85174	. 71078	4
57	. 83173	. 67878	. 83689	. 68690	. 84196	. 69496	. 84694	. 70297	. 85182	. 71091	3
58	. 83181	. 67891	. 83698	. 68703	. 84205	. 69510	. 84702	. 70310	. 85190	. 71105	2
59	. 83190	. 67905	. 83706	. 68717	. 84213	. 69523	. 84710	. 70324	. 85198	. 71118	1
60	9. 83199	0. 67918	9. 83715	0. 68730	9. 84221	0. 69537	9. 84718	0. 70337	9. 85206	0. 71131	0
	249°		248°		247°		246°		245°		

Haversines

′	115°		116°		117°		118°		119°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 85206	0. 71131	9. 85684	0. 71919	9. 86153	0. 72700	9. 86613	0. 73474	9. 87064	0. 74240	60
1	. 85214	. 71144	. 85692	. 71932	. 86161	. 72712	. 86621	. 73486	. 87072	. 74253	59
2	. 85222	. 71157	. 85700	. 71945	. 86169	. 72725	. 86628	. 73499	. 87079	. 74266	58
3	. 85230	. 71170	. 85708	. 71958	. 86176	. 72738	. 86636	. 73512	. 87086	. 74279	57
4	. 85238	. 71184	. 85716	. 71971	. 86184	. 72751	. 86643	. 73525	. 87094	. 74291	56
5	9. 85246	0. 71197	9. 85724	0. 71984	9. 86192	0. 72764	9. 86651	0. 73538	9. 87101	0. 74304	55
6	. 85254	. 71210	. 85731	. 71997	. 86200	. 72777	. 86659	. 73551	. 87109	. 74317	54
7	. 85262	. 71223	. 85739	. 72010	. 86207	. 72790	. 86666	. 73563	. 87116	. 74329	53
8	. 85270	. 71236	. 85747	. 72023	. 86215	. 72803	. 86674	. 73576	. 87124	. 74342	52
9	. 85278	. 71249	. 85755	. 72036	. 86223	. 72816	. 86681	. 73589	. 87131	. 74355	51
10	9. 85286	0. 71263	9. 85763	0. 72049	9. 86230	0. 72829	9. 86689	0. 73602	9. 87138	0. 74368	50
11	. 85294	. 71276	. 85771	. 72062	. 86238	. 72842	. 86696	. 73615	. 87146	. 74380	49
12	. 85302	. 71289	. 85779	. 72075	. 86246	. 72855	. 86704	. 73628	. 87153	. 74393	48
13	. 85310	. 71302	. 85787	. 72088	. 86254	. 72868	. 86712	. 73640	. 87161	. 74406	47
14	. 85318	. 71315	. 85794	. 72101	. 86261	. 72881	. 86719	. 73653	. 87168	. 74418	46
15	9. 85326	0. 71328	9. 85802	0. 72114	9. 86269	0. 72894	9. 86727	0. 73666	9. 87175	0. 74431	45
16	. 85334	. 71342	. 85810	. 72127	. 86277	. 72907	. 86734	. 73679	. 87183	. 74444	44
17	. 85342	. 71355	. 85818	. 72141	. 86284	. 72920	. 86742	. 73692	. 87190	. 74456	43
18	. 85350	. 71368	. 85826	. 72154	. 86292	. 72932	. 86749	. 73704	. 87198	. 74469	42
19	. 85358	. 71381	. 85834	. 72167	. 86300	. 72945	. 86757	. 73717	. 87205	. 74482	41
20	9. 85366	0. 71394	9. 85841	0. 72180	9. 86307	0. 72958	9. 86764	0. 73730	9. 87212	0. 74494	40
21	. 85374	. 71407	. 85849	. 72193	. 86315	. 72971	. 86772	. 73743	. 87220	. 74507	39
22	. 85382	. 71420	. 85857	. 72206	. 86323	. 72984	. 86780	. 73756	. 87227	. 74520	38
23	. 85390	. 71434	. 85865	. 72219	. 86331	. 72997	. 86787	. 73768	. 87235	. 74533	37
24	. 85398	. 71447	. 85873	. 72232	. 86338	. 73010	. 86795	. 73781	. 87242	. 74545	36
25	9. 85406	0. 71460	9. 85881	0. 72245	9. 86346	0. 73023	9. 86802	0. 73794	9. 87249	0. 74558	35
26	. 85414	. 71473	. 85888	. 72258	. 86354	. 73036	. 86810	. 73807	. 87257	. 74571	34
27	. 85422	. 71486	. 85896	. 72271	. 86361	. 73049	. 86817	. 73820	. 87264	. 74583	33
28	. 85430	. 71499	. 85904	. 72284	. 86369	. 73062	. 86825	. 73832	. 87271	. 74596	32
29	. 85438	. 71512	. 85912	. 72297	. 86377	. 73075	. 86832	. 73845	. 87279	. 74609	31
30	9. 85446	0. 71526	9. 85920	0. 72310	9. 86384	0. 73087	9. 86840	0. 73858	9. 87286	0. 74621	30
31	. 85454	. 71539	. 85928	. 72323	. 86392	. 73100	. 86847	. 73871	. 87294	. 74634	29
32	. 85462	. 71552	. 85935	. 72336	. 86400	. 73113	. 86855	. 73883	. 87301	. 74646	28
33	. 85470	. 71565	. 85943	. 72349	. 86407	. 73126	. 86862	. 73896	. 87308	. 74659	27
34	. 85478	. 71578	. 85951	. 72362	. 86415	. 73139	. 86870	. 73909	. 87316	. 74672	26
35	9. 85486	0. 71591	9. 85959	0. 72375	9. 86423	0. 73152	9. 86877	0. 73922	9. 87323	0. 74684	25
36	. 85494	. 71604	. 85967	. 72388	. 86430	. 73165	. 86885	. 73935	. 87330	. 74697	24
37	. 85502	. 71617	. 85974	. 72401	. 86438	. 73178	. 86892	. 73947	. 87338	. 74710	23
38	. 85510	. 71631	. 85982	. 72414	. 86446	. 73191	. 86900	. 73960	. 87345	. 74722	22
39	. 85518	. 71644	. 85990	. 72427	. 86453	. 73203	. 86907	. 73973	. 87352	. 74735	21
40	9. 85526	0. 71657	9. 85998	0. 72440	9. 86461	0. 73216	9. 86915	0. 73986	9. 87360	0. 74748	20
41	. 85534	. 71670	. 86006	. 72453	. 86468	. 73229	. 86922	. 73998	. 87367	. 74760	19
42	. 85542	. 71683	. 86013	. 72466	. 86476	. 73242	. 86930	. 74011	. 87374	. 74773	18
43	. 85550	. 71696	. 86021	. 72479	. 86484	. 73255	. 86937	. 74024	. 87382	. 74786	17
44	. 85557	. 71709	. 86029	. 72492	. 86491	. 73268	. 86945	. 74037	. 87389	. 74798	16
45	9. 85565	0. 71722	9. 86037	0. 72505	9. 86499	0. 73281	9. 86952	0. 74049	9. 87396	0. 74811	15
46	. 85573	. 71735	. 86045	. 72518	. 86507	. 73294	. 86960	. 74062	. 87404	. 74823	14
47	. 85581	. 71748	. 86052	. 72531	. 86514	. 73306	. 86967	. 74075	. 87411	. 74836	13
48	. 85589	. 71762	. 86060	. 72544	. 86522	. 73319	. 86975	. 74088	. 87418	. 74849	12
49	. 85597	. 71775	. 86068	. 72557	. 86529	. 73332	. 86982	. 74100	. 87426	. 74861	11
50	9. 85605	0. 71788	9. 86076	0. 72570	9. 86537	0. 73345	9. 86990	0. 74113	9. 87433	0. 74874	10
51	. 85613	. 71801	. 86083	. 72583	. 86545	. 73358	. 86997	. 74126	. 87440	. 74887	9
52	. 85621	. 71814	. 86091	. 72596	. 86552	. 73371	. 87004	. 74139	. 87448	. 74899	8
53	. 85629	. 71827	. 86099	. 72609	. 86560	. 73384	. 87012	. 74151	. 87455	. 74912	7
54	. 85637	. 71840	. 86107	. 72622	. 86568	. 73396	. 87019	. 74164	. 87462	. 74924	6
55	9. 85645	0. 71853	9. 86114	0. 72635	9. 86575	0. 73409	9. 87027	0. 74177	9. 87470	0. 74937	5
56	. 85653	. 71866	. 86122	. 72648	. 86583	. 73422	. 87034	. 74190	. 87477	. 74950	4
57	. 85660	. 71879	. 86130	. 72661	. 86590	. 73435	. 87042	. 74202	. 87484	. 74962	3
58	. 85668	. 71892	. 86138	. 72674	. 86598	. 73448	. 87049	. 74215	. 87492	. 74975	2
59	. 85676	. 71905	. 86145	. 72687	. 86606	. 73461	. 87057	. 74228	. 87499	. 74987	1
60	9. 85684	0. 71919	9. 86153	0. 72700	9. 86613	0. 73474	9. 87064	0. 74240	9. 87506	0. 75000	0
	244°		243°		242°		241°		240°		

Haversines

′	120°		121°		122°		123°		124°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 87506	0. 75000	9. 87939	0. 75752	9. 88364	0. 76496	9. 88780	0. 77232	9. 89187	0. 77960	60
1	. 87513	. 75013	. 87947	. 75764	. 88371	. 76508	. 88787	. 77244	. 89194	. 77972	59
2	. 87521	. 75025	. 87954	. 75777	. 88378	. 76521	. 88793	. 77256	. 89200	. 77984	58
3	. 87528	. 75038	. 87961	. 75789	. 88385	. 76533	. 88800	. 77269	. 89207	. 77996	57
4	. 87535	. 75050	. 87968	. 75802	. 88392	. 76545	. 88807	. 77281	. 89214	. 78008	56
5	9. 87543	0. 75063	9. 87975	0. 75814	9. 88399	0. 76558	9. 88814	0. 77293	9. 89221	0. 78020	55
6	. 87550	. 75076	. 87982	. 75827	. 88406	. 76570	. 88821	. 77305	. 89227	. 78032	54
7	. 87557	. 75088	. 87989	. 75839	. 88413	. 76582	. 88828	. 77317	. 89234	. 78044	53
8	. 87564	. 75101	. 87996	. 75852	. 88420	. 76595	. 88835	. 77329	. 89241	. 78056	52
9	. 87572	. 75113	. 88004	. 75864	. 88427	. 76607	. 88841	. 77342	. 89247	. 78068	51
10	9. 87579	0. 75126	9. 88011	0. 75876	9. 88434	0. 76619	9. 88848	0. 77354	9. 89254	0. 78080	50
11	. 87586	. 75138	. 88018	. 75889	. 88441	. 76632	. 88855	. 77366	. 89261	. 78092	49
12	. 87593	. 75151	. 88025	. 75901	. 88448	. 76644	. 88862	. 77378	. 89267	. 78104	48
13	. 87601	. 75164	. 88032	. 75914	. 88455	. 76656	. 88869	. 77390	. 89274	. 78116	47
14	. 87608	. 75176	. 88039	. 75926	. 88462	. 76668	. 88876	. 77402	. 89281	. 78128	46
15	9. 87615	0. 75189	9. 88046	0. 75939	9. 88469	0. 76681	9. 88882	0. 77415	9. 89287	0. 78140	45
16	. 87623	. 75201	. 88053	. 75951	. 88476	. 76693	. 88889	. 77427	. 89294	. 78152	44
17	. 87630	. 75214	. 88061	. 75964	. 88483	. 76705	. 88896	. 77439	. 89301	. 78164	43
18	. 87637	. 75226	. 88068	. 75976	. 88490	. 76718	. 88903	. 77451	. 89308	. 78176	42
19	. 87644	. 75239	. 88075	. 75988	. 88496	. 76730	. 88910	. 77463	. 89314	. 78188	41
20	9. 87652	0. 75251	9. 88082	0. 76001	9. 88503	0. 76742	9. 88916	0. 77475	9. 89321	0. 78200	40
21	. 87659	. 75264	. 88089	. 76013	. 88510	. 76754	. 88923	. 77488	. 89328	. 78212	39
22	. 87666	. 75277	. 88096	. 76026	. 88517	. 76767	. 88930	. 77500	. 89334	. 78224	38
23	. 87673	. 75289	. 88103	. 76038	. 88524	. 76779	. 88937	. 77512	. 89341	. 78236	37
24	. 87680	. 75302	. 88110	. 76050	. 88531	. 76791	. 88944	. 77524	. 89348	. 78248	36
25	9. 87688	0. 75314	9. 88117	0. 76063	9. 88538	0. 76804	9. 88950	0. 77536	9. 89354	0. 78260	35
26	. 87695	. 75327	. 88124	. 76075	. 88545	. 76816	. 88957	. 77548	. 89361	. 78272	34
27	. 87702	. 75339	. 88131	. 76088	. 88552	. 76828	. 88964	. 77560	. 89368	. 78284	33
28	. 87709	. 75352	. 88139	. 76100	. 88559	. 76840	. 88971	. 77573	. 89374	. 78296	32
29	. 87717	. 75364	. 88146	. 76113	. 88566	. 76853	. 88978	. 77585	. 89381	. 78308	31
30	9. 87724	0. 75377	9. 88153	0. 76125	9. 88573	0. 76865	9. 88984	0. 77597	9. 89387	0. 78320	30
31	. 87731	. 75389	. 88160	. 76137	. 88580	. 76877	. 88991	. 77609	. 89394	. 78332	29
32	. 87738	. 75402	. 88167	. 76150	. 88587	. 76890	. 88998	. 77621	. 89400	. 78344	28
33	. 87745	. 75415	. 88174	. 76162	. 88594	. 76902	. 89005	. 77633	. 89407	. 78356	27
34	. 87753	. 75427	. 88181	. 76175	. 88600	. 76914	. 89012	. 77645	. 89414	. 78368	26
35	9. 87760	0. 75440	9. 88188	0. 76187	9. 88607	0. 76926	9. 89018	0. 77657	9. 89421	0. 78380	25
36	. 87767	. 75452	. 88195	. 76199	. 88614	. 76939	. 89025	. 77670	. 89427	. 78392	24
37	. 87774	. 75465	. 88202	. 76212	. 88621	. 76951	. 89032	. 77682	. 89434	. 78404	23
38	. 87782	. 75477	. 88209	. 76224	. 88628	. 76963	. 89039	. 77694	. 89441	. 78416	22
39	. 87789	. 75490	. 88216	. 76236	. 88635	. 76975	. 89045	. 77706	. 89447	. 78428	21
40	9. 87796	0. 75502	9. 88223	0. 76249	9. 88642	0. 76988	9. 89052	0. 77718	9. 89454	0. 78440	20
41	. 87803	. 75515	. 88230	. 76261	. 88649	. 77000	. 89059	. 77730	. 89460	. 78452	19
42	. 87810	. 75527	. 88237	. 76274	. 88656	. 77012	. 89066	. 77742	. 89467	. 78464	18
43	. 87818	. 75540	. 88244	. 76286	. 88663	. 77024	. 89072	. 77754	. 89474	. 78476	17
44	. 87825	. 75552	. 88252	. 76298	. 88670	. 77036	. 89079	. 77766	. 89480	. 78488	16
45	9. 87832	0. 75565	9. 88259	0. 76311	9. 88677	0. 77049	9. 89086	0. 77779	9. 89487	0. 78500	15
46	. 87839	. 75577	. 88266	. 76323	. 88683	. 77061	. 89093	. 77791	. 89493	. 78512	14
47	. 87846	. 75590	. 88273	. 76335	. 88690	. 77073	. 89099	. 77803	. 89500	. 78524	13
48	. 87853	. 75602	. 88280	. 76348	. 88697	. 77085	. 89106	. 77815	. 89507	. 78536	12
49	. 87861	. 75615	. 88287	. 76360	. 88704	. 77098	. 89113	. 77827	. 89513	. 78548	11
50	9. 87868	0. 75627	9. 88294	0. 76373	9. 88711	0. 77110	9. 89120	0. 77839	9. 89520	0. 78560	10
51	. 87875	. 75640	. 88301	. 76385	. 88718	. 77122	. 89126	. 77851	. 89527	. 78571	9
52	. 87882	. 75652	. 88308	. 76397	. 88725	. 77134	. 89133	. 77863	. 89533	. 78583	8
53	. 87889	. 75665	. 88315	. 76410	. 88732	. 77147	. 89140	. 77875	. 89540	. 78595	7
54	. 87896	. 75677	. 88322	. 76422	. 88739	. 77159	. 89147	. 77887	. 89546	. 78607	6
55	9. 87904	0. 75690	9. 88329	0. 76434	9. 88745	0. 77171	9. 89153	0. 77899	9. 89553	0. 78619	5
56	. 87911	. 75702	. 88336	. 76447	. 88752	. 77183	. 89160	. 77911	. 89559	. 78631	4
57	. 87918	. 75714	. 88343	. 76459	. 88759	. 77195	. 89167	. 77923	. 89566	. 78643	3
58	. 87925	. 75727	. 88350	. 76471	. 88766	. 77208	. 89174	. 77936	. 89573	. 78655	2
59	. 87932	. 75739	. 88357	. 76484	. 88773	. 77220	. 89180	. 77948	. 89579	. 78667	1
60	9. 87939	0. 75752	9. 88364	0. 76496	9. 88780	0. 77232	9. 89187	0. 77960	9. 89586	0. 78679	0
′	239°		238°		237°		236°		235°		′

Haversines

′	125°		126°		127°		128°		129°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 89586	0. 78679	9. 89976	0. 79389	9. 90358	0. 80091	9. 90732	0. 80783	9. 91098	0. 81466	60
1	. 89592	. 78691	. 89983	. 79401	. 90365	. 80102	. 90738	. 80795	. 91104	. 81477	59
2	. 89599	. 78703	. 89989	. 79413	. 90371	. 80114	. 90744	. 80806	. 91110	. 81489	58
3	. 89606	. 78715	. 89995	. 79425	. 90377	. 80126	. 90751	. 80817	. 91116	. 81500	57
4	. 89612	. 78726	. 90002	. 79436	. 90383	. 80137	. 90757	. 80829	. 91122	. 81511	56
5	9. 89619	0. 78738	9. 90008	0. 79448	9. 90390	0. 80149	9. 90763	0. 80840	9. 91128	0. 81523	55
6	. 89625	. 78750	. 90015	. 79460	. 90396	. 80160	. 90769	. 80852	. 91134	. 81534	54
7	. 89632	. 78762	. 90021	. 79472	. 90402	. 80172	. 90775	. 80863	. 91140	. 81545	53
8	. 89638	. 78774	. 90028	. 79483	. 90409	. 80184	. 90781	. 80875	. 91146	. 81556	52
9	. 89645	. 78786	. 90034	. 79495	. 90415	. 80195	. 90787	. 80886	. 91152	. 81568	51
10	9. 89651	0. 78798	9. 90040	0. 79507	9. 90421	0. 80207	9. 90794	0. 80898	9. 91158	0. 81579	50
11	. 89658	. 78810	. 90047	. 79519	. 90428	. 80218	. 90800	. 80909	. 91164	. 81590	49
12	. 89665	. 78822	. 90053	. 79530	. 90434	. 80230	. 90806	. 80920	. 91170	. 81601	48
13	. 89671	. 78833	. 90060	. 79542	. 90440	. 80242	. 90812	. 80932	. 91176	. 81613	47
14	. 89678	. 78845	. 90066	. 79554	. 90446	. 80253	. 90818	. 80943	. 91182	. 81624	46
15	9. 89684	0. 78857	9. 90072	0. 79565	9. 90452	0. 80265	9. 90824	0. 80955	9. 91188	0. 81635	45
16	. 89691	. 78869	. 90079	. 79577	. 90459	. 80276	. 90830	. 80966	. 91194	. 81647	44
17	. 89697	. 78881	. 90085	. 79589	. 90465	. 80288	. 90836	. 80978	. 91200	. 81658	43
18	. 89704	. 78893	. 90092	. 79601	. 90471	. 80299	. 90843	. 80989	. 91206	. 81669	42
19	. 89710	. 78905	. 90098	. 79612	. 90478	. 80311	. 90849	. 81000	. 91212	. 81680	41
20	9. 89717	0. 78917	9. 90104	0. 79624	9. 90484	0. 80323	9. 90855	0. 81012	9. 91218	0. 81692	40
21	. 89723	. 78928	. 90111	. 79636	. 90490	. 80334	. 90861	. 81023	. 91224	. 81703	39
22	. 89730	. 78940	. 90117	. 79648	. 90496	. 80346	. 90867	. 81035	. 91230	. 81714	38
23	. 89736	. 78952	. 90124	. 79659	. 90503	. 80357	. 90873	. 81046	. 91236	. 81725	37
24	. 89743	. 78964	. 90130	. 79671	. 90509	. 80369	. 90879	. 81057	. 91242	. 81737	36
25	9. 89749	0. 78976	9. 90136	0. 79683	9. 90515	0. 80380	9. 90885	0. 81069	9. 91248	0. 81748	35
26	. 89756	. 78988	. 90143	. 79694	. 90521	. 80392	. 90892	. 81080	. 91254	. 81759	34
27	. 89763	. 79000	. 90149	. 79706	. 90527	. 80403	. 90898	. 81092	. 91260	. 81770	33
28	. 89769	. 79011	. 90156	. 79718	. 90534	. 80415	. 90904	. 81103	. 91265	. 81781	32
29	. 89776	. 79023	. 90162	. 79729	. 90540	. 80427	. 90910	. 81114	. 91271	. 81793	31
30	9. 89782	0. 79035	9. 90168	0. 79741	9. 90546	0. 80438	9. 90916	0. 81126	9. 91277	0. 81804	30
31	. 89789	. 79047	. 90175	. 79753	. 90552	. 80450	. 90922	. 81137	. 91283	. 81815	29
32	. 89795	. 79059	. 90181	. 79765	. 90559	. 80461	. 90928	. 81148	. 91289	. 81826	28
33	. 89802	. 79071	. 90187	. 79776	. 90565	. 80473	. 90934	. 81160	. 91295	. 81838	27
34	. 89808	. 79082	. 90194	. 79788	. 90571	. 80484	. 90940	. 81171	. 91301	. 81849	26
35	9. 89815	0. 79094	9. 90200	0. 79800	9. 90577	0. 80496	9. 90946	0. 81183	9. 91307	0. 81860	25
36	. 89821	. 79106	. 90206	. 79811	. 90584	. 80507	. 90952	. 81194	. 91313	. 81871	24
37	. 89828	. 79118	. 90213	. 79823	. 90590	. 80519	. 90958	. 81205	. 91319	. 81882	23
38	. 89834	. 79130	. 90219	. 79835	. 90596	. 80530	. 90965	. 81217	. 91325	. 81894	22
39	. 89840	. 79142	. 90225	. 79846	. 90602	. 80542	. 90971	. 81228	. 91331	. 81905	21
40	9. 89847	0. 79153	9. 90232	0. 79858	9. 90608	0. 80553	9. 90977	0. 81239	9. 91337	0. 81916	20
41	. 89853	. 79165	. 90238	. 79870	. 90615	. 80565	. 90983	. 81251	. 91343	. 81927	19
42	. 89860	. 79177	. 90244	. 79881	. 90621	. 80576	. 90989	. 81262	. 91349	. 81938	18
43	. 89866	. 79189	. 90251	. 79893	. 90627	. 80588	. 90995	. 81273	. 91355	. 81950	17
44	. 89873	. 79201	. 90257	. 79905	. 90633	. 80599	. 91001	. 81285	. 91361	. 81961	16
45	9. 89879	0. 79212	9. 90264	0. 79916	9. 90639	0. 80611	9. 91007	0. 81296	9. 91367	0. 81972	15
46	. 89886	. 79224	. 90270	. 79928	. 90646	. 80622	. 91013	. 81308	. 91372	. 81983	14
47	. 89892	. 79236	. 90276	. 79940	. 90652	. 80634	. 91019	. 81319	. 91378	. 81994	13
48	. 89899	. 79248	. 90282	. 79951	. 90658	. 80645	. 91025	. 81330	. 91384	. 82005	12
49	. 89905	. 79260	. 90289	. 79963	. 90664	. 80657	. 91031	. 81342	. 91390	. 82017	11
50	9. 89912	0. 79271	9. 90295	0. 79974	9. 90670	0. 80668	9. 91037	0. 81353	9. 91396	0. 82028	10
51	. 89918	. 79283	. 90301	. 79986	. 90676	. 80680	. 91043	. 81364	. 91402	. 82039	9
52	. 89925	. 79295	. 90308	. 79998	. 90683	. 80691	. 91049	. 81376	. 91408	. 82050	8
53	. 89931	. 79307	. 90314	. 80009	. 90689	. 80703	. 91055	. 81387	. 91414	. 82061	7
54	. 89938	. 79319	. 90320	. 80021	. 90695	. 80714	. 91061	. 81398	. 91420	. 82072	6
55	9. 89944	0. 79330	9. 90327	0. 80033	9. 90701	0. 80726	9. 91067	0. 81409	9. 91426	0. 82084	5
56	. 89950	. 79342	. 90333	. 80044	. 90707	. 80737	. 91074	. 81421	. 91432	. 82095	4
57	. 89957	. 79354	. 90339	. 80056	. 90714	. 80749	. 91080	. 81432	. 91437	. 82106	3
58	. 89963	. 79366	. 90346	. 80068	. 90720	. 80760	. 91086	. 81443	. 91443	. 82117	2
59	. 89970	. 79377	. 90352	. 80079	. 90726	. 80772	. 91092	. 81455	. 91449	. 82128	1
60	9. 89976	0. 79389	9. 90358	0. 80091	9. 90732	0. 80783	9. 91098	0. 81466	9. 91455	0. 82139	0
	234°		233°		232°		231°		230°		

Haversines

′	130°		131°		132°		133°		134°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 91455	0. 82139	9. 91805	0. 82803	9. 92146	0. 83457	9. 92480	0. 84100	9. 92805	0. 84733	60
1	. 91461	. 82151	. 91810	. 82814	. 92152	. 83467	. 92485	. 84111	. 92811	. 84743	59
2	. 91467	. 82162	. 91816	. 82825	. 92157	. 83478	. 92491	. 84121	. 92816	. 84754	58
3	. 91473	. 82173	. 91822	. 82836	. 92163	. 83489	. 92496	. 84132	. 92821	. 84764	57
4	. 91479	. 82184	. 91828	. 82847	. 92169	. 83500	. 92502	. 84142	. 92827	. 84775	56
5	9. 91485	0. 82195	9. 91833	0. 82858	9. 92174	0. 83511	9. 92507	0. 84153	9. 92832	0. 84785	55
6	. 91490	. 82206	. 91839	. 82869	. 92180	. 83521	. 92512	. 84164	. 92837	. 84796	54
7	. 91496	. 82217	. 91845	. 82880	. 92185	. 83532	. 92518	. 84174	. 92843	. 84806	53
8	. 91502	. 82228	. 91851	. 82891	. 92191	. 83543	. 92523	. 84185	. 92848	. 84817	52
9	. 91508	. 82240	. 91856	. 82902	. 92197	. 83554	. 92529	. 84196	. 92853	. 84827	51
10	9. 91514	0. 82251	9. 91862	0. 82913	9. 92202	0. 83564	9. 92534	0. 84206	9. 92859	0. 84837	50
11	. 91520	. 82262	. 91868	. 82924	. 92208	. 83575	. 92540	. 84217	. 92864	. 84848	49
12	. 91526	. 82273	. 91874	. 82934	. 92213	. 83586	. 92545	. 84227	. 92869	. 84858	48
13	. 91532	. 82284	. 91879	. 82945	. 92219	. 83597	. 92551	. 84238	. 92875	. 84869	47
14	. 91537	. 82295	. 91885	. 82956	. 92225	. 83608	. 92556	. 84249	. 92880	. 84879	46
15	9. 91543	0. 82306	9. 91891	0. 82967	9. 92230	0. 83618	9. 92562	0. 84259	9. 92885	0. 84890	45
16	. 91549	. 82317	. 91896	. 82978	. 92236	. 83629	. 92567	. 84270	. 92891	. 84900	44
17	. 91555	. 82328	. 91902	. 82989	. 92241	. 83640	. 92573	. 84280	. 92896	. 84910	43
18	. 91561	. 82339	. 91908	. 83000	. 92247	. 83651	. 92578	. 84291	. 92901	. 84921	42
19	. 91567	. 82351	. 91914	. 83011	. 92253	. 83661	. 92584	. 84302	. 92907	. 84931	41
20	9. 91573	0. 82362	9. 91919	0. 83022	9. 92258	0. 83672	9. 92589	0. 84312	9. 92912	0. 84942	40
21	. 91578	. 82373	. 91925	. 83033	. 92264	. 83683	. 92594	. 84323	. 92917	. 84952	39
22	. 91584	. 82384	. 91931	. 83044	. 92269	. 83694	. 92600	. 84333	. 92923	. 84962	38
23	. 91590	. 82395	. 91936	. 83055	. 92275	. 83704	. 92605	. 84344	. 92928	. 84973	37
24	. 91596	. 82406	. 91942	. 83066	. 92280	. 83715	. 92611	. 84354	. 92933	. 84983	36
25	9. 91602	0. 82417	9. 91948	0. 83077	9. 92286	0. 83726	9. 92616	0. 84365	9. 92939	0. 84994	35
26	. 91608	. 82428	. 91954	. 83087	. 92292	. 83737	. 92622	. 84376	. 92944	. 85004	34
27	. 91613	. 82439	. 91959	. 83098	. 92297	. 83747	. 92627	. 84386	. 92949	. 85014	33
28	. 91619	. 82450	. 91965	. 83109	. 92303	. 83758	. 92633	. 84397	. 92955	. 85025	32
29	. 91625	. 82461	. 91971	. 83120	. 92308	. 83769	. 92638	. 84407	. 92960	. 85035	31
30	9. 91631	0. 82472	9. 91976	0. 83131	9. 92314	0. 83780	9. 92643	0. 84418	9. 92965	0. 85045	30
31	. 91637	. 82483	. 91982	. 83142	. 92319	. 83790	. 92649	. 84428	. 92970	. 85056	29
32	. 91643	. 82495	. 91988	. 83153	. 92325	. 83801	. 92654	. 84439	. 92975	. 85066	28
33	. 91648	. 82506	. 91993	. 83164	. 92330	. 83812	. 92660	. 84449	. 92981	. 85077	27
34	. 91654	. 82517	. 91999	. 83175	. 92336	. 83822	. 92665	. 84460	. 92986	. 85087	26
35	9. 91660	0. 82528	9. 92005	0. 83185	9. 92342	0. 83833	9. 92670	0. 84470	9. 92992	0. 85097	25
36	. 91666	. 82539	. 92010	. 83196	. 92347	. 83844	. 92676	. 84481	. 92997	. 85108	24
37	. 91672	. 82550	. 92016	. 83207	. 92353	. 83855	. 92681	. 84492	. 93002	. 85118	23
38	. 91677	. 82561	. 92022	. 83218	. 92358	. 83865	. 92687	. 84502	. 93007	. 85128	22
39	. 91683	. 82572	. 92027	. 83229	. 92364	. 83876	. 92692	. 84513	. 93013	. 85139	21
40	9. 91689	0. 82583	9. 92033	0. 83240	9. 92369	0. 83887	9. 92698	0. 84523	9. 93018	0. 85149	20
41	. 91695	. 82594	. 92039	. 83251	. 92375	. 83897	. 92703	. 84534	. 93023	. 85159	19
42	. 91701	. 82605	. 92044	. 83262	. 92380	. 83908	. 92708	. 84544	. 93029	. 85170	18
43	. 91706	. 82616	. 92050	. 83272	. 92386	. 83919	. 92714	. 84555	. 93034	. 85180	17
44	. 91712	. 82627	. 92056	. 83283	. 92391	. 83929	. 92719	. 84565	. 93039	. 85190	16
45	9. 91718	0. 82638	9. 92061	0. 83294	9. 92397	0. 83940	9. 92725	0. 84576	9. 93044	0. 85201	15
46	. 91724	. 82649	. 92067	. 83305	. 92402	. 83951	. 92730	. 84586	. 93050	. 85211	14
47	. 91730	. 82660	. 92073	. 83316	. 92408	. 83961	. 92735	. 84597	. 93055	. 85221	13
48	. 91735	. 82671	. 92078	. 83327	. 92413	. 83972	. 92741	. 84607	. 93060	. 85232	12
49	. 91741	. 82682	. 92084	. 83337	. 92419	. 83983	. 92746	. 84618	. 93065	. 85242	11
50	9. 91747	0. 82693	9. 92090	0. 83348	9. 92425	0. 83993	9. 92751	0. 84628	9. 93071	0. 85252	10
51	. 91753	. 82704	. 92095	. 83359	. 92430	. 84004	. 92757	. 84639	. 93076	. 85263	9
52	. 91758	. 82715	. 92101	. 83370	. 92436	. 84015	. 92762	. 84649	. 93081	. 85273	8
53	. 91764	. 82726	. 92107	. 83381	. 92441	. 84025	. 92768	. 84660	. 93086	. 85283	7
54	. 91770	. 82737	. 92112	. 83392	. 92447	. 84036	. 92773	. 84670	. 93092	. 85294	6
55	9. 91776	0. 82748	9. 92118	0. 83402	9. 92452	0. 84047	9. 92778	0. 84681	9. 93097	0. 85304	5
56	. 91782	. 82759	. 92124	. 83413	. 92458	. 84057	. 92784	. 84691	. 93102	. 85314	4
57	. 91787	. 82770	. 92129	. 83424	. 92463	. 84068	. 92789	. 84702	. 93107	. 85324	3
58	. 91793	. 82781	. 92135	. 83435	. 92469	. 84079	. 92794	. 84712	. 93113	. 85335	2
59	. 91799	. 82792	. 92140	. 83446	. 92474	. 84089	. 92800	. 84722	. 93118	. 85345	1
60	9. 91805	0. 82803	9. 92146	0. 83457	9. 92480	0. 84100	9. 92805	0. 84733	9. 93123	0. 85355	0
	229°		228°		227°		226°		225°		

(2)

Haversines

′	135°		136°		137°		138°		139°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 93123	0. 85355	9. 93433	0. 85967	9. 93736	0. 86568	9. 94030	0. 87157	9. 94318	0. 87735	60
1	. 93128	. 85366	. 93438	. 85977	. 93741	. 86578	. 94035	. 87167	. 94322	. 87745	59
2	. 93134	. 85376	. 93443	. 85987	. 93746	. 86588	. 94040	. 87177	. 94327	. 87755	58
3	. 93139	. 85386	. 93448	. 85997	. 93751	. 86597	. 94045	. 87186	. 94332	. 87764	57
4	. 93144	. 85396	. 93454	. 86007	. 93755	. 86607	. 94050	. 87196	. 94336	. 87774	56
5	9. 93149	0. 85407	9. 93459	0. 86017	9. 93760	0. 86617	9. 94055	0. 87206	9. 94341	0. 87783	55
6	. 93154	. 85417	. 93464	. 86028	. 93765	. 86627	. 94059	. 87216	. 94346	. 87793	54
7	. 93160	. 85427	. 93469	. 86038	. 93770	. 86637	. 94064	. 87225	. 94351	. 87802	53
8	. 93165	. 85438	. 93474	. 86048	. 93775	. 86647	. 94069	. 87235	. 94355	. 87812	52
9	. 93170	. 85448	. 93479	. 86058	. 93780	. 86657	. 94074	. 87245	. 94360	. 87821	51
10	9. 93175	0. 85458	9. 93484	0. 86068	9. 93785	0. 86667	9. 94079	0. 87254	9. 94365	0. 87831	50
11	. 93181	. 85468	. 93489	. 86078	. 93790	. 86677	. 94084	. 87264	. 94369	. 87840	49
12	. 93186	. 85479	. 93494	. 86088	. 93795	. 86686	. 94088	. 87274	. 94374	. 87850	48
13	. 93191	. 85489	. 93499	. 86098	. 93800	. 86696	. 94093	. 87283	. 94379	. 87859	47
14	. 93196	. 85499	. 93504	. 86108	. 93805	. 86706	. 94098	. 87293	. 94383	. 87869	46
15	9. 93201	0. 85509	9. 93509	0. 86118	9. 93810	0. 86716	9. 94103	0. 87303	9. 94388	0. 87878	45
16	. 93207	. 85520	. 93515	. 86128	. 93815	. 86726	. 94108	. 87313	. 94393	. 87888	44
17	. 93212	. 85530	. 93520	. 86138	. 93820	. 86736	. 94112	. 87322	. 94398	. 87897	43
18	. 93217	. 85540	. 93525	. 86148	. 93825	. 86746	. 94117	. 87332	. 94402	. 87907	42
19	. 93222	. 85550	. 93530	. 86158	. 93830	. 86756	. 94122	. 87342	. 94407	. 87916	41
20	9. 93227	0. 85560	9. 93535	0. 86168	9. 93835	0. 86765	9. 94127	0. 87351	9. 94412	0. 87926	40
21	. 93232	. 85571	. 93540	. 86178	. 93840	. 86775	. 94132	. 87361	. 94416	. 87935	39
22	. 93238	. 85581	. 93545	. 86189	. 93845	. 86785	. 94137	. 87371	. 94421	. 87945	38
23	. 93243	. 85591	. 93550	. 86199	. 93849	. 86795	. 94141	. 87380	. 94426	. 87954	37
24	. 93248	. 85601	. 93555	. 86209	. 93854	. 86805	. 94146	. 87390	. 94430	. 87964	36
25	9. 93253	0. 85612	9. 93560	0. 86219	9. 93859	0. 86815	9. 94151	0. 87400	9. 94435	0. 87973	35
26	. 93258	. 85622	. 93565	. 86229	. 93864	. 86825	. 94156	. 87409	. 94440	. 87982	34
27	. 93264	. 85632	. 93570	. 86239	. 93869	. 86834	. 94161	. 87419	. 94444	. 87992	33
28	. 93269	. 85642	. 93575	. 86249	. 93874	. 86844	. 94165	. 87429	. 94449	. 88001	32
29	. 93274	. 85652	. 93580	. 86259	. 93879	. 86854	. 94170	. 87438	. 94454	. 88011	31
30	9. 93279	0. 85663	9. 93585	0. 86269	9. 93884	0. 86864	9. 94175	0. 87448	9. 94458	0. 88020	30
31	. 93284	. 85673	. 93590	. 86279	. 93889	. 86874	. 94180	. 87457	. 94463	. 88030	29
32	. 93289	. 85683	. 93595	. 86289	. 93894	. 86884	. 94184	. 87467	. 94468	. 88039	28
33	. 93295	. 85693	. 93600	. 86299	. 93899	. 86893	. 94189	. 87477	. 94472	. 88049	27
34	. 93300	. 85703	. 93605	. 86309	. 93904	. 86903	. 94194	. 87486	. 94477	. 88058	26
35	9. 93305	0. 85713	9. 93611	0 86319	9. 93908	0. 86913	9. 94199	0. 87496	9. 94482	0. 88067	25
36	. 93310	. 85724	. 93616	. 86329	. 93913	. 86923	. 94204	. 87506	. 94486	. 88077	24
37	. 93315	. 85734	. 93621	. 86339	. 93918	. 86933	. 94208	. 87515	. 94491	. 88086	23
38	. 93320	. 85744	. 93626	. 86349	. 93923	. 86942	. 94213	. 87525	. 94496	. 88096	22
39	. 93326	. 85754	. 93631	. 86359	. 93928	. 86952	. 94218	. 87534	. 94500	. 88105	21
40	9. 93331	0. 85764	9. 93636	0. 86369	9. 93933	0. 86962	9. 94223	0. 87544	9. 94505	0. 88115	20
41	. 93336	. 85774	. 93641	. 86379	. 93938	. 86972	. 94227	. 87554	. 94509	. 88124	19
42	. 93341	. 85785	. 93646	. 86389	. 93943	. 86982	. 94232	. 87563	. 94514	. 88133	18
43	93346	. 85795	. 93651	. 86399	. 93948	. 86991	. 94237	. 87573	. 94519	. 88143	17
44	. 93351	. 85805	. 93656	. 86409	. 93952	. 87001	. 94242	. 87582	. 94523	. 88152	16
45	9. 93356	0. 85815	9. 93661	0. 86419	9. 93957	0. 87011	9. 94246	0. 87592	9. 94528	0. 88162	15
46	. 93362	. 85825	. 93666	. 86429	. 93962	. 87021	. 94251	. 87602	. 94533	. 88171	14
47	. 93367	. 85835	. 93671	. 86438	. 93967	. 87030	. 94256	. 87611	. 94537	. 88180	13
48	. 93372	. 85846	. 93676	. 86448	. 93972	. 87040	. 94261	. 87621	. 94542	. 88190	12
49	. 93377	. 85856	. 93681	. 86458	. 93977	. 87050	. 94265	. 87630	. 94546	. 88199	11
50	9. 93382	0. 85866	9. 93686	0. 86468	9. 93982	0. 87060	9. 94270	0. 87640	9. 94551	0. 88209	10
51	. 93387	. 85876	. 93691	. 86478	. 93987	. 87070	. 94275	. 87649	. 94556	. 88218	9
52	. 93392	. 85886	. 93696	. 86488	. 93991	. 87079	. 94280	. 87659	. 94560	. 88227	8
53	. 93397	. 85896	. 93701	. 86498	. 93996	. 87089	. 94284	. 87669	. 94565	. 88237	7
54	. 93403	. 85906	. 93706	. 86508	. 94001	. 87099	. 94289	. 87678	. 94570	. 88246	6
55	9. 93408	0. 85916	9. 93711	0. 86518	9. 94006	0. 87109	9. 94294	0. 87688	9. 94574	0. 88255	5
56	. 93413	. 85927	. 93716	. 86528	. 94011	. 87118	. 94299	. 87697	. 94579	. 88265	4
57	. 93418	. 85937	. 93721	. 86538	. 94016	. 87128	. 94303	. 87707	. 94583	. 88274	3
58	. 93423	. 85947	. 93726	. 86548	. 94021	. 87138	. 94308	. 87716	. 94588	. 88284	2
59	. 93428	. 85957	. 93731	. 86558	. 94026	. 87148	. 94313	. 87726	. 94593	. 88293	1
60	9. 93433	0. 85967	9. 93736	0. 86568	9. 94030	0. 87157	9. 94318	0. 87735	9. 94597	0. 88302	0
	224°		223°		222°		221°		220°		

Haversines

′	140°		141°		142°		143°		144°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 94597	0. 88302	9. 94869	0. 88857	9. 95134	0. 89401	9. 95391	0. 89932	9. 95641	0. 90451	60
1	. 94602	. 88312	. 94874	. 88866	. 95138	. 89409	. 95396	. 89941	. 95645	. 90459	59
2	. 94606	. 88321	. 94878	. 88876	. 95143	. 89418	. 95400	. 89949	. 95649	. 90468	58
3	. 94611	. 88330	. 94883	. 88885	. 95147	. 89427	. 95404	. 89958	. 95654	. 90476	57
4	. 94616	. 88340	. 94887	. 88894	. 95151	. 89436	. 95408	. 89967	. 95658	. 90485	56
5	9. 94620	0. 88349	9. 94892	0. 88903	9. 95156	0. 89445	9. 95412	0. 89975	9. 95662	0. 90494	55
6	. 94625	. 88358	. 94896	. 88912	. 95160	. 89454	. 95417	. 89984	. 95666	. 90502	54
7	. 94629	. 88368	. 94901	. 88921	. 95164	. 89463	. 95421	. 89993	. 95670	. 90511	53
8	. 94634	. 88377	. 94905	. 88930	. 95169	. 89472	. 95425	. 90002	. 95674	. 90519	52
9	. 94638	. 88386	. 94909	. 88940	. 95173	. 89481	. 95429	. 90010	. 95678	. 90528	51
10	9. 94643	0. 88396	9. 94914	0. 88949	9. 95177	0. 89490	9. 95433	0. 90019	9. 95682	0. 90536	50
11	. 94648	. 88405	. 94918	. 88958	. 95182	. 89499	. 95438	. 90028	. 95686	. 90545	49
12	. 94652	. 88414	. 94923	. 88967	. 95186	. 89508	. 95442	. 90037	. 95690	. 90553	48
13	. 94657	. 88423	. 94927	. 88976	. 95190	. 89517	. 95446	. 90045	. 95694	. 90562	47
14	. 94661	. 88433	. 94932	. 88985	. 95195	. 89526	. 95450	. 90054	. 95699	. 90570	46
15	9. 94666	0. 88442	9. 94936	0. 88994	9. 95199	0. 89534	9. 95454	0. 90063	9. 95703	0. 90579	45
16	. 94670	. 88451	. 94941	. 89003	. 95203	. 89543	. 95459	. 90071	. 95707	. 90587	44
17	. 94675	. 88461	. 94945	. 89012	. 95208	. 89552	. 95463	. 90080	. 95711	. 90596	43
18	. 94680	. 88470	. 94950	. 89022	. 95212	. 89561	. 95467	. 90089	. 95715	. 90604	42
19	. 94684	. 88479	. 94954	. 89031	. 95216	. 89570	. 95471	. 90097	. 95719	. 90613	41
20	9. 94689	0. 88489	9. 94958	0. 89040	9. 95221	0. 89579	9. 95475	0. 90106	9. 95723	0. 90621	40
21	. 94693	. 88498	. 94963	. 89049	. 95225	. 89588	. 95480	. 90115	. 95727	. 90630	39
22	. 94698	. 88507	. 94967	. 89058	. 95229	. 89597	. 95484	. 90124	. 95731	. 90638	38
23	. 94702	. 88516	. 94972	. 89067	. 95234	. 89606	. 95488	. 90132	. 95735	. 90647	37
24	. 94707	. 88526	. 94976	. 89076	. 95238	. 89614	. 95492	. 90141	. 95739	. 90655	36
25	9. 94711	0. 88535	9. 94981	0. 89085	9. 95242	0. 89623	9. 95496	0. 90150	9. 95743	0. 90664	35
26	. 94716	. 88544	. 94985	. 89094	. 95246	. 89632	. 95501	. 90158	. 95747	. 90672	34
27	. 94721	. 88553	. 94989	. 89103	. 95251	. 89641	. 95505	. 90167	. 95751	. 90680	33
28	. 94725	. 88563	. 94994	. 89112	. 95255	. 89650	. 95509	. 90176	. 95755	. 90689	32
29	. 94730	. 88572	. 94998	. 89121	. 95259	. 89659	. 95513	. 90184	. 95759	. 90697	31
30	9. 94734	0. 88581	9. 95003	0. 89130	9. 95264	0. 89668	9. 95517	0. 90193	9. 95763	0. 90706	30
31	. 94739	. 88590	. 95007	. 89139	. 95268	. 89677	. 95521	. 90201	. 95768	. 90714	29
32	. 94743	. 88600	. 95011	. 89149	. 95272	. 89685	. 95526	. 90210	. 95772	. 90723	28
33	. 94748	. 88609	. 95016	. 89158	. 95276	. 89694	. 95530	. 90219	. 95776	. 90731	27
34	. 94752	. 88618	. 95020	. 89167	. 95281	. 89703	. 95534	. 90227	. 95780	. 90740	26
35	9. 94757	0. 88627	9. 95025	0. 89176	9. 95285	0. 89712	9. 95538	0. 90236	9. 95784	0. 90748	25
36	. 94761	. 88637	. 95029	. 89185	. 95289	. 89721	. 95542	. 90245	. 95788	. 90756	24
37	. 94766	. 88646	. 95033	. 89194	. 95294	. 89730	. 95546	. 90253	. 95792	. 90765	23
38	. 94770	. 88655	. 95038	. 89203	. 95298	. 89738	. 95550	. 90262	. 95796	. 90773	22
39	. 94774	. 88664	. 95042	. 89212	. 95302	. 89747	. 95555	. 90271	. 95800	. 90782	21
40	9. 94779	0. 88674	9. 95047	0. 89221	9. 95306	0. 89756	9. 95559	0. 90279	9. 95804	0. 90790	20
41	. 94784	. 88683	. 95051	. 89230	. 95311	. 89765	. 95563	. 90288	. 95808	. 90798	19
42	. 94788	. 88692	. 95055	. 89239	. 95315	. 89774	. 95567	. 90296	. 95812	. 90807	18
43	. 94793	. 88701	. 95060	. 89248	. 95319	. 89782	. 95571	. 90305	. 95816	. 90815	17
44	. 94797	. 88710	. 95064	. 89257	. 95323	. 89791	. 95575	. 90314	. 95820	. 90824	16
45	9. 94802	0. 88720	9. 95069	0. 89266	9. 95328	0. 89800	9. 95579	0. 90322	9. 95824	0. 90832	15
46	. 94806	. 88729	. 95073	. 89275	. 95332	. 89809	. 95584	. 90331	. 95828	. 90840	14
47	. 94811	. 88738	. 95077	. 89284	. 95336	. 89818	. 95588	. 90339	. 95832	. 90849	13
48	. 94815	. 88747	. 95082	. 89293	. 95340	. 89826	. 95592	. 90348	. 95836	. 90857	12
49	. 94820	. 88756	. 95086	. 89302	. 95345	. 89835	. 95596	. 90357	. 95840	. 90866	11
50	9. 94824	0. 88766	9. 95090	0. 89311	9. 95349	0. 89844	9. 95600	0. 90365	9. 95844	0. 90874	10
51	. 94829	. 88775	. 95095	. 89320	. 95353	. 89853	. 95604	. 90374	. 95848	. 90882	9
52	. 94833	. 88784	. 95099	. 89329	. 95357	. 89862	. 95608	. 90382	. 95852	. 90891	8
53	. 94838	. 88793	. 95104	. 89338	. 95362	. 89870	. 95613	. 90391	. 95856	. 90899	7
54	. 94842	. 88802	. 95108	. 89347	. 95366	. 89879	. 95617	. 90399	. 95860	. 90907	6
55	9. 94847	0. 88811	9. 95112	0. 89356	9. 95370	0. 89888	9. 95621	0. 90408	9. 95864	0. 90916	5
56	. 94851	. 88821	. 95117	. 89365	. 95374	. 89897	. 95625	. 90417	. 95868	. 90924	4
57	. 94856	. 88830	. 95121	. 89374	. 95379	. 89906	. 95629	. 90425	. 95872	. 90933	3
58	. 94860	. 88839	. 95125	. 89383	. 95383	. 89914	. 95633	. 90434	. 95876	. 90941	2
59	. 94865	. 88848	. 95130	. 89392	. 95387	. 89923	. 95637	. 90442	. 95880	. 90949	1
60	9. 94869	0. 88857	9. 95134	0. 89401	9. 95391	0. 89932	9. 95641	0. 90451	9. 95884	0. 90958	0
′	219°		218°		217°		216°		215°		′

(2)

Haversines

′	145°		146°		147°		148°		149°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 95884	0. 90958	9. 96119	0. 91452	9. 96347	0. 91934	9. 96568	0. 92402	9. 96782	0. 92858	60
1	. 95888	. 90966	. 96123	. 91460	. 96351	. 91941	. 96572	. 92410	. 96786	. 92866	59
2	. 95892	. 90974	. 96127	. 91468	. 96355	. 91949	. 96576	. 92418	. 96789	. 92873	58
3	. 95896	. 90983	. 96131	. 91476	. 96359	. 91957	. 96579	. 92426	. 96793	. 92881	57
4	. 95900	. 90991	. 96135	. 91484	. 96362	. 91965	. 96583	. 92433	. 96796	. 92888	56
5	9. 95904	0. 90999	9. 96139	0. 91493	9. 96366	0. 91973	9. 96586	0. 92441	9. 96800	0. 92896	55
6	. 95908	. 91008	. 96142	. 91501	. 96370	. 91981	. 96590	. 92449	. 96803	. 92903	54
7	. 95912	. 91016	. 96146	. 91509	. 96374	. 91989	. 96594	. 92456	. 96807	. 92911	53
8	. 95916	. 91024	. 96150	. 91517	. 96377	. 91997	. 96597	. 92464	. 96810	. 92918	52
9	. 95920	. 91033	. 96154	. 91525	. 96381	. 92005	. 96601	. 92472	. 96814	. 92926	51
10	9. 95924	0. 91041	9. 96158	0. 91533	9. 96385	0. 92013	9. 96604	0. 92479	9. 96817	0. 92933	50
11	. 95928	. 91049	. 96162	. 91541	. 96388	. 92020	. 96608	. 92487	. 96821	. 92941	49
12	. 95932	. 91057	. 96165	. 91549	. 96392	. 92028	. 96612	. 92495	. 96824	. 92948	48
13	. 95936	. 91066	. 96169	. 91557	. 96396	. 92036	. 96615	. 92502	. 96827	. 92955	47
14	. 95939	. 91074	. 96173	. 91565	. 96400	. 92044	. 96619	. 92510	. 96831	. 92963	46
15	9. 95943	0. 91082	9. 96177	0. 91573	9. 96403	0. 92052	9. 96622	0. 92518	9. 96834	0. 92970	45
16	. 95947	. 91091	. 96181	. 91582	. 96407	. 92060	. 96626	. 92525	. 96837	. 92978	44
17	. 95951	. 91099	. 96185	. 91590	. 96411	. 92068	. 96630	. 92533	. 96841	. 92985	43
18	. 95955	. 91107	. 96188	. 91598	. 96414	. 92076	. 96633	. 92541	. 96845	. 92993	42
19	. 95959	. 91115	. 96192	. 91606	. 96418	. 92083	. 96637	. 92548	. 96848	. 93000	41
20	9. 95963	0. 91124	9. 96196	0. 91614	9. 96422	0. 92091	9. 96640	0. 92556	9. 96852	0. 93007	40
21	. 95967	. 91132	. 96200	. 91622	. 96426	. 92099	. 96644	. 92563	. 96855	. 93015	39
22	. 95971	. 91140	. 96204	. 91630	. 96429	. 92107	. 96648	. 92571	. 96859	. 93022	38
23	. 95975	. 91149	. 96208	. 91638	. 96433	. 92115	. 96651	. 92579	. 96862	. 93030	37
24	. 95979	. 91157	. 96211	. 91646	. 96437	. 92123	. 96655	. 92586	. 96866	. 93037	36
25	9. 95983	0. 91165	9. 96215	0. 91654	9. 96440	0. 92130	9. 96658	0. 92594	9. 96869	0. 93045	35
26	. 95987	. 91173	. 96219	. 91662	. 96444	. 92138	. 96662	. 92602	. 96873	. 93052	34
27	. 95991	. 91182	. 96223	. 91670	. 96448	. 92146	. 96665	. 92609	. 96876	. 93059	33
28	. 95995	. 91190	. 96227	. 91678	. 96451	. 92154	. 96669	. 92617	. 96879	. 93067	32
29	. 95999	. 91198	. 96230	. 91686	. 96455	. 92162	. 96673	. 92624	. 96883	. 93074	31
30	9. 96002	0. 91206	9. 96234	0. 91694	9. 96459	0. 92170	9. 96676	0. 92632	9. 96886	0. 93081	30
31	. 96006	. 91215	. 96238	. 91702	. 96462	. 92177	. 96680	. 92640	. 96890	. 93089	29
32	. 96010	. 91223	. 96242	. 91710	. 96466	. 92185	. 96683	. 92647	. 96894	. 93096	28
33	. 96014	. 91231	. 96246	. 91718	. 96470	. 92193	. 96687	. 92655	. 96897	. 93104	27
34	. 96018	. 91239	. 96249	. 91726	. 96473	. 92201	. 96690	. 92662	. 96900	. 93111	26
35	9. 96022	0. 91247	9. 96253	0. 91734	9. 96477	0. 92209	9. 96694	0. 92670	9. 96904	0. 93118	25
36	. 96026	. 91256	. 96257	. 91742	. 96481	. 92216	. 96697	. 92678	. 96907	. 93126	24
37	. 96030	. 91264	. 96261	. 91750	. 96484	. 92224	. 96701	. 92685	. 96910	. 93133	23
38	. 96034	. 91272	. 96265	. 91758	. 96488	. 92232	. 96705	. 92693	. 96914	. 93140	22
39	. 96038	. 91280	. 96268	. 91766	. 96492	. 92240	. 96708	. 92700	. 96917	. 93148	21
40	9. 96042	0. 91289	9. 96272	0. 91774	9. 96495	0. 92248	9. 96712	0. 92708	9. 96921	0. 93155	20
41	. 96046	. 91297	. 96276	. 91782	. 96499	. 92255	. 96715	. 92715	. 96924	. 93162	19
42	. 96049	. 91305	. 96280	. 91790	. 96503	. 92263	. 96719	. 92723	. 96928	. 93170	18
43	. 96053	. 91313	. 96283	. 91798	. 96506	. 92271	. 96722	. 92730	. 96931	. 93177	17
44	. 96057	. 91321	. 96287	. 91806	. 96510	. 92279	. 96726	. 92738	. 96934	. 93184	16
45	9. 96061	0. 91329	9. 96291	0. 91814	9. 96514	0. 92286	9. 96729	0. 92746	9. 96938	0. 93192	15
46	. 96065	. 91338	. 96295	. 91822	. 96517	. 92294	. 96733	. 92753	. 96941	. 93199	14
47	. 96069	. 91346	. 96299	. 91830	. 96521	. 92302	. 96736	. 92761	. 96945	. 93206	13
48	. 96073	. 91354	. 96302	. 91838	. 96525	. 92310	. 96740	. 92768	. 96948	. 93214	12
49	. 96077	. 91362	. 96306	. 91846	. 96528	. 92317	. 96743	. 92776	. 96951	. 93221	11
50	9. 96081	0. 91370	9. 96310	0. 91854	9. 96532	0. 92325	9. 96747	0. 92783	9. 96955	0. 93228	10
51	. 96084	. 91379	. 96314	. 91862	. 96536	. 92333	. 96750	. 92791	. 96958	. 93236	9
52	. 96088	. 91387	. 96317	. 91870	. 96539	. 92341	. 96754	. 92798	. 96962	. 93243	8
53	. 96092	. 91395	. 96321	. 91878	. 96543	. 92348	. 96758	. 92806	. 96965	. 93250	7
54	. 96096	. 91403	. 96325	. 91886	. 96547	. 92356	. 96761	. 92813	. 96968	. 93258	6
55	9. 96100	0. 91411	9. 96329	0. 91894	9. 96550	0. 92361	9 96765	0. 92821	9. 96972	0. 93265	5
56	. 96104	. 91419	. 96332	. 91902	. 96554	. 92372	. 96768	. 92828	. 96975	. 93272	4
57	. 96108	. 91427	. 96336	. 91910	. 96557	. 92379	. 96772	. 92836	. 96979	. 93279	3
58	. 96112	. 91436	. 96340	. 91918	. 96561	. 92387	. 96775	. 92843	. 96982	. 93287	2
59	. 96115	. 91444	. 96344	. 91926	. 96565	. 92395	. 96779	. 92851	. 96985	. 93294	1
60	9. 96119	0. 91452	9. 96347	0. 91934	9. 96568	0. 92402	9. 96782	0. 92858	9. 96989	0. 93301	0
	214°		213°		212°		211°		210°		

Haversines

′	150°		151°		152°		153°		154°		
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 96989	0. 93301	9. 97188	0. 93731	9. 97381	0. 94147	9. 97566	0. 94550	9. 97745	0. 94940	60
1	. 96992	. 93309	. 97192	. 93738	. 97384	. 94154	. 97569	. 94557	. 97748	. 94946	59
2	. 96996	. 93316	. 97195	. 93745	. 97387	. 94161	. 97572	. 94564	. 97751	. 94952	58
3	. 96999	. 93323	. 97198	. 93752	. 97390	. 94168	. 97575	. 94570	. 97754	. 94959	57
4	. 97002	. 93330	. 97201	. 93759	. 97393	. 94175	. 97578	. 94577	. 97756	. 94965	56
5	9. 97006	0. 93338	9. 97205	0. 93766	9. 97397	0. 94181	9. 97581	0. 94583	9. 97759	0. 94972	55
6	. 97009	. 93345	. 97208	. 93773	. 97400	. 94188	. 97584	. 94590	. 97762	. 94978	54
7	. 97012	. 93352	. 97211	. 93780	. 97403	. 94195	. 97587	. 94596	. 97765	. 94984	53
8	. 97016	. 93359	. 97214	. 93787	. 97406	. 94202	. 97591	. 94603	. 97768	. 94991	52
9	. 97019	. 93367	. 97218	. 93794	. 97409	. 94209	. 97594	. 94610	. 97771	. 94997	51
10	9. 97022	0. 93374	9. 97221	0. 93801	9. 97412	0. 94215	9. 97597	0. 94616	9. 97774	0. 95003	50
11	. 97026	. 93381	. 97224	. 93808	. 97415	. 94222	. 97600	. 94623	. 97777	. 95010	49
12	. 97029	. 93388	. 97227	. 93815	. 97418	. 94229	. 97603	. 94629	. 97780	. 95016	48
13	. 97033	. 93395	. 97231	. 93822	. 97422	. 94236	. 97606	. 94636	. 97783	. 95022	47
14	. 97036	. 93403	. 97234	. 93829	. 97425	. 94243	. 97609	. 94642	. 97785	. 95029	46
15	9. 97039	0. 93410	9. 97237	0. 93836	9. 97428	0. 94249	9. 97612	0. 94649	9. 97788	0. 95035	45
16	. 97043	. 93417	. 97240	. 93843	. 97431	. 94256	. 97615	. 94655	. 97791	. 95041	44
17	. 97046	. 93424	. 97244	. 93850	. 97434	. 94263	. 97618	. 94662	. 97794	. 95048	43
18	. 97049	. 93432	. 97247	. 93857	. 97437	. 94270	. 97621	. 94669	. 97797	. 95054	42
19	. 97052	. 93439	. 97250	. 93864	. 97440	. 94276	. 97624	. 94675	. 97800	. 95060	41
20	9. 97056	0. 93446	9. 97253	0. 93871	9. 97443	0. 94283	9. 97627	0. 94682	9. 97803	0. 95066	40
21	. 97059	. 93453	. 97257	. 93878	. 97447	. 94290	. 97630	. 94688	. 97806	. 95073	39
22	. 97063	. 93460	. 97260	. 93885	. 97450	. 94297	. 97633	. 94695	. 97808	. 95079	38
23	. 97066	. 93468	. 97263	. 93892	. 97453	. 94303	. 97636	. 94701	. 97811	. 95085	37
24	. 97069	. 93475	. 97266	. 93899	. 97456	. 94310	. 97639	. 94708	. 97814	. 95092	36
25	9. 97073	0. 93482	9. 97269	0. 93906	9. 97459	0. 94317	9. 97642	0. 94714	9. 97817	0. 95098	35
26	. 97076	. 93489	. 97273	. 93913	. 97462	. 94324	. 97645	. 94721	. 97820	. 95104	34
27	. 97079	. 93496	. 97276	. 93920	. 97465	. 94330	. 97647	. 94727	. 97823	. 95110	33
28	. 97083	. 93503	. 97279	. 93927	. 97468	. 94337	. 97650	. 94734	. 97826	. 95117	32
29	. 97086	. 93511	. 97282	. 93934	. 97471	. 94344	. 97653	. 94740	. 97829	. 95123	31
30	9. 97089	0. 93518	9. 97285	0. 93941	9. 97474	0. 94351	9. 97656	0. 94747	9. 97831	0. 95129	30
31	. 97093	. 93525	. 97289	. 93948	. 97478	. 94357	. 97659	. 94753	. 97834	. 95136	29
32	. 97096	. 93532	. 97292	. 93955	. 97481	. 94364	. 97662	. 94760	. 97837	. 95142	28
33	. 97099	. 93539	. 97295	. 93962	. 97484	. 94371	. 97665	. 94766	. 97840	. 95148	27
34	. 97103	. 93546	. 97298	. 93969	. 97487	. 94377	. 97668	. 94773	. 97843	. 95154	26
35	9. 97106	0. 93554	9. 97301	0. 93976	9. 97490	0. 94384	9. 97671	0. 94779	9. 97846	0. 95161	25
36	. 97109	. 93561	. 97305	. 93982	. 97493	. 94391	. 97674	. 94786	. 97849	. 95167	24
37	. 97113	. 93568	. 97308	. 93989	. 97496	. 94397	. 97677	. 94792	. 97851	. 95173	23
38	. 97116	. 93575	. 97311	. 93996	. 97499	. 94404	. 97680	. 94799	. 97854	. 95179	22
39	. 97119	. 93582	. 97314	. 94003	. 97502	. 94411	. 97683	. 94805	. 97857	. 95185	21
40	9. 97123	0. 93589	9. 97317	0. 94010	9. 97505	0. 94418	9. 97686	0. 94811	9. 97860	0. 95192	20
41	. 97126	. 93596	. 97321	. 94017	. 97508	. 94424	. 97689	. 94818	. 97863	. 95198	19
42	. 97129	. 93603	. 97324	. 94024	. 97511	. 94431	. 97692	. 94824	. 97866	. 95204	18
43	. 97132	. 93611	. 97327	. 94031	. 97514	. 94438	. 97695	. 94831	. 97868	. 95210	17
44	. 97136	. 93618	. 97330	. 94038	. 97518	. 94444	. 97698	. 94837	. 97871	. 95217	16
45	9. 97139	0. 93625	9. 97333	0. 94045	9. 97521	0. 94451	9. 97701	0. 94844	9. 97874	0. 95223	15
46	. 97142	. 93632	. 97337	. 94051	. 97524	. 94458	. 97704	. 94850	. 97877	. 95229	14
47	. 97146	. 93639	. 97340	. 94058	. 97527	. 94464	. 97707	. 94856	. 97880	. 95235	13
48	. 97149	. 93646	. 97343	. 94065	. 97530	. 94471	. 97710	. 94863	. 97883	. 95241	12
49	. 97152	. 93653	. 97346	. 94072	. 97533	. 94477	. 97713	. 94869	. 97885	. 95248	11
50	9. 97156	0. 93660	9. 97349	0. 94079	9. 97536	0. 94484	9. 97716	0. 94876	9. 97888	0. 95254	10
51	. 97159	. 93667	. 97352	. 94086	. 97539	. 94491	. 97718	. 94882	. 97891	. 95260	9
52	. 97162	. 93674	. 97356	. 94093	. 97542	. 94497	. 97721	. 94889	. 97894	. 95266	8
53	. 97165	. 93682	. 97359	. 94099	. 97545	. 94504	. 97724	. 94895	. 97897	. 95272	7
54	. 97169	. 93689	. 97362	. 94106	. 97548	. 94511	. 97727	. 94901	. 97899	. 95278	6
55	9. 97172	0. 93696	9. 97365	0. 94113	9. 97551	0. 94517	9. 97730	0. 94908	9. 97902	0. 95285	5
56	. 97175	. 93703	. 97368	. 94120	. 97554	. 94524	. 97733	. 94914	. 97905	. 95291	4
57	. 97179	. 93710	. 97371	. 94127	. 97557	. 94531	. 97736	. 94921	. 97908	. 95297	3
58	. 97182	. 93717	. 97375	. 94134	. 97560	. 94537	. 97739	. 94927	. 97911	. 95303	2
59	. 97185	. 93724	. 97378	. 94141	. 97563	. 94544	. 97742	. 94933	. 97914	. 95309	1
60	9. 97188	0. 93731	9. 97381	0. 94147	9. 97566	0. 94550	9. 97745	0. 94940	9. 97916	0. 95315	0
	209°		208°		207°		206°		205°		

Haversines

′	155° Log Hav	155° Nat. Hav	156° Log Hav	156° Nat. Hav	157° Log Hav	157° Nat. Hav	158° Log Hav	158° Nat. Hav	159° Log Hav	159° Nat. Hav	′
0	9. 97916	0. 95315	9. 98081	0. 95677	9. 98239	0. 96025	9. 98389	0. 96359	9. 98533	0. 96679	60
1	. 97919	. 95322	. 98084	. 95683	. 98241	. 96031	. 98392	. 96365	. 98536	. 96684	59
2	. 97922	. 95328	. 98086	. 95689	. 98244	. 96037	. 98394	. 96370	. 98538	. 96689	58
3	. 97925	. 95334	. 98089	. 95695	. 98246	. 96042	. 98397	. 96376	. 98540	. 96695	57
4	. 97927	. 95340	. 98092	. 95701	. 98249	. 96048	. 98399	. 96381	. 98543	. 96700	56
5	9. 97930	0. 95346	9. 98094	0. 95707	9. 98251	0. 96054	9. 98402	0. 96386	9. 98545	0. 96705	55
6	. 97933	. 95352	. 98097	. 95713	. 98254	. 96059	. 98404	. 96392	. 98547	. 96710	54
7	. 97936	. 95358	. 98100	. 95719	. 98256	. 96065	. 98406	. 96397	. 98550	. 96715	53
8	. 97939	. 95364	. 98102	. 95724	. 98259	. 96071	. 98409	. 96403	. 98552	. 96721	52
9	. 97941	. 95371	. 98105	. 95730	. 98262	. 96076	. 98411	. 96408	. 98554	. 96726	51
10	9. 97944	0. 95377	9. 98108	0. 95736	9. 98264	0. 96082	9. 98414	0. 96413	9. 98557	0. 96731	50
11	. 97947	. 95383	. 98110	. 95742	. 98267	. 96088	. 98416	. 96419	. 98559	. 96736	49
12	. 97950	. 95389	. 98113	. 95748	. 98269	. 96093	. 98419	. 96424	. 98561	. 96741	48
13	. 97953	. 95395	. 98116	. 95754	. 98272	. 96099	. 98421	. 96430	. 98564	. 96746	47
14	. 97955	. 95401	. 98118	. 95760	. 98274	. 96104	. 98424	. 96435	. 98566	. 96752	46
15	9. 97958	0. 95407	9. 98121	0. 95766	9. 98277	0. 96110	9. 98426	0. 96440	9. 98568	0. 96757	45
16	. 97961	. 95413	. 98124	. 95771	. 98279	. 96116	. 98428	. 96446	. 98570	. 96762	44
17	. 97964	. 95419	. 98126	. 95777	. 98282	. 96121	. 98431	. 96451	. 98573	. 96767	43
18	. 97966	. 95425	. 98129	. 95783	. 98285	. 96127	. 98433	. 96457	. 98575	. 96772	42
19	. 97969	. 95431	. 98132	. 95789	. 98287	. 96133	. 98436	. 96462	. 98577	. 96777	41
20	9. 97972	0. 95438	9. 98134	0. 95795	9. 98290	0. 96138	9. 98438	0. 96467	9. 98580	0. 96782	40
21	. 97975	. 95444	. 98137	. 95801	. 98292	. 96144	. 98440	. 96473	. 98582	. 96788	39
22	. 97977	. 95450	. 98139	. 95806	. 98295	. 96149	. 98443	. 96478	. 98584	. 96793	38
23	. 97980	. 95456	. 98142	. 95812	. 98297	. 96155	. 98445	. 96483	. 98587	. 96798	37
24	. 97983	. 95462	. 98145	. 95818	. 98300	. 96161	. 98448	. 96489	. 98589	. 96803	36
25	9. 97986	0. 95468	9. 98147	0. 95824	9. 98302	0. 96166	9. 98450	0. 96494	9. 98591	0. 96808	35
26	. 97988	. 95474	. 98150	. 95830	. 98305	. 96172	. 98453	. 96500	. 98593	. 96813	34
27	. 97991	. 95480	. 98153	. 95836	. 98307	. 96177	. 98455	. 96505	. 98596	. 96818	33
28	. 97994	. 95486	. 98155	. 95841	. 98310	. 96183	. 98457	. 96510	. 98598	. 96823	32
29	. 97997	. 95492	. 98158	. 95847	. 98312	. 96188	. 98460	. 96516	. 98600	. 96829	31
30	9. 97999	0. 95498	9. 98161	0. 95853	9. 98315	0. 96194	9. 98462	0. 96521	9. 98603	0. 96834	30
31	. 98002	. 95504	. 98163	. 95859	. 98317	. 96200	. 98465	. 96526	. 98605	. 96839	29
32	. 98005	. 95510	. 98166	. 95865	. 98320	. 96205	. 98467	. 96532	. 98607	. 96844	28
33	. 98008	. 95516	. 98168	. 95870	. 98322	. 96211	. 98469	. 96537	. 98609	. 96849	27
34	. 98010	. 95522	. 98171	. 95876	. 98325	. 96216	. 98472	. 96542	. 98612	. 96854	26
35	9. 98013	0. 95528	9. 98174	0. 95882	9. 98327	0. 96222	9. 98474	0. 96547	9. 98614	0. 96859	25
36	. 98016	. 95534	. 98176	. 95888	. 98330	. 96227	. 98476	. 96553	. 98616	. 96864	24
37	. 98019	. 95540	. 98179	. 95894	. 98332	. 96233	. 98479	. 96558	. 98619	. 96869	23
38	. 98021	. 95546	. 98182	. 95899	. 98335	. 96238	. 98481	. 96563	. 98621	. 96874	22
39	. 98024	. 95552	. 98184	. 95905	. 98337	. 96244	. 98484	. 96569	. 98623	. 96879	21
40	9. 98027	0. 95558	9. 98187	0. 95911	9. 98340	0. 96249	9. 98486	0. 96574	9. 98625	0. 96884	20
41	. 98030	. 95564	. 98189	. 95917	. 98342	. 96255	. 98488	. 96579	. 98628	. 96889	19
42	. 98032	. 95570	. 98192	. 95922	. 98345	. 96260	. 98491	. 96585	. 98630	. 96894	18
43	. 98035	. 95576	. 98195	. 95928	. 98347	. 96266	. 98493	. 96590	. 98632	. 96899	17
44	. 98038	. 95582	. 98197	. 95934	. 98350	. 96272	. 98496	. 96595	. 98634	. 96905	16
45	9. 98040	0. 95588	9. 98200	0. 95940	9. 98352	0. 96277	9. 98498	0. 96600	9. 98637	0. 96910	15
46	. 98043	. 95594	. 98202	. 95945	. 98355	. 96283	. 98500	. 96606	. 98639	. 96915	14
47	. 98046	. 95600	. 98205	. 95951	. 98357	. 96288	. 98503	. 96611	. 98641	. 96920	13
48	. 98049	. 95606	. 98208	. 95957	. 98360	. 96294	. 98505	. 96616	. 98643	. 96925	12
49	. 98051	. 95612	. 98210	. 95962	. 98362	. 96299	. 98507	. 96621	. 98646	. 96930	11
50	9. 98054	0. 95618	9. 98213	0. 95968	9. 98365	0. 96305	9. 98510	0. 96627	9. 98648	0. 96935	10
51	. 98057	. 95624	. 98215	. 95974	. 98367	. 96310	. 98512	. 96632	. 98650	. 96940	9
52	. 98059	. 95630	. 98218	. 95980	. 98370	. 96315	. 98514	. 96637	. 98652	. 96945	8
53	. 98062	. 95636	. 98221	. 95985	. 98372	. 96321	. 98517	. 96642	. 98655	. 96950	7
54	. 98065	. 95642	. 98223	. 95991	. 98375	. 96326	. 98519	. 96648	. 98657	. 96955	6
55	9. 98067	0. 95648	9. 98226	0. 95997	9. 98377	0. 96332	9. 98521	0. 96653	9. 98659	0. 96960	5
56	. 98070	. 95654	. 98228	. 96002	. 98379	. 96337	. 98524	. 96658	. 98661	. 96965	4
57	. 98073	. 95660	. 98231	. 96008	. 98382	. 96343	. 98526	. 96663	. 98664	. 96970	3
58	. 98076	. 95665	. 98233	. 96014	. 98384	. 96348	. 98529	. 96669	. 98666	. 96975	2
59	. 98078	. 95671	. 98236	. 96020	. 98387	. 96354	. 98531	. 96674	. 98668	. 96980	1
60	9. 98081	0. 95677	9. 98239	0. 96025	9. 98389	0. 96359	9. 98533	0. 96679	9. 98670	0. 96985	0
	204°		203°		202°		201°		200°		

Haversines

′	160°		161°		162°		163°		164°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 98670	0. 96985	9. 98801	0. 97276	9. 98924	0. 97553	9. 99041	0. 97815	9. 99151	0. 98063	60
1	. 98673	. 96990	. 98803	. 97281	. 98926	. 97557	. 99043	. 97819	. 99152	. 98067	59
2	. 98675	. 96995	. 98805	. 97285	. 98928	. 97562	. 99044	. 97824	. 99154	. 98071	58
3	. 98677	. 97000	. 98807	. 97290	. 98930	. 97566	. 99046	. 97828	. 99156	. 98075	57
4	. 98679	. 97004	. 98809	. 97295	. 98932	. 97571	. 99048	. 97832	. 99158	. 98079	56
5	9. 98681	0. 97009	9. 98811	0. 97300	9. 98934	0. 97575	9. 99050	0. 97836	9. 99159	0. 98083	55
6	. 98684	. 97014	. 98813	. 97304	. 98936	. 97580	. 99052	. 97841	. 99161	. 98087	54
7	. 98686	. 97019	. 98815	. 97309	. 98938	. 97584	. 99054	. 97845	. 99163	. 98091	53
8	. 98688	. 97024	. 98817	. 97314	. 98940	. 97589	. 99056	. 97849	. 99165	. 98095	52
9	. 98690	. 97029	. 98819	. 97318	. 98942	. 97593	. 99058	. 97853	. 99166	. 98099	51
10	9. 98692	0. 97034	9. 98822	0. 97323	9. 98944	0. 97598	9. 99059	0. 97858	9. 99168	0. 98103	50
11	. 98695	. 97039	. 98824	. 97328	. 98946	. 97602	. 99061	. 97862	. 99170	. 98107	49
12	. 98697	. 97044	. 98826	. 97332	. 98948	. 97606	. 99063	. 97866	. 99172	. 98111	48
13	. 98699	. 97049	. 98828	. 97337	. 98950	. 97611	. 99065	. 97870	. 99173	. 98115	47
14	. 98701	. 97054	. 98830	. 97342	. 98952	. 97615	. 99067	. 97874	. 99175	. 98119	46
15	9. 98703	0. 97059	9. 98832	0. 97347	9. 98954	0. 97620	9. 99069	0. 97879	9. 99177	0. 98123	45
16	. 98706	. 97064	. 98834	. 97351	. 98956	. 97624	. 99071	. 97883	. 99179	. 98127	44
17	. 98708	. 97069	. 98836	. 97356	. 98958	. 97629	. 99072	. 97887	. 99180	. 98131	43
18	. 98710	. 97074	. 98838	. 97361	. 98960	. 97633	. 99074	. 97891	. 99182	. 98135	42
19	. 98712	. 97078	. 98840	. 97365	. 98962	. 97637	. 99076	. 97895	. 99184	. 98139	41
20	9. 98714	0. 97083	9. 98842	0. 97370	9. 98964	0. 97642	9. 99078	0. 97899	9. 99186	0. 98142	40
21	. 98717	. 97088	. 98845	. 97374	. 98966	. 97646	. 99080	. 97904	. 99187	. 98146	39
22	. 98719	. 97093	. 98847	. 97379	. 98968	. 97651	. 99082	. 97908	. 99189	. 98150	38
23	. 98721	. 97098	. 98849	. 97384	. 98970	. 97655	. 99084	. 97912	. 99191	. 98154	37
24	. 98723	. 97103	. 98851	. 97388	. 98971	. 97660	. 99085	. 97916	. 99193	. 98158	36
25	9. 98725	0. 97108	9. 98853	0. 97393	9. 98973	0. 97664	9. 99087	0. 97920	9. 99194	0. 98162	35
26	. 98728	. 97113	. 98855	. 97398	. 98975	. 97668	. 99089	. 97924	. 99196	. 98166	34
27	. 98730	. 97117	. 98857	. 97402	. 98977	. 97673	. 99091	. 97929	. 99198	. 98170	33
28	. 98732	. 97122	. 98859	. 97407	. 98979	. 97677	. 99093	. 97933	. 99200	. 98174	32
29	. 98734	. 97127	. 98861	. 97412	. 98981	. 97681	. 99095	. 97937	. 99201	. 98178	31
30	9. 98736	0. 97132	9. 98863	0. 97416	9. 98983	0. 97686	9. 99096	0. 97941	9. 99203	0. 98182	30
31	. 98738	. 97137	. 98865	. 97421	. 98985	. 97690	. 99098	. 97945	. 99205	. 98185	29
32	. 98741	. 97142	. 98867	. 97425	. 98987	. 97695	. 99100	. 97949	. 99206	. 98189	28
33	. 98743	. 97147	. 98869	. 97430	. 98989	. 97699	. 99102	. 97953	. 99208	. 98193	27
34	. 98745	. 97151	. 98871	. 97435	. 98991	. 97703	. 99104	. 97957	. 99210	. 98197	26
35	9. 98747	0. 97156	9. 98873	0. 97439	9. 98993	0. 97708	9. 99106	0. 97962	9. 99212	0. 98201	25
36	. 98749	. 97161	. 98875	. 97444	. 98995	. 97712	. 99107	. 97966	. 99213	. 98205	24
37	. 98751	. 97166	. 98877	. 97448	. 98997	. 97716	. 99109	. 97970	. 99215	. 98209	23
38	. 98754	. 97171	. 98880	. 97453	. 98999	. 97721	. 99111	. 97974	. 99217	. 98212	22
39	. 98756	. 97176	. 98882	. 97458	. 99001	. 97725	. 99113	. 97978	. 99218	. 98216	21
40	9. 98758	0. 97180	9. 98884	0. 97462	9. 99003	0. 97729	9. 99115	0. 97982	9. 99220	0. 98220	20
41	. 98760	. 97185	. 98886	. 97467	. 99004	. 97734	. 99116	. 97986	. 99222	. 98224	19
42	. 98762	. 97190	. 98888	. 97471	. 99006	. 97738	. 99118	. 97990	. 99223	. 98228	18
43	. 98764	. 97195	. 98890	. 97476	. 99008	. 97742	. 99120	. 97994	. 99225	. 98232	17
44	. 98766	. 97200	. 98892	. 97480	. 99010	. 97747	. 99122	. 97998	. 99227	. 98236	16
45	9. 98769	0. 97204	9. 98894	0. 97485	9. 99012	0. 97751	9. 99124	0. 98002	9. 99229	0. 98239	15
46	. 98771	. 97209	. 98896	. 97490	. 99014	. 97755	. 99126	. 98007	. 99230	. 98243	14
47	. 98773	. 97214	. 98898	. 97494	. 99016	. 97760	. 99127	. 98011	. 99232	. 98247	13
48	. 98775	. 97219	. 98900	. 97499	. 99018	. 97764	. 99129	. 98015	. 99234	. 98251	12
49	. 98777	. 97224	. 98902	. 97503	. 99020	. 97768	. 99131	. 98019	. 99235	. 98255	11
50	9. 98779	0. 97228	9. 98904	0. 97508	9. 99022	0. 97773	9. 99133	0. 98023	9. 99237	0. 98258	10
51	. 98781	. 97233	. 98906	. 97512	. 99024	. 97777	. 99135	. 98027	. 99239	. 98262	9
52	. 98784	. 97238	. 98908	. 97517	. 99026	. 97781	. 99136	. 98031	. 99240	. 98266	8
53	. 98786	. 97243	. 98910	. 97521	. 99027	. 97785	. 99138	. 98035	. 99242	. 98270	7
54	. 98788	. 97247	. 98912	. 97526	. 99029	. 97790	. 99140	. 98039	. 99244	. 98274	6
55	9. 98790	0. 97252	9. 98914	0. 97530	9. 99031	0. 97794	9. 99142	0. 98043	9. 99245	0. 98277	5
56	. 98792	. 97257	. 98916	. 97535	. 99033	. 97798	. 99143	. 98047	. 99247	. 98281	4
57	. 98794	. 97262	. 98918	. 97539	. 99035	. 97802	. 99145	. 98051	. 99249	. 98285	3
58	. 98796	. 97266	. 98920	. 97544	. 99037	. 97807	. 99147	. 98055	. 99250	. 98289	2
59	. 98798	. 97271	. 98922	. 97548	. 99039	. 97811	. 99149	. 98059	. 99252	. 98293	1
60	9. 98801	0. 97276	9. 98924	0. 97553	9. 99041	0. 97815	9. 99151	0. 98063	9. 99254	0. 98296	0
	199°		198°		197°		196°		195°		

(2)

Haversines

′	165°		166°		167°		168°		169°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 99254	0. 98296	9. 99350	0. 98515	9. 99440	0. 98719	9. 99523	0. 98907	9. 99599	0. 99081	60
1	. 99255	. 98300	. 99352	. 98518	. 99441	. 98722	. 99524	. 98910	. 99600	. 99084	59
2	. 99257	. 98304	. 99353	. 98522	. 99443	. 98725	. 99526	. 98913	. 99602	. 99087	58
3	. 99259	. 98308	. 99355	. 98525	. 99444	. 98728	. 99527	. 98916	. 99603	. 99090	57
4	. 99260	. 98311	. 99356	. 98529	. 99446	. 98732	. 99528	. 98919	. 99604	. 99092	56
5	9. 99262	0. 98315	9. 99358	0. 98532	9. 99447	0. 98735	9. 99529	0. 98922	9. 99605	0. 99095	55
6	. 99264	. 98319	. 99359	. 98536	. 99448	. 98738	. 99531	. 98925	. 99606	. 99098	54
7	. 99265	. 98323	. 99361	. 98539	. 99450	. 98741	. 99532	. 98928	. 99608	. 99101	53
8	. 99267	. 98326	. 99362	. 98543	. 99451	. 98745	. 99533	. 98931	. 99609	. 99103	52
9	. 99269	. 98330	. 99364	. 98546	. 99453	. 98748	. 99535	. 98934	. 99610	. 99106	51
10	9. 99270	0. 98334	9. 99366	0. 98550	9. 99454	0. 98751	9. 99536	0. 98937	9. 99611	0. 99109	50
11	. 99272	. 98337	. 99367	. 98553	. 99456	. 98754	. 99537	. 98940	. 99612	. 99112	49
12	. 99274	. 98341	. 99369	. 98557	. 99457	. 98757	. 99539	. 98943	. 99614	. 99114	48
13	. 99275	. 98345	. 99370	. 98560	. 99458	. 98761	. 99540	. 98946	. 99615	. 99117	47
14	. 99277	. 98349	. 99372	. 98564	. 99460	. 98764	. 99541	. 98949	. 99616	. 99120	46
15	9. 99278	0. 98352	9. 99373	0. 98567	9. 99461	0. 98767	9. 99543	0. 98952	9. 99617	0. 99123	45
16	. 99280	. 98356	. 99375	. 98571	. 99463	. 98770	. 99544	. 98955	. 99618	. 99125	44
17	. 99282	. 98360	. 99376	. 98574	. 99464	. 98774	. 99545	. 98958	. 99620	. 99128	43
18	. 99283	. 98363	. 99378	. 98577	. 99465	. 98777	. 99546	. 98961	. 99621	. 99131	42
19	. 99285	. 98367	. 99379	. 98581	. 99467	. 98780	. 99548	. 98964	. 99622	. 99133	41
20	9. 99287	0. 98371	9. 99381	0. 98584	9. 99468	0. 98783	9. 99549	0. 98967	9. 99623	0. 99136	40
21	. 99288	. 98374	. 99382	. 98588	. 99470	. 98786	. 99550	. 98970	. 99624	. 99139	39
22	. 99290	. 98378	. 99384	. 98591	. 99471	. 98789	. 99552	. 98973	. 99626	. 99141	38
23	. 99291	. 98382	. 99385	. 98595	. 99472	. 98793	. 99553	. 98976	. 99627	. 99144	37
24	. 99293	. 98385	. 99387	. 98598	. 99474	. 98796	. 99554	. 98979	. 99628	. 99147	36
25	9. 99295	0. 98389	9. 99388	0. 98601	9. 99475	0. 98799	9. 99555	0. 98982	9. 99629	0. 99149	35
26	. 99296	. 98393	. 99390	. 98605	. 99477	. 98802	. 99557	. 98985	. 99630	. 99152	34
27	. 99298	. 98396	. 99391	. 98608	. 99478	. 98805	. 99558	. 98988	. 99631	. 99155	33
28	. 99300	. 98400	. 99393	. 98612	. 99479	. 98808	. 99559	. 98990	. 99633	. 99157	32
29	. 99301	. 98404	. 99394	. 98615	. 99481	. 98812	. 99561	. 98993	. 99634	. 99160	31
30	9. 99303	0. 98407	9. 99396	0. 98618	9. 99482	0. 98815	9. 99562	0. 98996	9. 99635	0. 99163	30
31	. 99304	. 98411	. 99397	. 98622	. 99484	. 98818	. 99563	. 98999	. 99636	. 99165	29
32	. 99306	. 98415	. 99399	. 98625	. 99485	. 98821	. 99564	. 99002	. 99637	. 99168	28
33	. 99308	. 98418	. 99400	. 98629	. 99486	. 98824	. 99566	. 99005	. 99638	. 99171	27
34	. 99309	. 98422	. 99402	. 98632	. 99488	. 98827	. 99567	. 99008	. 99639	. 99173	26
35	9. 99311	0. 98426	9. 99403	0. 98635	9. 99489	0. 98830	9. 99568	0. 99011	9. 99641	0. 99176	25
36	. 99312	. 98429	. 99405	. 98639	. 99490	. 98834	. 99569	. 99014	. 99642	. 99179	24
37	. 99314	. 98433	. 99406	. 98642	. 99492	. 98837	. 99571	. 99016	. 99643	. 99181	23
38	. 99316	. 98436	. 99408	. 98646	. 99493	. 98840	. 99572	. 99019	. 99644	. 99184	22
39	. 99317	. 98440	. 99409	. 98649	. 99495	. 98843	. 99573	. 99022	. 99645	. 99186	21
40	9. 99319	0. 98444	9. 99411	0. 98652	9. 99496	0. 98846	9. 99575	0. 99025	9. 99646	0. 99189	20
41	. 99320	. 98447	. 99412	. 98656	. 99497	. 98849	. 99576	. 99028	. 99648	. 99192	19
42	. 99322	. 98451	. 99414	. 98659	. 99499	. 98852	. 99577	. 99031	. 99649	. 99194	18
43	. 99324	. 98454	. 99415	. 98662	. 99500	. 98855	. 99578	. 99034	. 99650	. 99197	17
44	. 99325	. 98458	. 99417	. 98666	. 99501	. 98858	. 99580	. 99036	. 99651	. 99199	16
45	9. 99327	0. 98462	9. 99418	0. 98669	9. 99503	0. 98862	9. 99581	0. 99039	9. 99652	0. 99202	15
46	. 99328	. 98465	. 99420	. 98672	. 99504	. 98865	. 99582	. 99042	. 99653	. 99205	14
47	. 99330	. 98469	. 99421	. 98676	. 99505	. 98868	. 99583	. 99045	. 99654	. 99207	13
48	. 99331	. 98472	. 99422	. 98679	. 99507	. 98871	. 99584	. 99048	. 99655	. 99210	12
49	. 99333	. 98476	. 99424	. 98682	. 99508	. 98874	. 99586	. 99051	. 99657	. 99212	11
50	9. 99335	0. 98479	9. 99425	0. 98686	9. 99510	0. 98877	9. 99587	0. 99053	9. 99658	0. 99215	10
51	. 99336	. 98483	. 99427	. 98689	. 99511	. 98880	. 99588	. 99056	. 99659	. 99217	9
52	. 99338	. 98487	. 99429	. 98692	. 99512	. 98883	. 99589	. 99059	. 99660	. 99220	8
53	. 99339	. 98490	. 99430	. 98695	. 99514	. 98886	. 99591	. 99062	. 99661	. 99223	7
54	. 99341	. 98494	. 99431	. 98699	. 99515	. 98889	. 99592	. 99065	. 99662	. 99225	6
55	9. 99342	0. 98497	9. 99433	0. 98702	9. 99516	0. 98892	9. 99593	0. 99067	9. 99663	0. 99228	5
56	. 99344	. 98501	. 99434	. 98705	. 99518	. 98895	. 99594	. 99070	. 99664	. 99230	4
57	. 99345	. 98504	. 99436	. 98709	. 99519	. 98898	. 99596	. 99073	. 99666	. 99233	3
58	. 99347	. 98508	. 99437	. 98712	. 99520	. 98901	. 99597	. 99076	. 99667	. 99235	2
59	. 99349	. 98511	. 99438	. 98715	. 99522	. 98904	. 99598	. 99079	. 99668	. 99238	1
60	9. 99350	0. 98515	9. 99440	0. 98719	9. 99523	0. 98907	9. 99599	0. 99081	9. 99669	0. 99240	0
	194°		193°		192°		191°		190°		

Haversines

′	170°		171°		172°		173°		174°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 99669	0. 99240	9. 99732	0. 99384	9. 99788	0. 99513	9. 99838	0. 99627	9. 99881	0. 99726	60
1	. 99670	. 99243	. 99733	. 99387	. 99789	. 99515	. 99839	. 99629	. 99882	. 99728	59
2	. 99671	. 99245	. 99734	. 99389	. 99790	. 99517	. 99839	. 99631	. 99882	. 99729	58
3	. 99672	. 99248	. 99735	. 99391	. 99791	. 99519	. 99840	. 99633	. 99883	. 99731	57
4	. 99673	. 99250	. 99736	. 99393	. 99792	. 99521	. 99841	. 99634	. 99884	. 99732	56
5	9. 99674	0. 99253	9. 99737	0. 99396	9. 99793	0. 99523	9. 99842	0. 99636	9. 99884	0. 99734	55
6	. 99675	. 99255	. 99738	. 99398	. 99793	. 99525	. 99842	. 99638	. 99885	. 99735	54
7	. 99677	. 99258	. 99739	. 99400	. 99794	. 99527	. 99843	. 99640	. 99885	. 99737	53
8	. 99678	. 99260	. 99740	. 99402	. 99795	. 99529	. 99844	. 99641	. 99886	. 99738	52
9	. 99679	. 99263	. 99741	. 99405	. 99796	. 99531	. 99845	. 99643	. 99887	. 99740	51
10	9. 99680	0. 99265	9. 99742	0. 99407	9. 99797	0. 99533	9. 99845	0. 99645	9. 99887	0. 99741	50
11	. 99681	. 99268	. 99743	. 99409	. 99798	. 99535	. 99846	. 99647	. 99888	. 99743	49
12	. 99682	. 99270	. 99744	. 99411	. 99799	. 99537	. 99847	. 99648	. 99889	. 99744	48
13	. 99683	. 99273	. 99745	. 99414	. 99800	. 99539	. 99848	. 99650	. 99889	. 99746	47
14	. 99684	. 99275	. 99746	. 99416	. 99800	. 99541	. 99848	. 99652	. 99890	. 99747	46
15	9. 99685	0. 99278	9. 99747	0. 99418	9. 99801	0. 99543	9. 99849	0. 99653	9. 99891	0. 99748	45
16	. 99686	. 99280	. 99748	. 99420	. 99802	. 99545	. 99850	. 99655	. 99891	. 99750	44
17	. 99687	. 99283	. 99748	. 99422	. 99803	. 99547	. 99851	. 99657	. 99892	. 99751	43
18	. 99688	. 99285	. 99749	. 99425	. 99804	. 99549	. 99851	. 99659	. 99893	. 99753	42
19	. 99690	. 99288	. 99750	. 99427	. 99805	. 99551	. 99852	. 99660	. 99893	. 99754	41
20	9. 99691	0. 99290	9. 99751	0. 99429	9. 99805	0. 99553	9. 99853	0. 99662	9. 99894	0. 99756	40
21	. 99692	. 99293	. 99752	. 99431	. 99806	. 99555	. 99854	. 99664	. 99894	. 99757	39
22	. 99693	. 99295	. 99753	. 99433	. 99807	. 99557	. 99854	. 99665	. 99895	. 99759	38
23	. 99694	. 99297	. 99754	. 99436	. 99808	. 99559	. 99855	. 99667	. 99896	. 99760	37
24	. 99695	. 99300	. 99755	. 99438	. 99809	. 99561	. 99856	. 99669	. 99896	. 99761	36
25	9. 99696	0. 99302	9. 99756	0. 99440	9. 99810	0. 99563	9. 99857	0. 99670	9. 99897	0. 99763	35
26	. 99697	. 99305	. 99757	. 99442	. 99811	. 99565	. 99857	. 99672	. 99897	. 99764	34
27	. 99698	. 99307	. 99758	. 99444	. 99811	. 99567	. 99858	. 99674	. 99898	. 99766	33
28	. 99699	. 99309	. 99759	. 99446	. 99812	. 99568	. 99859	. 99675	. 99899	. 99767	32
29	. 99700	. 99312	. 99760	. 99449	. 99813	. 99570	. 99859	. 99677	. 99899	. 99768	31
30	9. 99701	0. 99314	9. 99761	0. 99451	9. 99814	0. 99572	9. 99860	0. 99679	9. 99900	0. 99770	30
31	. 99702	. 99317	. 99762	. 99453	. 99815	. 99574	. 99861	. 99680	. 99901	. 99771	29
32	. 99703	. 99319	. 99763	. 99455	. 99815	. 99576	. 99862	. 99682	. 99901	. 99773	28
33	. 99704	. 99321	. 99764	. 99457	. 99816	. 99578	. 99862	. 99684	. 99902	. 99774	27
34	. 99705	. 99324	. 99765	. 99459	. 99817	. 99580	. 99863	. 99685	. 99902	. 99775	26
35	9. 99706	0. 99326	9. 99766	0. 99461	9. 99818	0. 99582	9. 99864	0. 99687	9. 99903	0. 99777	25
36	. 99707	. 99329	. 99766	. 99464	. 99819	. 99584	. 99864	. 99688	. 99904	. 99778	24
37	. 99708	. 99331	. 99767	. 99466	. 99820	. 99585	. 99865	. 99690	. 99904	. 99779	23
38	. 99710	. 99333	. 99768	. 99468	. 99820	. 99587	. 99866	. 99692	. 99905	. 99781	22
39	. 99711	. 99336	. 99769	. 99470	. 99821	. 99589	. 99867	. 99693	. 99905	. 99782	21
40	9. 99712	0. 99338	9. 99770	0. 99472	9. 99822	0. 99591	9. 99867	0. 99695	9. 99906	0. 99784	20
41	. 99713	. 99340	. 99771	. 99474	. 99823	. 99593	. 99868	. 99696	. 99906	. 99785	19
42	. 99714	. 99343	. 99772	. 99476	. 99824	. 99595	. 99869	. 99698	. 99907	. 99786	18
43	. 99715	. 99345	. 99773	. 99478	. 99824	. 99597	. 99869	. 99700	. 99908	. 99788	17
44	. 99716	. 99347	. 99774	. 99480	. 99825	. 99598	. 99870	. 99701	. 99908	. 99789	16
45	9. 99717	0. 99350	9. 99774	0. 99483	9. 99826	0. 99600	9. 99871	0. 99703	9. 99909	0. 99790	15
46	. 99718	. 99352	. 99775	. 99485	. 99827	. 99602	. 99871	. 99704	. 99909	. 99792	14
47	. 99719	. 99354	. 99776	. 99487	. 99828	. 99604	. 99872	. 99706	. 99910	. 99793	13
48	. 99720	. 99357	. 99777	. 99489	. 99828	. 99606	. 99873	. 99708	. 99911	. 99794	12
49	. 99721	. 99359	. 99778	. 99491	. 99829	. 99608	. 99874	. 99709	. 99911	. 99796	11
50	9. 99722	0. 99361	9. 99779	0. 99493	9. 99830	0. 99609	9. 99874	0. 99711	9. 99912	0. 99797	10
51	. 99723	. 99364	. 99780	. 99495	. 99831	. 99611	. 99875	. 99712	. 99912	. 99798	9
52	. 99724	. 99366	. 99781	. 99497	. 99832	. 99613	. 99876	. 99714	. 99913	. 99799	8
53	. 99725	. 99368	. 99782	. 99499	. 99832	. 99615	. 99876	. 99715	. 99913	. 99801	7
54	. 99726	. 99371	. 99783	. 99501	. 99833	. 99617	. 99877	. 99717	. 99914	. 99802	6
55	9. 99727	0. 99373	9. 99784	0. 99503	9. 99834	0. 99618	9. 99878	0. 99718	9. 99915	0. 99803	5
56	. 99728	. 99375	. 99785	. 99505	. 99835	. 99620	. 99878	. 99720	. 99915	. 99805	4
57	. 99729	. 99378	. 99786	. 99507	. 99836	. 99622	. 99879	. 99722	. 99916	. 99806	3
58	. 99730	. 99380	. 99786	. 99509	. 99836	. 99624	. 99880	. 99723	. 99916	. 99807	2
59	. 99731	. 99382	. 99787	. 99511	. 99837	. 99626	. 99880	. 99725	. 99917	. 99808	1
60	9. 99732	0. 99384	9. 99788	0. 99513	9. 99838	0. 99627	9. 99881	0. 99726	9. 99917	0. 99810	0
	189°		188°		187°		186°		185°		

Haversines

′	175°		176°		177°		178°		179°		′
	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	Log Hav	Nat. Hav	
0	9. 99917	0. 99810	9. 99947	0. 99878	9. 99970	0. 99931	9. 99987	0. 99970	9. 99997	0. 99992	60
1	. 99918	. 99811	. 99948	. 99879	. 99971	. 99932	. 99987	. 99970	. 99997	. 99993	59
2	. 99918	. 99812	. 99948	. 99880	. 99971	. 99933	. 99987	. 99971	. 99997	. 99993	58
3	. 99919	. 99814	. 99948	. 99881	. 99971	. 99934	. 99987	. 99971	. 99997	. 99993	57
4	. 99919	. 99815	. 99949	. 99882	. 99972	. 99934	. 99988	. 99972	. 99997	. 99993	56
5	9. 99920	0. 99816	9. 99949	0. 99883	9. 99972	0. 99935	9. 99988	0. 99972	9. 99997	0. 99994	55
6	. 99921	. 99817	. 99950	. 99884	. 99972	. 99936	. 99988	. 99973	. 99997	. 99994	54
7	. 99921	. 99819	. 99950	. 99885	. 99973	. 99937	. 99988	. 99973	. 99997	. 99994	53
8	. 99922	. 99820	. 99951	. 99886	. 99973	. 99937	. 99988	. 99973	. 99998	. 99994	52
9	. 99922	. 99821	. 99951	. 99887	. 99973	. 99938	. 99989	. 99974	. 99998	. 99994	51
10	9. 99923	0. 99822	9. 99951	0. 99888	9. 99973	0. 99939	9. 99989	0. 99974	9. 99998	0. 99995	50
11	. 99923	. 99823	. 99952	. 99889	. 99974	. 99940	. 99989	. 99975	. 99998	. 99995	49
12	. 99924	. 99825	. 99952	. 99890	. 99974	. 99940	. 99989	. 99975	. 99998	. 99995	48
13	. 99924	. 99826	. 99953	. 99891	. 99974	. 99941	. 99989	. 99976	. 99998	. 99995	47
14	. 99925	. 99827	. 99953	. 99892	. 99975	. 99942	. 99990	. 99976	. 99998	. 99996	46
15	9. 99925	0. 99828	9. 99953	0. 99893	9. 99975	0. 99942	9. 99990	0. 99977	9. 99998	0. 99996	45
16	. 99926	. 99829	. 99954	. 99894	. 99975	. 99943	. 99990	. 99977	. 99998	. 99996	44
17	. 99926	. 99831	. 99954	. 99895	. 99976	. 99944	. 99990	. 99978	. 99998	. 99996	43
18	. 99927	. 99832	. 99954	. 99896	. 99976	. 99944	. 99990	. 99978	. 99998	. 99996	42
19	. 99927	. 99833	. 99955	. 99897	. 99976	. 99945	. 99991	. 99978	. 99998	. 99996	41
20	9. 99928	0. 99834	9. 99955	0. 99898	9. 99976	0. 99946	9. 99991	0. 99979	9. 99999	0. 99997	40
21	. 99928	. 99835	. 99956	. 99899	. 99977	. 99947	. 99991	. 99979	. 99999	. 99997	39
22	. 99929	. 99837	. 99956	. 99900	. 99977	. 99947	. 99991	. 99980	. 99999	. 99997	38
23	. 99929	. 99838	. 99957	. 99900	. 99977	. 99948	. 99991	. 99980	. 99999	. 99997	37
24	. 99930	. 99839	. 99957	. 99901	. 99978	. 99949	. 99992	. 99981	. 99999	. 99997	36
25	9. 99931	0. 99840	9. 99958	0. 99902	9. 99978	0. 99949	9. 99992	0. 99981	9. 99999	0. 99997	35
26	. 99931	. 99841	. 99958	. 99903	. 99978	. 99950	. 99992	. 99981	. 99999	. 99998	34
27	. 99932	. 99842	. 99958	. 99904	. 99978	. 99950	. 99992	. 99982	. 99999	. 99998	33
28	. 99932	. 99844	. 99959	. 99905	. 99979	. 99951	. 99992	. 99982	. 99999	. 99998	32
29	. 99933	. 99845	. 99959	. 99906	. 99979	. 99952	. 99992	. 99982	. 99999	. 99998	31
30	9. 99933	0. 99846	9. 99959	0. 99907	9. 99979	0. 99952	9. 99993	0. 99983	9. 99999	0. 99998	30
31	. 99934	. 99847	. 99960	. 99908	. 99980	. 99953	. 99993	. 99983	. 99999	. 99998	29
32	. 99934	. 99848	. 99960	. 99909	. 99980	. 99954	. 99993	. 99984	. 99999	. 99998	28
33	. 99935	. 99849	. 99961	. 99909	. 99980	. 99954	. 99993	. 99984	. 99999	. 99998	27
34	. 99935	. 99850	. 99961	. 99910	. 99980	. 99955	. 99993	. 99984	. 99999	. 99999	26
35	9. 99935	0. 99852	9. 99961	0. 99911	9. 99981	0. 99956	9. 99993	0. 99985	9. 99999	0. 99999	25
36	. 99936	. 99853	. 99962	. 99912	. 99981	. 99956	. 99994	. 99985	9. 99999	. 99999	24
37	. 99936	. 99854	. 99962	. 99913	. 99981	. 99957	. 99994	. 99985	0. 00000	. 99999	23
38	. 99937	. 99855	. 99963	. 99914	. 99981	. 99957	. 99994	. 99986	. 00000	. 99999	22
39	. 99937	. 99856	. 99963	. 99915	. 99982	. 99958	. 99994	. 99986	. 00000	. 99999	21
40	9. 99938	0. 99857	9. 99963	0. 99915	9. 99982	0. 99959	9. 99994	0. 99986	0. 00000	0. 99999	20
41	. 99938	. 99858	. 99964	. 99916	. 99982	. 99959	. 99994	. 99987	. 00000	. 99999	19
42	. 99939	. 99859	. 99964	. 99917	. 99983	. 99960	. 99994	. 99987	. 00000	. 99999	18
43	. 99939	. 99860	. 99964	. 99918	. 99983	. 99960	. 99995	. 99987	. 00000	. 99999	17
44	. 99940	. 99861	. 99965	. 99919	. 99983	. 99961	. 99995	. 99988	. 00000	. 99999	16
45	9. 99940	0. 99863	9. 99965	0. 99920	9. 99983	0. 99961	9. 99995	0. 99988	0. 00000	1. 00000	15
46	. 99941	. 99864	. 99965	. 99920	. 99983	. 99962	. 99995	. 99988	. 00000	. 00000	14
47	. 99941	. 99865	. 99966	. 99921	. 99984	. 99963	. 99995	. 99989	. 00000	. 00000	13
48	. 99942	. 99866	. 99966	. 99922	. 99984	. 99963	. 99995	. 99989	. 00000	. 00000	12
49	. 99942	. 99867	. 99966	. 99923	. 99984	. 99964	. 99995	. 99989	. 00000	. 00000	11
50	9. 99943	0. 99868	9. 99967	0. 99924	9. 99984	0. 99964	9. 99996	0. 99990	0. 00000	1. 00000	10
51	. 99943	. 99869	. 99967	. 99924	. 99985	. 99965	. 99996	. 99990	. 00000	. 00000	9
52	. 99943	. 99870	. 99968	. 99925	. 99985	. 99965	. 99996	. 99990	. 00000	. 00000	8
53	. 99944	. 99871	. 99968	. 99926	. 99985	. 99966	. 99996	. 99991	. 00000	. 00000	7
54	. 99944	. 99872	. 99968	. 99927	. 99985	. 99966	. 99996	. 99991	. 00000	. 00000	6
55	9. 99945	0. 99873	9. 99969	0. 99928	9. 99986	0. 99967	9. 99996	0. 99991	0. 00000	1. 00000	5
56	. 99945	. 99874	. 99969	. 99928	. 99986	. 99967	. 99996	. 99991	. 00000	. 00000	4
57	. 99946	. 99875	. 99969	. 99929	. 99986	. 99968	. 99996	. 99992	. 00000	. 00000	3
58	. 99946	. 99876	. 99970	. 99930	. 99986	. 99969	. 99996	. 99992	. 00000	. 00000	2
59	. 99947	. 99877	. 99970	. 99931	. 99987	. 99969	. 99997	. 99992	. 00000	. 00000	1
60	9. 99947	0. 99878	9. 99970	0. 99931	9. 99987	0. 99970	9. 99997	0. 99992	0. 00000	1. 00000	0
	184°		183°		182°		181°		180°		

$\log 253^8 = 8 \log 253$

$\log \sqrt[7]{157^6} = \frac{1}{7} \log 157^6 = \frac{6}{7} \log 157$

$\frac{a}{\eta\mu A} = \frac{b}{\eta\mu B} = \frac{\gamma}{\eta\mu \Gamma}$

$\eta\mu \Pi_\rho A \overset{\eta\mu}{=} \frac{(\tau-b)(\tau-\gamma)}{\sigma\tau\epsilon\rho\ \gamma \cdot b}$

$2\tau = a+b+\gamma \Leftrightarrow \tau = \frac{a+b+\gamma}{2}$

$\epsilon\varphi \frac{B-\Gamma}{2} = \frac{b-\gamma}{b+\gamma} \cdot \sigma\varphi \frac{A}{2}$

1) $\eta\mu\Pi\rho\, \lambda = [\eta\mu\Pi\rho\, a - \eta\mu\Pi\rho(b-\gamma)]\, \tau\epsilon\mu\, b \cdot \tau\epsilon\mu\, \gamma$

2) $\eta\mu\Pi\rho\, a = [\eta\mu\Pi\rho\, \lambda \cdot \eta\mu b \cdot \eta\mu\gamma + \eta\mu\Pi\rho(b+\delta)$

3) $\eta\mu\Pi\rho\, Z a = \eta\mu\Pi\rho\, \Theta\, \sigma\upsilon\nu\varphi \cdot \sigma\upsilon\nu\delta + \eta\mu\Pi\rho(\varphi \pm \delta)$

4) $\eta\mu\Pi\rho\, \Theta = [\eta\mu\Pi\rho\, Z a - \eta\mu\Pi\rho\, (\varphi \pm \delta)]\ \tau\epsilon\mu\varphi \cdot \tau\epsilon\mu\delta$

5) $\eta\mu\Pi\rho\, \theta = \eta\mu\Pi\rho\, \Delta a \cdot \sigma\upsilon\nu\Phi \cdot \sigma\upsilon\nu\Phi' + \eta\mu\Pi\rho\, \Delta\Phi$

6) $\eta\mu\Pi\rho\, \delta = [\eta\mu\Pi\rho(90 \pm \Phi') - \eta\mu\Pi\rho[\theta - (90-\Phi)]\, \tau\epsilon\mu\Phi \cdot \tau\epsilon\mu$

③	360°	359°	358°	357°	356°	355°	354°	353°	352°	351°	350°	349°	348°	347°	346°	345°
A	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°
0°	∞	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	∞	10.0	5.0	3.3	2.5	2.0	1.7	1.4	1.2	1.1	1.0	0.9	0.8	0.8	0.7	0.7
2	∞	20.0	10.0	6.7	5.0	4.0	3.3	2.8	2.5	2.2	2.0	1.8	1.6	1.5	1.4	1.3
3	∞	30.0	15.0	10.0	7.5	6.0	5.0	4.3	3.7	3.3	3.0	2.7	2.5	2.3	2.1	2.0
4	∞	40.1	20.0	13.3	10.0	8.0	6.7	5.7	5.0	4.4	4.0	3.6	3.3	3.0	2.8	2.6
5	∞	50.1	25.1	16.7	12.5	10.0	8.3	7.1	6.2	5.5	5.0	4.5	4.1	3.8	3.5	3.3
6	∞	60.2	30.1	20.1	15.0	12.0	10.0	8.6	7.5	6.6	6.0	5.4	4.9	4.6	4.2	3.9
7	∞	70.3	35.2	23.4	17.6	14.0	11.7	10.0	8.7	7.8	7.0	6.3	5.8	5.3	4.9	4.6
8	∞	80.5	40.2	26.8	20.1	16.1	13.4	11.4	10.0	8.9	8.0	7.2	6.6	6.1	5.6	5.2
9	∞	90.7	45.4	30.2	22.7	18.1	15.1	12.9	11.3	10.0	9.0	8.1	7.5	6.9	6.4	5.9
10	∞	101	50.5	33.6	25.2	20.2	16.8	14.4	12.5	11.1	10.0	9.1	8.3	7.6	7.1	6.6
11	∞	111	55.7	37.1	27.8	22.2	18.5	15.8	13.8	12.3	11.0	10.0	9.1	8.4	7.8	7.2
12	∞	121	60.9	40.6	30.4	24.3	20.2	17.3	15.1	13.4	12.1	10.9	10.0	9.2	8.5	7.9
13	∞	132	66.1	44.1	33.0	26.4	22.0	18.8	16.4	14.6	13.1	11.9	10.9	10.0	9.3	8.6
14	∞	142	71.4	47.6	35.7	28.5	23.7	20.3	17.7	15.7	14.1	12.8	11.7	10.8	10.0	9.3
15	∞	153	76.7	51.1	38.3	30.6	25.5	21.8	19.1	16.9	15.2	13.8	12.6	11.6	10.7	10.0
16	∞	164	82.1	54.7	41.0	32.8	27.3	23.4	20.4	18.1	16.3	14.8	13.5	12.4	11.5	10.7
17	∞	175	87.6	58.3	43.7	34.9	29.1	24.9	21.8	19.3	17.3	15.7	14.4	13.2	12.3	11.4
18	∞	186	93.0	62.0	46.5	37.1	30.9	26.5	23.1	20.5	18.4	16.7	13.3	14.1	13.0	12.1
19	∞	197	98.6	65.7	49.2	39.4	32.8	28.0	24.5	21.7	19.5	17.7	16.2	14.9	13.8	12.9
20	∞	208	104	69.4	52.1	41.6	34.6	29.6	25.9	23.0	20.6	18.7	17.1	13.8	14.6	13.6
21	∞	219	109	73.2	54.9	43.9	36.5	31.3	27.3	24.2	21.8	19.7	18.1	16.6	15.4	14.3
22	∞	231	115	77.1	57.8	46.2	38.4	32.9	28.7	25.5	22.9	20.8	19.0	17.5	16.2	15.1
23	∞	243	121	81.0	60.7	48.5	40.4	34.6	30.2	26.8	24.1	21.8	20.0	18.4	17.0	15.8
24	∞	255	127	85.0	63.7	50.9	42.4	36.3	31.7	28.1	25.3	22.9	20.9	19.3	17.9	16.6
25	∞	267	133	89.0	66.7	53.3	44.4	38.0	33.2	29.4	26.4	24.0	21.9	20.2	18.7	17.4
26	∞	279	139	93.1	69.7	55.7	46.4	39.7	34.7	30.8	27.7	25.1	22.9	21.1	19.6	18.2
27	∞	291	145	97.2	72.9	58.2	48.5	41.5	36.3	32.2	28.9	26.2	24.0	22.1	20.4	19.0
28	∞	304	152	101	76.0	60.8	50.6	43.3	37.8	33.6	30.2	27.4	25.0	23.0	21.3	19.8
29	∞	317	158	105	79.3	63.4	52.7	45.1	39.4	35.0	31.4	28.5	26.1	24.0	22.2	20.7
30	∞	330	166	110	82.6	66.0	54.9	47.0	41.1	36.5	32.7	29.7	27.2	25.0	23.2	21.5
31	∞	344	172	114	85.9	68.7	57.2	48.9	42.8	37.9	34.1	30.9	28.3	26.0	24.1	22.4
32	∞	358	178	119	89.4	71.4	59.5	50.9	44.5	39.5	35.4	32.1	29.4	27.1	25.1	23.3
33	∞	372	186	123	92.9	74.2	61.8	52.9	46.2	41.0	36.8	33.4	30.6	28.1	26.0	24.2
34	∞	386	193	128	96.5	77.1	64.2	54.9	48.0	42.6	30.3	34.7	31.7	29.2	27.1	25.2
35	∞	401	200	133	100	80.0	66.6	57.0	49.8	44.2	39.7	36.0	32.9	30.3	28.1	26.1
36	∞	416	208	138	103	83.0	69.1	59.2	51.7	45.9	41.2	37.4	34.2	31.5	29.1	27.1
37	∞	431	215	143	107	86.1	71.7	61.4	53.6	47.6	42.7	38.8	35.5	32.6	30.2	28.1
38	∞	447	223	149	111	89.3	74.3	63.6	55.6	49.3	44.3	40.2	36.8	33.8	31.3	29.2
39	∞	463	231	154	115	92.6	77.0	66.0	57.6	51.1	45.9	41.7	38.1	35.1	32.5	30.2
40	∞	480	240	160	120	95.9	79.8	68.3	59.7	53.0	47.6	43.2	39.5	36.3	33.7	31.3
41	∞	498	248	165	124	99.4	82.7	70.8	61.9	54.9	49.3	44.7	40.9	37.7	34.9	32.4
42	∞	515	257	171	128	102	85.7	73.3	64.1	56.8	51.1	46.3	42.4	39.0	36.1	33.4
43	∞	534	267	177	133	106	88.7	75.9	66.4	58.9	52.9	48.0	43.9	40.4	37.4	34.8
44	∞	553	276	184	138	110	91.9	78.6	68.7	61.0	54.8	49.7	45.4	41.8	38.7	36.0
45	∞	572	286	190	143	114	95.1	81.4	71.2	63.1	56.7	51.4	47.0	43.3	40.1	37.3
46	∞	593	296	197	148	118	98.5	84.3	73.7	65.4	58.7	53.3	48.7	44.9	41.5	38.6
47	∞	614	307	204	153	122	102	87.3	76.3	67.7	60.8	55.2	50.5	46.5	43.0	40.0
48	∞	636	318	211	158	126	105	90.5	79.0	70.1	63.0	57.1	52.2	48.1	44.5	41.4
49	∞	659	329	219	164	131	109	93.7	81.9	72.6	65.2	59.2	54.1	49.8	46.1	42.9
50	∞	682	341	227	170	136	113	97.1	84.8	75.2	67.6	61.3	56.1	51.6	47.8	44.5
51	∞	707	353	235	176	141	117	100	87.9	78.0	70.0	63.5	58.1	53.5	49.5	46.1
52	∞	733	366	244	183	146	121	104	91.1	80.8	72.6	65.8	60.2	55.4	51.3	47.8
53	∞	760	380	253	189	151	126	108	94.4	83.8	75.3	68.3	62.4	57.5	53.2	49.5
54	∞	788	394	262	196	157	131	112	97.9	86.9	78.1	70.8	64.8	59.6	55.2	51.4
55	∞	818	409	272	204	163	135	116	101	90.2	81.0	73.5	67.2	61.9	57.3	53.3
56	∞	849	424	282	212	169	141	120	105	93.6	84.1	76.3	69.7	64.2	59.5	55.3
57	∞	882	441	293	220	176	146	125	109	97.2	87.3	79.2	72.4	66.7	61.8	57.5
58	∞	916	458	305	228	182	152	130	113	101	90.8	82.3	75.3	69.3	64.2	59.7
59	∞	953	476	317	238	190	158	135	118	105	94.4	85.6	78.3	72.1	66.8	62.1
60	∞	992	496	330	247	198	164	141	123	109	98.2	89.1	81.5	75.0	69.5	64.6
61	∞	1033	516	344	258	206	171	146	128	113	102	92.8	84.9	78.1	72.4	67.3
62	∞	1077	538	358	269	215	178	153	133	118	106	96.8	88.5	81.5	75.4	70.2
63	∞	1124	562	374	280	224	186	159	139	123	111	101	92.3	85.0	78.7	73.3
64	∞	1174	587	391	293	234	195	167	145	129	116	105	96.5	88.8	82.2	76.5
65	∞	1228	614	409	306	245	204	174	152	135	121	110	100	92.9	86.0	80.0
66	∞	1290	643	429	321	257	214	183	160	142	127	116	106	97.3	90.1	83.8
67	∞	1350	675	450	337	269	224	192	168	149	134	121	111	102	94.5	87.9
68	∞	1420	709	472	354	283	235	202	176	156	140	127	116	107	99.3	92.4
69	∞	1490	746	497	373	298	248	212	185	165	148	134	123	113	105	97.2
70	∞	1570	787	524	393	314	261	224	196	174	156	141	129	119	110	103
71	∞	1660	832	554	415	332	276	237	207	183	165	149	137	126	117	108
72	∞	1760	881	587	440	352	293	251	219	194	175	158	145	133	123	115
73	∞	1870	937	624	468	374	311	266	233	206	186	168	154	142	131	122
74	∞	2000	999	666	500	399	332	284	248	220	198	179	164	151	140	130
75	∞	2150	1070	713	534	427	355	304	266	236	212	192	176	162	150	139
	180°	179°	178°	177°	176°	175°	174°	173°	172°	171°	170°	169°	168°	167°	166°	165°
	180°	181°	182°	183°	184°	185°	186°	187°	188°	189°	190°	191°	192°	193°	194°	195°

③	360°	359°	358°	357°	356°	355°	354°	353°	352°	351°	350°	349°	348°	347°	346°	345°
	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°
0°	∞	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	∞	10.0	5.0	3.3	2.5	2.0	1.7	1.4	1.3	1.1	1.0	0.9	0.8	0.8	0.7	0.7
2	∞	20.0	10.0	6.7	5.0	4.0	3.3	2.9	2.5	2.2	2.0	1.8	1.7	1.6	1.4	1.3
3	∞	30.0	15.0	10.0	7.5	6.0	5.0	4.3	3.8	3.4	3.0	2.7	2.5	2.3	2.2	2.0
4	∞	40.1	20.0	13.4	10.0	8.0	6.7	5.7	5.0	4.5	4.0	3.7	3.4	3.1	2.9	2.7
5	∞	50.1	25.1	16.7	12.5	10.0	8.4	7.2	6.3	5.6	5.0	4.6	4.2	3.9	3.6	3.4
6	∞	60.2	30.1	20.1	15.1	12.1	10.1	8.6	7.6	6.7	6.1	5.5	5.1	4.7	4.3	4.1
7	∞	70.4	35.2	23.5	17.6	14.1	11.7	10.1	8.8	7.8	7.1	6.4	5.9	5.5	5.1	4.7
8	∞	80.5	40.3	26.9	20.1	16.1	13.4	11.5	10.1	9.0	8.1	7.4	6.8	6.2	5.8	5.4
9	∞	90.8	45.4	30.3	22.7	18.2	15.2	13.0	11.4	10.1	9.1	8.3	7.6	7.0	6.5	6.1
10	∞	101	50.5	33.7	25.3	20.2	16.9	14.5	12.7	11.3	10.2	9.2	8.5	7.8	7.3	6.8
11	∞	111	55.7	37.1	27.9	22.3	18.6	15.9	14.0	12.4	11.2	10.2	9.3	8.6	8.0	7.5
12	∞	121	60.9	40.6	30.5	24.4	20.3	17.4	15.3	13.6	12.2	11.1	10.2	9.4	8.8	8.2
13	∞	132	66.2	44.1	33.1	26.5	22.1	18.9	16.6	14.8	13.3	12.1	11.1	10.3	9.5	8.9
14	∞	142	71.4	47.6	35.7	28.6	23.9	20.5	17.9	15.9	14.4	13.1	12.0	11.1	10.3	9.6
15	∞	153	76.8	51.2	38.4	30.7	25.6	22.0	19.3	17.1	15.4	14.0	12.9	11.9	11.1	10.4
16	∞	164	82.2	54.8	41.1	32.9	27.4	23.5	20.6	18.3	16.5	15.0	13.8	12.7	11.9	11.1
17	∞	175	87.6	58.4	43.8	35.1	29.2	25.1	22.0	19.5	17.6	16.0	14.7	13.6	12.6	11.8
18	∞	186	93.1	62.1	46.6	37.3	31.1	26.7	23.3	20.8	18.7	17.0	15.6	14.4	13.4	12.6
19	∞	197	98.7	65.8	49.4	39.5	32.9	28.3	24.7	22.0	19.8	18.0	16.6	15.3	14.2	13.3
20	∞	208	104	69.5	52.2	41.8	34.8	29.9	26.2	23.3	21.0	19.1	17.5	16.2	15.0	14.1
21	∞	219	110	73.3	55.0	44.0	36.7	31.5	27.6	24.5	22.1	20.1	18.5	17.1	15.9	14.8
22	∞	231	115	77.2	57.9	46.4	38.7	33.2	29.0	25.8	23.3	21.2	19.4	18.0	16.7	15.6
23	∞	243	121	81.1	60.9	48.7	40.6	34.8	30.5	27.1	24.4	22.2	20.4	18.9	17.5	16.4
24	∞	255	127	85.1	63.8	51.1	42.6	36.5	32.0	28.5	25.6	23.3	21.4	19.8	18.4	17.2
25	∞	267	133	89.1	66.8	53.5	44.6	38.3	33.5	29.8	26.9	24.4	22.4	20.7	19.3	18.0
26	∞	279	139	93.2	69.9	56.0	46.7	40.0	35.0	31.2	28.1	25.6	23.5	21.7	20.2	18.8
27	∞	292	146	97.4	73.0	58.5	48.7	41.8	36.6	32.6	29.3	26.7	24.5	22.7	21.1	19.7
28	∞	304	152	101	76.2	61.0	50.9	43.6	38.2	34.0	30.6	27.9	25.6	23.6	22.0	20.5
29	∞	317	158	105	79.5	63.6	53.0	45.5	39.8	35.4	31.9	29.1	26.7	24.6	22.9	21.4
30	∞	330	165	110	82.8	66.2	55.2	47.4	41.5	36.9	33.2	30.3	27.8	25.7	23.9	22.3
31	∞	344	172	114	86.1	68.9	57.5	49.3	43.2	38.4	34.6	31.5	28.9	26.7	24.8	23.2
32	∞	358	179	119	89.6	71.7	59.8	51.3	44.9	39.9	36.0	32.7	30.1	27.8	25.8	24.1
33	∞	372	186	124	93.1	74.5	62.1	53.3	46.7	41.5	37.4	34.0	31.2	28.9	26.8	25.1
34	∞	386	193	128	96.7	77.4	64.5	55.3	48.5	43.1	38.8	35.3	32.4	30.0	27.9	26.1
35	∞	401	200	133	100	80.3	67.0	57.5	50.3	44.8	40.3	36.7	33.7	31.1	28.9	27.1
36	∞	416	208	138	104	83.4	69.5	59.6	52.2	46.4	41.8	38.1	34.9	32.3	30.0	28.1
37	∞	431	215	144	108	86.5	72.1	61.8	54.1	48.2	43.4	39.5	36.2	33.5	31.1	29.1
38	∞	447	223	149	112	89.6	74.7	64.1	56.1	49.9	45.0	40.9	37.6	34.7	32.3	30.2
39	∞	464	232	154	116	92.9	77.5	66.4	58.2	51.8	46.6	42.4	38.9	36.0	33.5	31.3
40	∞	480	240	160	120	96.3	80.3	68.9	60.3	53.6	48.3	44.0	40.4	37.3	34.7	32.4
41	∞	498	249	166	124	99.7	83.2	71.3	62.5	55.6	50.1	45.6	41.8	38.6	35.9	33.6
42	∞	515	258	172	129	103	86.1	73.9	64.7	57.6	51.9	47.2	43.3	40.0	37.2	34.8
43	∞	534	267	178	133	107	89.2	76.5	67.0	59.6	53.7	48.9	44.9	41.5	38.5	36.0
44	∞	553	276	184	138	110	92.4	79.2	69.4	61.7	55.6	50.6	46.4	42.9	39.9	37.3
45	∞	573	286	191	143	114	95.7	82.1	71.9	63.9	57.6	52.4	48.1	44.5	41.3	38.6
46	∞	593	296	197	148	118	99.1	85.0	74.4	66.2	59.6	54.3	49.8	46.0	42.8	40.0
47	∞	614	307	204	153	123	102	88.0	77.1	68.6	61.8	56.2	51.6	47.7	44.3	41.4
48	∞	636	318	212	159	127	106	91.1	79.8	71.0	64.0	58.2	53.4	49.4	45.9	42.9
49	∞	659	329	219	164	132	110	94.4	82.7	73.5	66.2	60.3	55.3	51.1	47.6	44.4
50	∞	682	341	227	170	136	114	97.8	85.6	76.2	68.6	62.5	57.3	53.0	49.3	46.0
51	∞	707	353	236	177	141	118	101	88.7	78.9	71.1	64.7	59.4	54.9	51.0	47.7
52	∞	733	366	244	183	146	122	105	92.0	81.8	73.7	67.1	61.6	56.9	52.9	49.5
53	∞	760	380	253	190	152	127	108	95.4	84.8	76.4	69.5	63.8	59.0	54.9	51.3
54	∞	788	394	263	197	157	131	112	98.9	88.0	79.3	72.1	66.2	61.2	56.9	53.2
55	∞	818	409	272	204	163	136	117	102	91.3	82.2	74.8	68.7	63.5	59.0	55.2
56	∞	849	424	283	212	170	141	121	106	94.8	85.4	77.7	71.3	65.9	61.3	57.3
57	∞	882	441	294	220	176	147	126	110	98.4	88.7	80.7	74.1	68.5	63.7	59.5
58	∞	917	458	305	229	183	153	131	115	102	92.2	83.9	77.0	71.1	66.2	61.8
59	∞	953	476	318	238	191	159	136	119	106	95.8	87.2	80.0	74.0	68.8	64.3
60	∞	992	496	330	248	198	165	142	124	110	99.7	90.8	83.3	77.0	71.6	66.9
61	∞	1033	516	344	258	207	172	148	129	115	103	94.6	86.8	80.2	74.6	69.7
62	∞	1077	538	359	269	215	179	154	135	120	108	98.6	90.5	83.6	77.7	72.7
63	∞	1124	562	375	281	225	187	161	141	125	113	102	94.4	87.2	81.1	75.8
64	∞	1174	587	391	293	235	196	168	147	131	118	107	98.6	91.1	84.8	79.2
65	∞	1228	614	409	307	246	205	176	154	137	123	112	103	95.3	88.6	82.9
66	∞	1290	644	429	322	258	215	184	161	144	129	118	108	99.8	92.8	86.8
67	∞	1350	675	450	338	270	225	193	169	151	136	123	113	105	97.4	91.0
68	∞	1420	709	473	355	284	237	203	178	158	143	130	119	110	102	95.6
69	∞	1490	746	498	373	299	249	214	187	167	150	137	125	116	108	101
70	∞	1570	787	525	394	315	263	225	197	176	158	144	132	122	114	106
71	∞	1660	832	555	416	333	278	238	209	186	167	152	140	129	120	112
72	∞	1760	882	588	441	353	294	253	221	197	177	161	148	137	127	119
73	∞	1870	937	625	469	375	313	268	235	209	188	171	157	145	135	126
74	∞	2000	1000	666	500	400	334	286	251	223	201	183	168	155	144	135
75	∞	2140	1070	713	535	428	357	306	268	239	215	196	180	166	154	144
	180°	179°	178°	177°	176°	175°	174°	173°	172°	171°	170°	169°	168°	167°	166°	165°
	180°	181°	182°	183°	184°	185°	186°	187°	188°	189°	190°	191°	192°	193°	194°	195°

	345°	344°	343°	342°	341°	340°	339°	338°	337°	336°	335°	334°	333°	332°	331°	330°
A ③	15°	16°	17°	18°	19°	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°
0°	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3
2	1.3	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6
3	2.0	1.8	1.7	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.0	1.0	0.9	0.9
4	2.6	2.4	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.6	1.5	1.4	1.4	1.3	1.3	1.2
5	3.3	3.1	2.9	2.7	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.6	1.5
6	3.9	3.7	3.4	3.2	3.1	2.9	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8
7	4.6	4.3	4.0	3.8	3.6	3.4	3.2	3.0	2.9	2.8	2.6	2.5	2.4	2.3	2.2	2.1
8	5.2	4.9	4.6	4.3	4.1	3.9	3.7	3.5	3.3	3.2	3.0	2.9	2.8	2.6	2.5	2.4
9	5.9	5.3	5.2	4.9	4.6	4.4	4.1	3.9	3.7	3.6	3.4	3.2	3.1	3.0	2.9	2.7
10	6.6	6.1	5.8	5.4	5.1	4.8	4.6	4.4	4.2	4.0	3.8	3.6	3.5	3.3	3.2	3.1
11	7.2	6.8	6.4	6.0	5.6	5.3	5.1	4.8	4.6	4.4	4.2	4.0	3.8	3.7	3.5	3.4
12	7.9	7.4	7.0	6.5	6.2	5.8	5.5	5.3	5.0	4.8	4.6	4.4	4.2	4.0	3.8	3.7
13	8.6	8.1	7.6	7.1	6.7	6.3	6.0	5.7	5.4	5.2	5.0	4.7	4.5	4.3	4.2	4.0
14	9.3	8.7	8.2	7.7	7.2	6.9	6.5	6.2	5.9	5.6	5.3	5.1	4.9	4.7	4.5	4.3
15	10.0	9.3	8.8	8.2	7.8	7.4	7.0	6.6	6.3	6.0	5.7	5.5	5.3	5.0	4.8	4.6
16	10.7	10.0	9.4	8.8	8.3	7.9	7.5	7.1	6.8	6.4	6.1	5.9	5.6	5.4	5.2	5.0
17	11.4	10.7	10.0	9.4	8.9	8.4	8.0	7.6	7.2	6.9	6.6	6.3	6.0	5.7	5.5	5.3
18	12.1	11.3	10.6	10.0	9.4	8.9	8.5	8.0	7.7	7.3	7.0	6.7	6.4	6.1	5.9	5.6
19	12.9	12.0	11.3	10.6	10.0	9.5	9.0	8.5	8.1	7.7	7.4	7.1	6.8	6.5	6.2	6.0
20	13.6	12.7	11.9	11.2	10.6	10.0	9.5	9.0	8.6	8.2	7.8	7.5	7.1	6.8	6.6	6.3
21	14.3	13.4	12.6	11.8	11.1	10.5	10.0	9.5	9.0	8.6	8.2	7.9	7.5	7.2	6.9	6.6
22	15.1	14.1	13.2	12.4	11.7	11.1	10.5	10.0	9.5	9.1	8.7	8.3	7.9	7.6	7.3	7.0
23	15.8	14.8	13.9	13.1	12.3	11.7	11.1	10.5	10.0	9.5	9.1	8.7	8.3	8.0	7.7	7.4
24	16.6	15.5	14.6	13.7	12.9	12.2	11.6	11.0	10.5	10.0	9.5	9.1	8.7	8.4	8.0	7.7
25	17.4	16.3	15.3	14.4	13.5	12.8	12.1	11.5	11.0	10.5	10.0	9.6	9.2	8.8	8.4	8.1
26	18.2	17.0	16.0	15.0	14.2	13.4	12.7	12.1	11.5	11.0	10.5	10.0	9.6	9.2	8.8	8.4
27	19.0	17.8	16.7	15.7	14.8	14.0	13.3	12.6	12.0	11.4	10.9	10.4	10.0	9.6	9.2	8.8
28	19.8	18.5	17.4	16.4	15.4	14.6	13.9	13.2	12.5	11.9	11.4	10.9	10.4	10.0	9.6	9.2
29	20.7	19.3	18.1	17.1	16.1	15.2	14.4	13.7	13.1	12.5	11.9	11.4	10.9	10.4	10.0	9.6
30	21.5	20.1	18.9	17.8	16.8	15.9	15.0	14.3	13.6	13.0	12.4	11.8	11.3	10.9	10.4	10.0
31	22.4	21.0	19.7	18.5	17.5	16.5	15.7	14.9	14.2	13.5	12.9	12.3	11.8	11.3	10.8	10.4
32	23.3	21.8	20.4	19.2	18.1	17.2	16.3	15.5	14.7	14.0	13.4	12.8	12.3	11.8	11.3	10.8
33	24.2	22.6	21.2	20.0	18.9	17.8	16.9	16.1	15.3	14.6	13.9	13.3	12.7	12.2	11.7	11.2
34	25.2	23.5	22.1	20.8	19.6	18.5	17.6	16.7	15.9	15.1	14.5	13.8	13.2	12.7	12.2	11.7
35	26.1	24.4	22.9	21.6	20.3	19.2	18.2	17.3	16.5	15.7	15.0	14.4	13.7	13.2	12.6	12.1
36	27.1	25.3	23.8	22.4	21.1	20.0	18.9	18.0	17.1	16.3	15.6	14.9	14.3	13.7	13.1	12.6
37	28.1	26.3	24.6	23.2	21.9	20.7	19.6	18.7	17.8	16.9	16.2	15.5	14.8	14.2	13.6	13.1
38	29.2	27.2	25.6	24.0	22.7	21.5	20.4	19.3	18.4	17.5	16.8	16.0	15.3	14.7	14.1	13.5
39	30.2	28.2	26.5	24.9	23.5	22.2	21.1	20.0	19.1	18.2	17.4	16.6	15.9	15.2	14.6	14.0
40	31.3	29.3	27.4	25.8	24.4	23.1	21.9	20.8	19.8	18.8	18.0	17.2	16.5	15.8	15.1	14.5
41	32.4	30.3	28.4	26.8	25.2	23.9	22.6	21.5	20.5	19.5	18.6	17.8	17.1	16.3	15.7	15.1
42	33.6	31.4	29.5	27.7	26.1	24.7	23.5	22.3	21.2	20.2	19.3	18.5	17.7	16.9	16.2	15.6
43	34.8	32.5	30.5	28.7	27.1	25.6	24.3	23.1	22.0	20.9	20.0	19.1	18.3	17.5	16.8	16.2
44	36.0	33.7	31.6	29.7	28.0	26.5	25.2	23.9	22.8	21.7	20.7	19.8	19.0	18.2	17.4	16.7
45	37.3	34.9	32.7	30.8	29.0	27.5	26.1	24.8	23.6	22.5	21.4	20.5	19.6	18.8	18.0	17.3
46	38.6	36.1	33.9	31.9	30.1	28.5	27.0	25.6	24.4	23.3	22.2	21.2	20.3	19.5	18.7	17.9
47	40.0	37.4	35.1	33.0	31.1	29.5	27.9	26.5	25.3	24.1	23.0	22.0	21.0	20.2	19.3	18.6
48	41.4	38.7	36.3	34.2	32.3	30.5	28.9	27.5	26.2	24.9	23.8	22.8	21.8	20.9	20.0	19.2
49	42.9	40.1	37.6	35.4	33.4	31.6	30.0	28.5	27.1	25.8	24.7	23.6	22.6	21.6	20.8	19.9
50	44.5	41.6	39.0	36.7	34.6	32.7	31.0	29.5	28.1	26.8	25.6	24.4	23.4	22.4	21.5	20.6
51	46.1	43.1	40.4	38.0	35.9	33.9	32.2	30.6	29.1	27.7	26.5	25.3	24.2	23.2	22.3	21.4
52	47.8	44.6	41.9	39.4	37.2	35.2	33.3	31.7	30.2	28.7	27.4	26.2	25.1	24.1	23.1	22.2
53	49.5	46.3	43.4	40.8	38.5	36.5	34.6	32.8	31.3	29.8	28.5	27.2	26.0	25.0	23.9	23.0
54	51.4	48.0	45.0	42.4	40.0	37.8	35.9	34.1	32.4	30.9	29.5	28.2	27.0	25.9	24.8	23.8
55	53.3	49.8	46.7	44.0	41.5	39.2	37.2	35.3	33.6	32.1	30.6	29.3	28.0	26.9	25.8	24.7
56	55.3	51.7	48.5	45.6	43.1	40.7	38.6	36.7	34.9	33.3	31.8	30.4	29.1	27.9	26.7	25.7
57	57.5	53.7	50.4	47.4	44.7	42.3	40.1	38.1	36.3	34.6	33.0	31.6	30.2	29.0	27.8	26.7
58	59.7	55.8	52.3	49.3	46.5	44.0	41.7	39.6	37.7	35.9	34.3	32.8	31.4	30.1	28.9	27.7
59	62.1	58.0	54.4	51.2	48.3	45.7	43.4	41.2	39.2	37.4	35.7	34.1	32.7	31.3	30.0	28.8
60	64.6	60.4	56.7	53.3	50.3	47.6	45.1	42.9	40.8	38.9	37.1	35.5	34.0	32.6	31.2	30.0
61	67.3	62.9	59.0	55.5	52.4	49.6	47.0	44.7	42.5	40.5	38.7	37.0	35.4	33.9	32.6	31.3
62	70.2	65.6	61.5	57.9	54.6	51.7	49.0	46.6	44.3	42.2	40.3	38.6	36.9	35.4	33.9	32.6
63	73.3	68.4	64.2	60.4	57.0	53.9	51.1	48.6	46.2	44.1	42.1	40.2	38.5	36.9	35.4	34.0
64	76.5	71.5	67.1	63.1	59.6	56.3	53.4	50.8	48.3	46.1	44.0	42.0	40.2	38.6	37.0	35.5
65	80.0	74.8	70.1	66.0	62.3	58.9	55.9	53.1	50.5	48.2	46.0	44.0	42.1	40.3	38.7	37.1
66	83.8	78.3	73.5	69.1	65.2	61.7	58.5	55.6	52.9	50.4	48.2	46.1	44.1	42.2	40.5	38.9
67	87.9	82.2	77.1	72.5	68.4	64.7	61.4	58.3	55.5	52.9	50.5	48.3	46.2	44.3	42.5	40.8
68	92.4	86.3	81.0	76.2	71.9	68.0	64.5	61.3	58.3	55.6	53.1	50.7	48.6	46.5	44.7	42.9
69	97.2	90.9	85.2	80.2	75.7	71.6	67.9	64.5	61.4	58.5	55.9	53.4	51.1	49.0	47.0	45.1
70	103	95.8	89.9	84.6	79.8	75.5	71.6	68.0	64.7	61.7	58.9	56.3	53.9	51.7	49.6	47.8
71	108	101	95.0	89.4	84.3	79.8	75.7	71.9	68.4	65.2	62.3	59.6	57.0	54.6	52.4	50.3
72	115	107	101	94.7	89.4	84.6	80.2	76.2	72.5	69.1	66.0	63.1	60.4	57.9	55.5	53.3
73	122	114	107	101	95.0	89.9	85.2	81.0	77.1	73.5	70.1	67.1	64.2	61.5	59.0	56.7
74	130	122	114	107	101	95.8	90.9	86.3	82.2	78.3	74.8	71.5	68.4	65.6	62.9	60.4
75	139	130	122	115	108	103	97.2	92.4	87.9	83.8	80.0	76.5	73.2	70.2	67.3	64.6
	165°	164°	163°	162°	161°	160°	159°	158°	157°	156°	155°	154°	153°	152°	151°	150°
R4	195°	196°	197°	198°	199°	200°	201°	202°	203°	204°	205°	206°	207°	208°	209°	210°

③	345°	344°	343°	342°	341°	340°	339°	338°	337°	336°	335°	334°	333°	332°	331°	330°
	15°	16°	17°	18°	19°	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°
0°	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3
2	1.3	1.3	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7
3	2.0	1.9	1.8	1.7	1.6	1.5	1.5	1.4	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.0
4	2.7	2.5	2.4	2.3	2.1	2.0	2.0	1.9	1.8	1.7	1.7	1.6	1.5	1.5	1.4	1.4
5	3.4	3.2	3.0	2.8	2.7	2.6	2.4	2.3	2.2	2.2	2.1	2.0	1.9	1.9	1.8	1.7
6	4.1	3.8	3.6	3.4	3.2	3.1	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.2	2.1
7	4.7	4.5	4.2	4.0	3.8	3.6	3.4	3.3	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.5
8	5.4	5.1	4.8	4.5	4.3	4.1	3.9	3.8	3.6	3.3	3.3	3.2	3.1	3.0	2.9	2.8
9	6.1	5.7	5.4	5.1	4.9	4.6	4.4	4.2	4.1	3.9	3.7	3.6	3.5	3.4	3.3	3.2
10	6.8	6.4	6.0	5.7	5.4	5.2	4.9	4.7	4.5	4.3	4.2	4.0	3.9	3.8	3.6	3.5
11	7.5	7.1	6.6	6.3	6.0	5.7	5.4	5.2	5.0	4.8	4.6	4.4	4.3	4.1	4.0	3.9
12	8.2	7.7	7.3	6.9	6.5	6.2	5.9	5.7	5.4	5.2	5.0	4.8	4.7	4.5	4.4	4.3
13	8.9	8.4	7.9	7.5	7.1	6.8	6.4	6.2	5.9	5.7	5.5	5.3	5.1	4.9	4.8	4.6
14	9.6	9.0	8.5	8.1	7.7	7.3	7.0	6.7	6.4	6.1	5.9	5.7	5.5	5.3	5.1	5.0
15	10.4	9.7	9.2	8.7	8.2	7.8	7.5	7.2	6.9	6.6	6.3	6.1	5.9	5.7	5.5	5.4
16	11.1	10.4	9.8	9.3	8.8	8.4	8.0	7.7	7.3	7.0	6.8	6.5	6.3	6.1	5.9	5.7
17	11.8	11.1	10.5	9.9	9.4	8.9	8.5	8.2	7.8	7.5	7.2	7.0	6.7	6.5	6.3	6.1
18	12.6	11.8	11.1	10.5	10.0	9.5	9.1	8.7	8.3	8.0	7.7	7.4	7.2	6.9	6.7	6.5
19	13.3	12.5	11.8	11.1	10.6	10.1	9.6	9.2	8.8	8.5	8.1	7.9	7.6	7.3	7.1	6.9
20	14.1	13.2	12.4	11.8	11.2	10.6	10.2	9.7	9.3	8.9	8.6	8.3	8.0	7.8	7.5	7.3
21	14.8	13.9	13.1	12.4	11.8	11.2	10.7	10.2	9.8	9.4	9.1	8.8	8.5	8.2	7.9	7.7
22	15.6	14.7	13.8	13.1	12.4	11.8	11.3	10.8	10.3	9.9	9.6	9.2	8.9	8.6	8.3	8.1
23	16.4	15.4	14.5	13.7	13.0	12.4	11.8	11.3	10.9	10.4	10.0	9.7	9.3	9.0	8.8	8.5
24	17.2	16.2	15.2	14.4	13.7	13.0	12.4	11.9	11.4	10.9	10.5	10.2	9.8	9.5	9.2	8.9
25	18.0	16.9	15.9	15.1	14.3	13.6	13.0	12.4	11.9	11.5	11.0	10.6	10.3	9.9	9.6	9.3
26	18.8	17.7	16.7	15.8	15.0	14.3	13.6	13.0	12.5	12.0	11.5	11.1	10.7	10.4	10.1	9.8
27	19.7	18.5	17.4	16.5	15.7	14.9	14.2	13.6	13.0	12.5	12.1	11.6	11.2	10.9	10.5	10.2
28	20.5	19.3	18.2	17.2	16.3	15.5	14.8	14.2	13.6	13.1	12.6	12.1	11.7	11.3	11.0	10.6
29	21.4	20.1	19.0	17.9	17.0	16.2	15.5	14.8	14.2	13.6	13.1	12.6	12.2	11.8	11.4	11.1
30	22.3	20.9	19.7	18.7	17.7	16.9	16.1	15.4	14.8	14.2	13.7	13.2	12.7	12.3	11.9	11.5
31	23.2	21.8	20.6	19.4	18.5	17.6	16.8	16.0	15.4	14.8	14.2	13.7	13.2	12.8	12.4	12.0
32	24.1	22.7	21.4	20.2	19.2	18.3	17.4	16.7	16.0	15.4	14.8	14.3	13.8	13.3	12.9	12.5
33	25.1	23.6	22.2	21.0	19.9	19.0	18.1	17.3	16.6	16.0	15.4	14.8	14.3	13.8	13.4	13.0
34	26.1	24.5	23.1	21.8	20.7	19.7	18.8	18.0	17.3	16.6	16.0	15.4	14.9	14.4	13.9	13.5
35	27.1	25.4	23.9	22.7	21.5	20.5	19.5	18.7	17.9	17.2	16.6	16.0	15.4	14.9	14.4	14.0
36	28.1	26.4	24.8	23.5	22.3	21.2	20.3	19.4	18.6	17.9	17.2	16.6	16.0	15.5	15.0	14.5
37	29.1	27.3	25.8	24.4	23.1	22.0	21.0	20.1	19.3	18.5	17.8	17.2	16.6	16.1	15.5	15.1
38	30.2	28.3	26.7	25.3	24.0	22.8	21.8	20.9	20.0	19.2	18.5	17.8	17.2	16.6	16.1	15.6
39	31.3	29.4	27.7	26.2	24.9	23.7	22.6	21.6	20.7	19.9	19.2	18.5	17.8	17.2	16.7	16.2
40	32.4	30.4	28.7	27.2	25.8	24.5	23.4	22.4	21.5	20.6	19.9	19.1	18.5	17.9	17.3	16.8
41	33.6	31.5	29.7	28.1	26.7	25.4	24.3	23.2	22.2	21.4	20.6	19.8	19.1	18.5	17.9	17.4
42	34.8	32.7	30.8	29.1	27.7	26.3	25.1	24.0	23.0	22.1	21.3	20.5	19.8	19.2	18.6	18.0
43	36.0	33.8	31.9	30.2	28.6	27.3	26.0	24.9	23.9	22.9	22.1	21.3	20.5	19.9	19.2	18.7
44	37.3	35.0	33.0	31.3	29.7	28.2	26.9	25.8	24.7	23.7	22.9	22.0	21.3	20.6	19.9	19.3
45	38.6	36.3	34.2	32.4	30.7	29.2	27.9	26.7	25.6	24.6	23.7	22.8	22.0	21.3	20.6	20.0
46	40.0	37.6	35.4	33.5	31.8	30.3	28.9	27.6	26.5	25.5	24.5	23.6	22.8	22.1	21.4	20.7
47	41.4	38.9	36.7	34.7	32.9	31.4	29.9	28.6	27.4	26.4	25.4	24.5	23.6	22.3	22.1	21.4
48	42.9	40.3	38.0	35.9	34.1	32.5	31.0	29.6	28.4	27.3	26.3	25.3	24.5	23.7	22.9	22.2
49	44.4	41.7	39.3	37.2	35.3	33.6	32.1	30.7	29.4	28.3	27.2	26.2	25.3	24.5	23.7	23.0
50	46.0	43.2	40.8	38.6	36.6	34.8	33.3	31.8	30.5	29.3	28.2	27.2	26.3	25.4	24.6	23.8
51	47.7	44.8	42.2	40.0	37.9	36.1	34.5	33.0	31.6	30.4	29.2	28.2	27.2	26.3	25.5	24.7
52	49.5	46.4	43.8	41.4	39.3	37.4	35.7	34.2	32.8	31.5	30.3	29.2	28.2	27.3	26.4	25.6
53	51.3	48.1	45.4	42.9	40.8	38.8	37.0	35.4	34.0	32.6	31.4	30.3	29.2	28.3	27.4	26.5
54	53.2	49.9	47.1	44.5	42.3	40.2	38.4	36.7	35.2	33.8	32.6	31.4	30.3	29.3	28.4	27.5
55	55.2	51.8	48.8	46.2	43.9	41.8	39.9	38.1	36.6	35.1	33.8	32.6	31.5	30.4	29.5	28.6
56	57.3	53.8	50.7	48.0	45.5	43.3	41.4	39.6	37.9	36.5	35.1	33.8	32.7	31.6	30.6	29.7
57	59.5	55.9	52.7	49.8	47.3	45.0	43.0	41.1	39.4	37.9	36.4	35.1	33.9	32.8	31.8	30.8
58	61.8	58.1	54.7	51.8	49.2	46.8	44.7	42.7	41.0	39.3	37.9	36.5	35.3	34.1	33.0	32.0
59	64.3	60.4	56.9	53.9	51.1	48.7	46.4	44.4	42.6	40.9	39.4	38.0	36.7	35.5	34.3	33.3
60	66.9	62.8	59.2	56.1	53.2	50.6	48.3	46.2	44.3	42.6	41.0	39.5	38.2	36.9	35.7	34.6
61	69.7	65.5	61.7	58.4	55.4	52.8	50.3	48.2	46.2	44.4	42.7	41.2	39.7	38.4	37.2	36.1
62	72.7	68.2	64.3	60.9	57.8	55.0	52.5	50.2	48.1	46.2	44.5	42.9	41.4	40.1	38.8	37.6
63	75.8	71.2	67.1	63.5	60.3	57.4	54.8	52.4	50.2	48.3	46.4	44.8	43.2	41.8	40.5	39.3
64	79.2	74.4	70.1	66.4	63.0	60.0	57.2	54.7	52.5	50.4	48.5	46.8	45.2	43.7	42.3	41.0
65	82.9	77.8	73.4	69.4	65.9	62.7	59.8	57.3	54.9	52.7	50.7	48.9	47.2	45.7	44.2	42.9
66	86.8	81.5	76.8	72.7	69.0	65.7	62.7	60.0	57.5	55.2	53.1	51.2	49.5	47.8	46.3	44.9
67	91.0	85.5	80.6	76.2	72.4	68.9	65.7	62.9	60.3	57.9	55.7	53.7	51.9	50.2	48.6	47.1
68	95.6	89.8	84.7	80.1	76.0	72.4	69.1	66.1	63.3	60.9	58.6	56.5	54.5	52.7	51.1	49.5
69	101	94.5	89.1	84.3	80.0	76.2	72.7	69.5	66.7	64.0	61.6	59.4	57.4	55.5	53.7	52.1
70	106	99.7	94.0	88.9	84.4	80.3	76.7	73.3	70.3	67.5	65.0	62.7	60.5	58.5	56.7	54.9
71	112	105	99.3	94.0	89.2	84.9	81.0	77.5	74.3	71.4	68.7	66.3	64.0	61.9	59.9	58.1
72	119	112	105	99.6	94.5	90.0	85.9	82.2	78.8	75.7	72.8	70.2	67.8	65.6	63.5	61.5
73	126	119	112	106	100	95.7	91.3	87.3	83.7	80.4	77.4	74.6	72.1	69.7	67.5	65.4
74	135	127	119	113	107	102	97.3	93.1	89.3	85.7	82.5	79.6	76.8	74.3	71.9	69.7
75	144	135	128	121	115	109	104	99.6	95.5	91.8	88.3	85.2	82.2	79.5	77.0	74.6
	165°	164°	163°	162°	161°	160°	159°	158°	157°	156°	155°	154°	153°	152°	151°	150°
	195°	196°	197°	198°	199°	200°	201°	202°	203°	204°	205°	206°	207°	208°	209°	210°

	330°	329°	328°	327°	326°	325°	324°	323°	322°	321°	320°	319°	318°	317°	316°	315°
③	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	41°	42°	43°	44°	45°
0°	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3
3	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.5	0.5
4	1.2	1.2	1.1	1.1	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7
5	1.5	1.5	1.4	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.0	1.0	1.0	0.9	0.9	0.9
6	1.8	1.7	1.7	1.6	1.6	1.5	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.1	1.1	1.1
7	2.1	2.0	2.0	1.9	1.8	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.3	1.3	1.2
8	2.4	2.3	2.2	2.2	2.1	2.0	1.9	1.9	1.8	1.7	1.7	1.6	1.6	1.5	1.5	1.4
9	2.7	2.6	2.5	2.4	2.3	2.3	2.2	2.1	2.0	2.0	1.9	1.8	1.8	1.7	1.6	1.6
10	3.1	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.3	2.2	2.1	2.0	2.0	1.9	1.8	1.8
11	3.4	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.2	2.1	2.0	1.9
12	3.7	3.5	3.4	3.3	3.2	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.4	2.3	2.2	2.1
13	4.0	3.8	3.7	3.6	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3
14	4.3	4.1	4.0	3.8	3.7	3.6	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5
15	4.6	4.5	4.3	4.1	4.0	3.8	3.7	3.6	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.7
16	5.0	4.8	4.6	4.4	4.3	4.1	3.9	3.8	3.7	3.5	3.4	3.3	3.2	3.1	3.0	2.9
17	5.3	5.1	4.9	4.7	4.5	4.4	4.2	4.1	3.9	3.8	3.6	3.5	3.4	3.3	3.2	3.1
18	5.6	5.4	5.2	5.0	4.8	4.6	4.5	4.3	4.2	4.0	3.9	3.7	3.6	3.5	3.4	3.2
19	6.0	5.7	5.5	5.3	5.1	4.9	4.7	4.6	4.4	4.3	4.1	4.0	3.8	3.7	3.6	3.4
20	6.3	6.1	5.8	5.6	5.4	5.2	5.0	4.8	4.7	4.5	4.3	4.2	4.0	3.9	3.8	3.6
21	6.6	6.4	6.1	5.9	5.7	5.5	5.3	5.1	4.9	4.7	4.6	4.4	4.3	4.1	4.0	3.8
22	7.0	6.7	6.5	6.2	6.0	5.8	5.6	5.4	5.2	5.0	4.8	4.6	4.5	4.3	4.2	4.0
23	7.4	7.1	6.8	6.5	6.3	6.1	5.8	5.6	5.4	5.2	5.1	4.9	4.7	4.6	4.4	4.2
24	7.7	7.4	7.1	6.9	6.6	6.4	6.1	5.9	5.7	5.5	5.3	5.1	4.9	4.8	4.6	4.5
25	8.1	7.8	7.5	7.2	6.9	6.7	6.4	6.2	6.0	5.8	5.6	5.4	5.2	5.0	4.8	4.7
26	8.4	8.1	7.8	7.5	7.2	7.0	6.7	6.5	6.2	6.0	5.8	5.6	5.4	5.2	5.1	4.9
27	8.8	8.5	8.2	7.8	7.6	7.3	7.0	6.8	6.5	6.3	6.1	5.9	5.7	5.5	5.3	5.1
28	9.2	8.8	8.5	8.2	7.9	7.6	7.3	7.1	6.8	6.6	6.3	6.1	5.9	5.7	5.5	5.3
29	9.6	9.2	8.9	8.5	8.2	7.9	7.6	7.4	7.1	6.8	6.6	6.4	6.2	5.9	5.7	5.5
30	10.0	9.6	9.2	8.9	8.6	8.2	7.9	7.7	7.4	7.1	6.9	6.6	6.4	6.2	6.0	5.8
31	10.4	10.0	9.6	9.3	8.9	8.6	8.3	8.0	7.7	7.4	7.2	6.9	6.7	6.4	6.2	6.0
32	10.8	10.4	10.0	9.6	9.3	8.9	8.6	8.3	8.0	7.7	7.4	7.2	6.9	6.7	6.5	6.2
33	11.2	10.8	10.4	10.0	9.6	9.3	8.9	8.6	8.3	8.0	7.7	7.5	7.2	7.0	6.7	6.5
34	11.7	11.2	10.8	10.4	10.0	9.6	9.3	9.0	8.6	8.3	8.0	7.8	7.5	7.2	7.0	6.7
35	12.1	11.7	11.2	10.8	10.4	10.0	9.6	9.3	9.0	8.6	8.3	8.1	7.8	7.5	7.3	7.0
36	12.6	12.1	11.6	11.2	10.8	10.4	10.0	9.6	9.3	9.0	8.7	8.4	8.1	7.8	7.5	7.3
37	13.1	12.5	12.1	11.6	11.2	10.8	10.4	10.0	9.6	9.3	9.0	8.7	8.4	8.1	7.8	7.5
38	13.5	13.0	12.5	12.0	11.6	11.2	10.8	10.4	10.0	9.6	9.3	9.0	8.7	8.4	8.1	7.8
39	14.0	13.5	13.0	12.5	12.0	11.6	11.1	10.7	10.4	10.0	9.7	9.3	9.0	8.7	8.4	8.1
40	14.5	14.0	13.4	12.9	12.4	12.0	11.5	11.1	10.7	10.4	10.0	9.7	9.3	9.0	8.7	8.4
41	15.1	14.5	13.9	13.4	12.9	12.4	12.0	11.5	11.1	10.7	10.4	10.0	9.7	9.3	9.0	8.7
42	15.6	15.0	14.4	13.9	13.3	12.9	12.4	11.9	11.5	11.1	10.7	10.4	10.0	9.7	9.3	9.0
43	16.2	15.5	14.9	14.4	13.8	13.3	12.8	12.4	11.9	11.5	11.1	10.7	10.4	10.0	9.7	9.3
44	16.7	16.1	15.5	14.9	14.3	13.8	13.3	12.8	12.4	11.9	11.5	11.1	10.7	10.4	10.0	9.7
45	17.3	16.6	16.0	15.4	14.8	14.3	13.8	13.3	12.8	12.3	11.9	11.5	11.1	10.7	10.4	10.0
46	17.9	17.2	16.6	15.9	15.4	14.8	14.3	13.7	13.3	12.8	12.3	11.9	11.5	11.1	10.7	10.4
47	18.6	17.8	17.2	16.5	15.9	15.3	14.8	14.2	13.7	13.2	12.8	12.3	11.9	11.5	11.1	10.7
48	19.2	18.5	17.8	17.1	16.5	15.9	15.3	14.7	14.2	13.7	13.2	12.8	12.3	11.9	11.5	11.1
49	19.9	19.1	18.4	17.7	17.1	16.4	15.8	15.3	14.7	14.2	13.7	13.2	12.8	12.3	11.9	11.5
50	20.6	19.8	19.1	18.4	17.7	17.0	16.4	15.8	15.3	14.7	14.2	13.7	13.2	12.8	12.3	11.9
51	21.4	20.6	19.8	19.0	18.3	17.6	17.0	16.4	15.8	15.2	14.7	14.2	13.7	13.2	12.8	12.3
52	22.2	21.3	20.5	19.7	19.0	18.3	17.6	17.0	16.4	15.8	15.3	14.7	14.2	13.7	13.3	12.8
53	23.0	22.1	21.2	20.4	19.7	19.0	18.3	17.6	17.0	16.4	15.8	15.3	14.7	14.2	13.7	13.3
54	23.8	22.9	22.0	21.2	20.4	19.7	18.9	18.3	17.6	17.0	16.4	15.8	15.3	14.8	14.3	13.8
55	24.7	23.8	22.9	22.0	21.2	20.4	19.7	19.0	18.3	17.6	17.0	16.4	15.9	15.3	14.8	14.3
56	25.7	24.7	23.7	22.8	22.0	21.2	20.4	19.7	19.0	18.3	17.7	17.1	16.5	15.9	15.4	14.8
57	26.7	25.6	24.6	23.7	22.8	22.0	21.2	20.4	19.7	19.0	18.4	17.7	17.1	16.5	15.9	15.4
58	27.7	26.6	25.6	24.6	23.7	22.9	22.0	21.2	20.5	19.8	19.1	18.4	17.8	17.2	16.6	16.0
59	28.8	27.7	26.6	25.6	24.7	23.8	22.9	22.1	21.3	20.6	19.8	19.1	18.5	17.8	17.2	16.6
60	30.0	28.8	27.7	26.7	25.7	24.7	23.8	23.0	22.2	21.4	20.6	19.9	19.2	18.6	17.9	17.3
61	31.3	30.0	28.9	27.8	26.8	25.8	24.8	23.9	23.1	22.3	21.5	20.8	20.0	19.4	18.7	18.0
62	32.6	31.3	30.1	29.0	27.9	26.9	25.9	25.0	24.1	23.2	22.4	21.6	20.9	20.2	19.5	18.8
63	34.0	32.7	31.4	30.2	29.1	28.0	27.0	26.0	25.1	24.2	23.4	22.6	21.8	21.1	20.3	19.6
64	35.5	34.1	32.8	31.6	30.4	29.3	28.2	27.2	26.2	25.3	24.4	23.6	22.8	22.0	21.2	20.5
65	37.1	35.7	34.3	33.0	31.8	30.6	29.5	28.5	27.5	26.5	25.6	24.7	23.8	23.0	22.2	21.5
66	38.9	37.4	35.9	34.6	33.3	32.1	30.9	29.8	28.7	27.7	26.8	25.8	24.9	24.1	23.3	22.5
67	40.8	39.2	37.7	36.3	34.9	33.6	32.4	31.3	30.2	29.1	28.1	27.1	26.2	25.3	24.4	23.6
68	42.9	41.2	39.6	38.1	36.7	35.3	34.1	32.8	31.7	30.6	29.5	28.5	27.5	26.5	25.6	24.8
69	45.1	43.4	41.7	40.1	38.6	37.2	35.9	34.6	33.4	32.2	31.1	30.0	28.9	27.9	27.0	26.1
70	47.6	45.7	44.0	42.3	40.7	39.2	37.8	36.5	35.2	33.9	32.7	31.6	30.4	29.5	28.5	27.5
71	50.3	48.3	46.5	44.7	43.1	41.5	40.0	38.5	37.2	35.9	34.6	33.4	32.3	31.1	30.1	29.0
72	53.3	51.2	49.3	47.4	45.6	44.0	42.4	40.8	39.4	38.0	36.7	35.4	34.2	33.0	31.9	30.8
73	56.7	54.4	52.3	50.4	48.5	46.7	45.0	43.4	41.9	40.4	39.0	37.6	36.3	35.1	33.9	32.7
74	60.4	58.0	55.8	53.7	51.7	49.8	48.0	46.3	44.6	43.1	41.6	40.1	38.7	37.4	36.1	34.9
75	64.6	62.1	59.7	57.5	55.3	53.3	51.4	49.5	47.8	46.1	44.5	42.9	41.5	40.0	38.7	37.3
	150°	149°	148°	147°	146°	145°	144°	143°	142°	141°	140°	139°	138°	137°	136°	135°
	210°	211°	212°	213°	214°	215°	216°	217°	218°	219°	220°	221°	222°	223°	224°	225°

	330°	329°	328°	327°	326°	325°	324°	323°	322°	321°	320°	319°	318°	317°	316°	315°
	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	41°	42°	43°	44°	45°
0°	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
2	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5
3	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7
4	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0
5	1.7	1.7	1.7	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.2
6	2.1	2.0	2.0	1.9	1.9	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.6	1.5	1.5	1.5
7	2.5	2.4	2.3	2.3	2.2	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.8	1.8	1.8	1.7
8	2.8	2.7	2.7	2.6	2.5	2.5	2.4	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.0	2.0
9	3.2	3.1	3.0	2.9	2.8	2.8	2.7	2.6	2.6	2.5	2.5	2.4	2.4	2.3	2.3	2.2
10	3.5	3.4	3.3	3.2	3.2	3.1	3.0	2.9	2.9	2.8	2.7	2.7	2.6	2.6	2.5	2.5
11	3.9	3.8	3.7	3.6	3.5	3.4	3.3	3.2	3.2	3.1	3.0	3.0	2.9	2.9	2.8	2.7
12	4.3	4.1	4.0	3.9	3.8	3.7	3.6	3.5	3.5	3.4	3.8	3.2	3.2	3.1	3.1	3.0
13	4.6	4.5	4.4	4.2	4.1	4.0	3.9	3.8	3.8	3.7	3.6	3.5	3.5	3.4	3.3	3.3
14	5.0	4.8	4.7	4.6	4.5	4.3	4.2	4.1	4.1	4.0	3.9	3.8	3.7	3.7	3.6	3.5
15	5.4	5.2	5.1	4.9	4.8	4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.0	3.9	3.9	3.8
16	5.7	5.6	5.4	5.3	5.1	5.0	4.9	4.8	4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.1
17	6.1	5.9	5.8	5.6	5.5	5.3	5.2	5.1	5.0	4.9	4.8	4.7	4.6	4.5	4.4	4.3
18	6.5	6.3	6.1	6.0	5.8	5.7	5.5	5.4	5.3	5.2	5.1	5.0	4.9	4.8	4.7	4.6
19	6.9	6.7	6.5	6.3	6.2	6.0	5.9	5.7	5.6	5.5	5.4	5.2	5.1	5.0	5.0	4.9
20	7.3	7.1	6.9	6.7	6.5	6.3	6.2	6.0	5.9	5.8	5.7	5.5	5.4	5.3	5.2	5.1
21	7.7	7.5	7.2	7.0	6.9	6.7	6.5	6.4	6.2	6.1	6.0	5.9	5.7	5.6	5.5	5.4
22	8.1	7.8	7.6	7.4	7.2	7.0	6.9	6.7	6.6	6.4	6.3	6.2	6.0	5.9	5.8	5.7
23	8.5	8.2	8.0	7.8	7.6	7.4	7.2	7.1	6.9	6.7	6.6	6.5	6.3	6.2	6.1	6.0
24	8.9	8.6	8.4	8.2	8.0	7.8	7.6	7.4	7.2	7.1	6.9	6.8	6.7	6.5	6.4	6.3
25	9.3	9.1	8.8	8.6	8.3	8.1	7.9	7.7	7.6	7.4	7.3	7.1	7.0	6.8	6.7	6.6
26	9.8	9.5	9.2	9.0	8.7	8.5	8.3	8.1	7.9	7.8	7.6	7.4	7.3	7.2	7.0	6.9
27	10.2	9.9	9.6	9.4	9.1	8.9	8.7	8.5	8.3	8.1	7.9	7.8	7.6	7.5	7.3	7.2
28	10.6	10.3	10.0	9.8	9.5	9.3	9.0	8.8	8.6	8.4	8.3	8.1	7.9	7.8	7.7	7.5
29	11.1	10.8	10.5	10.2	9.9	9.7	9.4	9.2	9.0	8.8	8.6	8.4	8.3	8.1	8.0	7.8
30	11.5	11.2	10.9	10.6	10.3	10.1	9.8	9.6	9.4	9.2	9.0	8.8	8.6	8.5	8.3	8.2
31	12.0	11.7	11.3	11.0	10.7	10.5	10.2	10.0	9.8	9.5	9.3	9.2	9.0	8.8	8.6	8.5
32	12.5	12.1	11.8	11.5	11.2	10.9	10.6	10.4	10.1	9.9	9.7	9.5	9.3	9.2	9.0	8.8
33	13.0	12.6	12.3	11.9	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.7	9.5	9.3	9.2
34	13.5	13.1	12.7	12.4	12.1	11.8	11.5	11.2	11.0	10.7	10.5	10.3	10.1	9.9	9.7	9.5
35	14.0	13.6	13.2	12.9	12.5	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.5	10.3	10.1	9.9
36	14.5	14.1	13.7	13.3	13.0	12.7	12.4	12.1	11.8	11.5	11.3	11.1	10.9	10.7	10.5	10.3
37	15.1	14.6	14.2	13.8	13.5	13.1	12.8	12.5	12.2	12.0	11.7	11.5	11.3	11.0	10.8	10.7
38	15.6	15.2	14.7	14.3	14.0	13.6	13.3	13.0	12.7	12.4	12.2	11.9	11.7	11.5	11.2	11.0
39	16.2	15.7	15.3	14.9	14.5	14.1	13.8	13.5	13.2	12.9	12.6	12.3	12.1	11.9	11.7	11.5
40	16.8	16.3	15.8	15.4	15.0	14.6	14.3	13.9	13.6	13.3	13.1	12.8	12.5	12.3	12.1	11.9
41	17.4	16.9	16.4	16.0	15.5	15.2	14.8	14.4	14.1	13.8	13.5	13.3	13.0	12.7	12.5	12.3
42	18.0	17.5	17.0	16.5	16.1	15.7	15.3	15.0	14.6	14.3	14.0	13.7	13.5	13.2	13.0	12.7
43	18.7	18.1	17.6	17.1	16.7	16.3	15.9	15.5	15.1	14.8	14.5	14.2	13.9	13.7	13.4	13.2
44	19.3	18.7	18.2	17.7	17.3	16.8	16.4	16.0	15.7	15.3	15.0	14.7	14.4	14.2	13.9	13.7
45	20.0	19.4	18.9	18.4	17.9	17.4	17.0	16.6	16.2	15.9	15.6	15.2	14.9	14.7	14.4	14.1
46	20.7	20.1	19.5	19.0	18.5	18.1	17.6	17.2	16.8	16.5	16.1	15.8	15.5	15.2	14.9	14.6
47	21.4	20.8	20.2	19.7	19.2	18.7	18.2	17.8	17.4	17.0	16.7	16.3	16.0	15.7	15.4	15.2
48	22.2	21.6	21.0	20.4	19.9	19.4	18.9	18.5	18.0	17.6	17.3	16.9	16.6	16.3	16.0	15.7
49	23.0	22.3	21.7	21.1	20.6	20.1	19.6	19.1	18.7	18.3	17.9	17.5	17.2	16.9	16.6	16.3
50	23.8	23.1	22.5	21.9	21.3	20.8	20.3	19.8	19.4	18.9	18.5	18.2	17.8	17.5	17.2	16.9
51	24.7	24.0	23.3	22.7	22.1	21.5	21.0	20.5	20.1	19.6	19.2	18.8	18.5	18.1	17.8	17.5
52	25.6	24.9	24.2	23.5	22.9	22.3	21.8	21.3	20.8	20.3	19.9	19.3	19.1	18.8	18.4	18.1
53	26.5	25.8	25.0	24.4	23.7	23.1	22.6	22.1	21.6	21.1	20.6	20.2	19.8	19.5	19.1	18.8
54	27.5	26.7	26.0	25.3	24.6	24.0	23.4	22.9	22.4	21.9	21.4	21.0	20.6	20.2	19.8	19.5
55	28.6	27.7	27.0	26.2	25.5	24.9	24.3	23.7	23.2	22.7	22.2	21.8	21.3	20.9	20.6	20.2
56	29.7	28.8	28.0	27.2	26.5	25.8	25.2	24.6	24.1	23.6	23.1	22.6	22.2	21.7	21.3	21.0
57	30.8	29.9	29.1	28.3	27.5	26.8	26.2	25.6	25.0	24.5	24.0	23.5	23.0	22.6	22.2	21.8
58	32.0	31.1	30.2	29.4	28.6	27.9	27.2	26.6	26.0	25.4	24.9	24.4	23.9	23.5	23.0	22.6
59	33.3	32.3	31.4	30.6	29.8	29.0	28.3	27.7	27.0	26.4	25.9	25.4	24.9	24.4	24.0	23.5
60	34.6	33.6	32.7	31.8	31.0	30.2	29.5	28.8	28.1	27.5	26.9	26.4	25.9	25.4	24.9	24.5
61	36.1	35.0	34.0	33.1	32.3	31.5	30.7	30.0	29.3	28.7	28.1	27.5	27.0	26.5	26.0	25.5
62	37.6	36.5	35.5	34.5	33.6	32.8	32.0	31.3	30.6	29.9	29.3	28.7	28.1	27.6	27.1	26.6
63	39.3	38.1	37.0	36.0	35.1	34.2	33.4	32.6	31.9	31.2	30.5	29.9	29.3	28.8	28.3	27.8
64	41.0	39.8	38.7	37.7	36.7	35.8	34.9	34.1	33.3	32.6	31.9	31.3	30.6	30.1	29.5	29.0
65	42.9	41.6	40.5	39.4	38.4	37.4	36.5	35.6	34.8	34.1	33.4	32.7	32.1	31.5	30.9	30.3
66	44.9	43.6	42.4	41.2	40.2	39.2	38.2	37.3	36.5	35.7	34.9	34.2	33.6	32.9	32.3	31.8
67	47.1	45.7	44.5	43.3	42.1	41.1	40.1	39.1	38.3	37.4	36.7	35.9	35.2	34.5	33.9	33.3
68	49.5	48.1	46.7	45.4	44.3	43.2	42.1	41.1	40.2	39.3	38.5	37.7	37.0	36.3	35.6	35.0
69	52.1	50.6	49.2	47.8	46.6	45.4	44.3	43.3	42.3	41.4	40.5	39.7	38.9	38.2	37.5	36.8
70	54.9	53.3	51.8	50.4	49.1	47.9	46.7	45.6	44.6	43.7	42.7	41.9	41.1	40.3	39.5	38.9
71	58.1	56.4	54.8	53.3	51.9	50.6	49.4	48.3	47.2	46.1	45.2	44.3	43.4	42.6	41.8	41.1
72	61.5	59.8	58.1	56.5	55.0	53.7	52.4	51.1	50.0	48.9	47.9	46.9	46.0	45.1	44.3	43.5
73	65.4	63.5	61.7	60.1	58.5	57.0	55.7	54.4	53.1	52.0	50.9	49.9	48.9	48.0	47.1	46.3
74	69.7	67.7	65.8	64.0	62.4	60.8	59.3	57.9	56.7	55.4	54.3	53.2	52.1	51.1	50.2	49.3
75	74.6	72.5	70.4	68.5	66.7	65.1	63.5	62.0	60.6	59.3	58.1	56.9	55.8	54.7	53.7	52.8
	150°	149°	148°	147°	146°	145°	144°	143°	142°	141°	140°	139°	138°	137°	136°	135°
	210°	211°	212°	213°	214°	215°	216°	217°	218°	219°	220°	221°	222°	223°	224°	225°

B

A ③	315°	314°	313°	312°	311°	310°	309°	308°	307°	306°	305°	304°	303°	302°	301°	300°
	45°	46°	47°	48°	49°	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°
0°	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2
3	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3
4	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4
5	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.5	0.5	0.5
6	1.1	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6
7	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7
8	1.4	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.8	0.8
9	1.6	1.5	1.5	1.4	1.4	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.0	1.0	1.0	0.9
10	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.1	1.0
11	1.9	1.9	1.8	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.3	1.3	1.2	1.2	1.1
12	2.1	2.1	2.0	1.9	1.8	1.8	1.7	1.7	1.6	1.5	1.5	1.4	1.4	1.3	1.3	1.2
13	2.3	2.2	2.2	2.1	2.0	1.9	1.9	1.8	1.7	1.7	1.6	1.6	1.5	1.4	1.4	1.3
14	2.5	2.4	2.3	2.2	2.2	2.1	2.0	1.9	1.9	1.8	1.7	1.7	1.6	1.6	1.5	1.4
15	2.7	2.6	2.5	2.4	2.3	2.2	2.2	2.1	2.0	1.9	1.9	1.8	1.7	1.7	1.6	1.5
16	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.2	2.1	2.0	1.9	1.9	1.8	1.7	1.7
17	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.1	2.0	1.9	1.8	1.8
18	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.4	2.3	2.2	2.1	2.0	2.0	1.9
19	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.2	2.1	2.0
20	3.6	3.5	3.4	3.3	3.2	3.1	2.9	2.8	2.7	2.6	2.5	2.5	2.4	2.3	2.2	2.1
21	3.8	3.7	3.6	3.5	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2
22	4.0	3.9	3.8	3.6	3.5	3.4	3.3	3.2	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3
23	4.2	4.1	4.0	3.8	3.7	3.6	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5
24	4.5	4.3	4.2	4.0	3.9	3.7	3.6	3.5	3.4	3.2	3.1	3.0	2.9	2.8	2.7	2.6
25	4.7	4.5	4.3	4.2	4.1	3.9	3.8	3.6	3.5	3.4	3.3	3.1	3.0	2.9	2.8	2.7
26	4.9	4.7	4.5	4.4	4.2	4.1	3.9	3.8	3.7	3.5	3.4	3.3	3.2	3.0	2.9	2.8
27	5.1	4.9	4.8	4.6	4.4	4.3	4.1	4.0	3.8	3.7	3.6	3.4	3.3	3.2	3.1	2.9
28	5.3	5.1	5.0	4.8	4.6	4.5	4.3	4.2	4.0	3.9	3.7	3.6	3.5	3.3	3.2	3.1
29	5.5	5.4	5.2	5.0	4.8	4.7	4.5	4.3	4.2	4.0	3.9	3.7	3.6	3.5	3.3	3.2
30	5.8	5.6	5.4	5.2	5.0	4.8	4.7	4.5	4.4	4.2	4.0	3.9	3.7	3.6	3.5	3.3
31	6.0	5.8	5.6	5.4	5.2	5.0	4.9	4.7	4.5	4.4	4.2	4.1	3.9	3.8	3.6	3.5
32	6.2	6.0	5.8	5.6	5.4	5.2	5.1	4.9	4.7	4.5	4.4	4.2	4.1	3.9	3.8	3.6
33	6.5	6.3	6.1	5.8	5.6	5.4	5.3	5.1	4.9	4.7	4.5	4.4	4.2	4.1	3.9	3.7
34	6.7	6.5	6.3	6.1	5.9	5.7	5.5	5.3	5.1	4.9	4.7	4.5	4.4	4.2	4.1	3.9
35	7.0	6.8	6.5	6.3	6.1	5.9	5.7	5.5	5.3	5.1	4.9	4.7	4.5	4.4	4.2	4.0
36	7.3	7.0	6.8	6.5	6.3	6.1	5.9	5.7	5.5	5.3	5.1	4.9	4.7	4.5	4.4	4.2
37	7.5	7.3	7.0	6.8	6.6	6.3	6.1	5.9	5.7	5.5	5.3	5.1	4.9	4.7	4.5	4.4
38	7.8	7.5	7.3	7.0	6.8	6.6	6.3	6.1	5.9	5.7	5.5	5.3	5.1	4.9	4.7	4.5
39	8.1	7.8	7.6	7.3	7.0	6.8	6.6	6.3	6.1	5.9	5.7	5.5	5.3	5.1	4.9	4.7
40	8.4	8.1	7.8	7.6	7.3	7.0	6.8	6.6	6.3	6.1	5.9	5.7	5.4	5.2	5.0	4.8
41	8.7	8.4	8.1	7.8	7.6	7.3	7.0	6.8	6.6	6.3	6.1	5.9	5.6	5.4	5.2	5.0
42	9.0	8.7	8.4	8.1	7.8	7.6	7.3	7.0	6.8	6.5	6.3	6.1	5.8	5.6	5.4	5.2
43	9.3	9.0	8.7	8.4	8.1	7.8	7.6	7.3	7.0	6.8	6.5	6.3	6.1	5.8	5.6	5.4
44	9.7	9.3	9.0	8.7	8.4	8.1	7.8	7.5	7.3	7.0	6.8	6.5	6.3	6.0	5.8	5.6
45	10.0	9.7	9.3	9.0	8.7	8.4	8.1	7.8	7.5	7.3	7.0	6.7	6.5	6.2	6.0	5.8
46	10.4	10.0	9.7	9.3	9.0	8.7	8.4	8.1	7.8	7.5	7.3	7.0	6.7	6.5	6.2	6.0
47	10.7	10.4	10.0	9.7	9.3	9.0	8.7	8.4	8.1	7.8	7.5	7.2	7.0	6.7	6.4	6.2
48	11.1	10.7	10.4	10.0	9.7	9.3	9.0	8.7	8.4	8.1	7.8	7.5	7.2	6.9	6.7	6.4
49	11.5	11.1	10.7	10.4	10.0	9.7	9.3	9.0	8.7	8.4	8.1	7.8	7.5	7.2	6.9	6.6
50	11.9	11.5	11.1	10.7	10.4	10.0	9.7	9.3	9.0	8.7	8.3	8.0	7.7	7.4	7.2	6.9
51	12.3	11.9	11.5	11.1	10.7	10.4	10.0	9.6	9.3	9.0	8.6	8.3	8.0	7.7	7.4	7.1
52	12.8	12.4	11.9	11.5	11.1	10.7	10.4	10.0	9.6	9.3	9.0	8.6	8.3	8.0	7.7	7.4
53	13.3	12.8	12.4	11.9	11.5	11.1	10.7	10.4	10.0	9.6	9.3	9.0	8.6	8.3	8.0	7.7
54	13.8	13.3	12.8	12.4	12.0	11.5	11.1	10.8	10.4	10.0	9.6	9.3	8.9	8.6	8.3	7.9
55	14.3	13.8	13.3	12.9	12.4	12.0	11.6	11.2	10.8	10.4	10.0	9.6	9.3	8.9	8.6	8.2
56	14.8	14.3	13.8	13.3	12.9	12.4	12.0	11.6	11.2	10.8	10.4	10.0	9.6	9.3	8.9	8.6
57	15.4	14.9	14.4	13.9	13.4	12.9	12.5	12.0	11.6	11.2	10.8	10.4	10.0	9.6	9.3	8.9
58	16.0	15.5	14.9	14.4	13.9	13.4	13.0	12.5	12.1	11.6	11.2	10.8	10.4	10.0	9.6	9.2
59	16.6	16.1	15.5	15.0	14.5	14.0	13.5	13.0	12.5	12.1	11.7	11.2	10.8	10.4	10.0	9.6
60	17.3	16.7	16.2	15.6	15.1	14.5	14.0	13.5	13.1	12.6	12.1	11.7	11.2	10.8	10.4	10.0
61	18.0	17.4	16.8	16.2	15.7	15.1	14.6	14.1	13.6	13.1	12.6	12.2	11.7	11.3	10.8	10.4
62	18.8	18.2	17.5	16.9	16.4	15.8	15.2	14.7	14.2	13.7	13.2	12.7	12.2	11.8	11.3	10.9
63	19.6	19.0	18.3	17.7	17.1	16.5	15.9	15.3	14.8	14.3	13.7	13.2	12.8	12.3	11.8	11.3
64	20.5	19.8	19.1	18.5	17.8	17.2	16.6	16.0	15.5	14.9	14.4	13.8	13.3	12.8	12.3	11.8
65	21.5	20.7	20.0	19.3	18.6	18.0	17.4	16.8	16.2	15.6	15.0	14.5	13.9	13.4	12.9	12.4
66	22.5	21.7	20.9	20.2	19.5	18.8	18.2	17.5	16.9	16.3	15.7	15.2	14.6	14.0	13.5	13.0
67	23.6	22.8	22.0	21.2	20.5	19.8	19.1	18.4	17.8	17.1	16.5	15.9	15.3	14.7	14.2	13.6
68	24.8	23.9	23.1	22.3	21.5	20.8	20.0	19.3	18.7	18.0	17.3	16.7	16.1	15.5	14.9	14.3
69	26.1	25.2	24.3	23.5	22.6	21.9	21.1	20.4	19.6	18.9	18.2	17.6	16.9	16.3	15.7	15.0
70	27.5	26.5	25.6	24.7	23.9	23.1	22.3	21.5	20.7	20.0	19.2	18.5	17.8	17.2	16.5	15.9
71	29.0	28.0	27.1	26.2	25.2	24.4	23.5	22.7	21.9	21.1	20.3	19.6	18.9	18.2	17.5	16.8
72	30.8	29.7	28.7	27.7	26.8	25.8	24.9	24.1	23.2	22.4	21.6	20.8	20.0	19.2	18.5	17.8
73	32.7	31.6	30.5	29.5	28.4	27.4	26.5	25.6	24.7	23.8	22.9	22.1	21.2	20.4	19.7	18.9
74	34.9	33.7	32.5	31.4	30.3	29.3	28.2	27.3	26.3	25.3	24.4	23.5	22.7	21.8	21.0	20.1
75	37.3	36.0	34.8	33.6	32.4	31.3	30.2	29.2	28.1	27.1	26.1	25.2	24.2	23.3	22.4	21.6
	135°	134°	133°	132°	131°	130°	129°	128°	127°	126°	125°	124°	123°	122°	121°	120°
QQ	225°	226°	227°	228°	229°	230°	231°	232°	233°	234°	235°	236°	237°	238°	239°	240°

	315°	314°	313°	312°	311°	310°	309°	308°	307°	306°	305°	304°	303°	302°	301°	300°
(3)	45°	46°	47°	48°	49°	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°
0°	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
3	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6
4	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8
5	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0
6	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.2
7	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.5	1.5	1.4	1.4	1.4
8	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.6
9	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8
10	2.5	2.5	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.0
11	2.7	2.7	2.7	2.6	2.6	2.5	2.5	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.2
12	3.0	3.0	2.9	2.9	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.5	2.5
13	3.3	3.2	3.2	3.1	3.1	3.0	3.0	2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7
14	3.5	3.5	3.4	3.4	3.3	3.3	3.2	3.2	3.1	3.1	3.0	3.0	3.0	2.9	2.9	2.9
15	3.8	3.7	3.7	3.6	3.6	3.5	3.4	3.4	3.4	3.3	3.3	3.2	3.2	3.2	3.1	3.1
16	4.1	4.0	3.9	3.9	3.8	3.7	3.7	3.6	3.6	3.5	3.5	3.5	3.4	3.4	3.3	3.3
17	4.3	4.3	4.2	4.1	4.1	4.0	3.9	3.9	3.8	3.8	3.7	3.7	3.6	3.6	3.6	3.5
18	4.6	4.5	4.4	4.4	4.3	4.2	4.2	4.1	4.1	4.0	4.0	3.9	3.9	3.8	3.8	3.8
19	4.9	4.8	4.7	4.6	4.6	4.5	4.4	4.4	4.3	4.3	4.2	4.2	4.1	4.1	4.0	4.0
20	5.1	5.1	5.0	4.9	4.8	4.8	4.7	4.6	4.6	4.5	4.4	4.4	4.3	4.3	4.2	4.2
21	5.4	5.3	5.2	5.2	5.1	5.0	4.9	4.9	4.8	4.7	4.7	4.6	4.6	4.5	4.5	4.4
22	5.7	5.6	5.5	5.4	5.4	5.3	5.2	5.1	5.1	5.0	4.9	4.9	4.8	4.8	4.7	4.7
23	6.0	5.9	5.8	5.7	5.6	5.5	5.5	5.4	5.3	5.2	5.2	5.1	5.1	5.0	5.0	4.8
24	6.3	6.2	6.1	6.0	5.9	5.8	5.7	5.6	5.6	5.5	5.4	5.4	5.3	5.3	5.2	5.1
25	6.6	6.5	6.4	6.3	6.2	6.1	6.0	5.9	5.8	5.8	5.7	5.6	5.6	5.5	5.4	5.4
26	6.9	6.8	6.7	6.6	6.5	6.4	6.3	6.2	6.1	6.0	6.0	5.9	5.8	5.8	5.7	5.6
27	7.2	7.1	7.0	6.9	6.8	6.7	6.6	6.5	6.4	6.3	6.2	6.1	6.1	6.0	5.9	5.9
28	7.5	7.4	7.3	7.2	7.0	6.9	6.8	6.7	6.7	6.6	6.5	6.4	6.3	6.3	6.2	6.1
29	7.8	7.7	7.6	7.5	7.3	7.2	7.1	7.0	6.9	6.9	6.8	6.7	6.6	6.5	6.5	6.4
30	8.2	8.0	7.9	7.8	7.6	7.5	7.4	7.3	7.2	7.1	7.0	7.0	6.9	6.8	6.7	6.7
31	8.5	8.4	8.2	8.1	8.0	7.8	7.7	7.6	7.5	7.4	7.3	7.2	7.2	7.1	7.0	6.9
32	8.8	8.7	8.5	8.4	8.3	8.2	8.0	7.9	7.8	7.7	7.6	7.5	7.4	7.4	7.3	7.2
33	9.2	9.0	8.9	8.7	8.6	8.5	8.4	8.2	8.1	8.0	7.9	7.8	7.7	7.7	7.6	7.5
34	9.5	9.4	9.2	9.1	8.9	8.8	8.7	8.6	8.4	8.3	8.2	8.1	8.0	8.0	7.9	7.8
35	9.9	9.7	9.6	9.4	9.3	9.1	9.0	8.9	8.8	8.7	8.5	8.4	8.3	8.3	8.2	8.1
36	10.3	10.1	9.9	9.8	9.6	9.5	9.3	9.2	9.1	9.0	8.9	8.8	8.7	8.6	8.5	8.4
37	10.7	10.5	10.3	10.1	10.0	9.8	9.7	9.6	9.4	9.3	9.2	9.1	9.0	8.9	8.8	8.7
38	11.0	10.9	10.7	10.5	10.4	10.2	10.1	9.9	9.8	9.7	9.5	9.4	9.3	9.2	9.1	9.0
39	11.5	11.3	11.1	10.9	10.7	10.6	10.4	10.3	10.1	10.0	9.9	9.8	9.7	9.5	9.4	9.4
40	11.9	11.7	11.5	11.3	11.1	11.0	10.8	10.6	10.5	10.4	10.2	10.1	10.0	9.9	9.8	9.7
41	12.3	12.1	11.9	11.7	11.5	11.3	11.2	11.0	10.9	10.7	10.6	10.5	10.4	10.3	10.1	10.0
42	12.7	12.5	12.3	12.1	11.9	11.8	11.6	11.4	11.3	11.1	11.0	10.9	10.7	10.6	10.5	10.4
43	13.2	13.0	12.8	12.5	12.4	12.2	12.0	11.8	11.7	11.5	11.4	11.2	11.1	11.0	10.9	10.8
44	13.7	13.4	13.2	13.0	12.8	12.6	12.4	12.3	12.1	11.9	11.8	11.6	11.5	11.4	11.3	11.2
45	14.1	13.9	13.7	13.5	13.3	13.1	12.9	12.7	12.5	12.4	12.2	12.1	11.9	11.8	11.7	11.5
46	14.6	14.4	14.2	13.9	13.7	13.5	13.3	13.1	13.0	12.8	12.6	12.5	12.3	12.2	12.1	12.0
47	15.2	14.9	14.7	14.4	14.2	14.0	13.8	13.6	13.4	13.3	13.1	12.9	12.8	12.6	12.5	12.4
48	15.7	15.4	15.2	14.9	14.7	14.5	14.3	14.1	13.9	13.7	13.6	13.4	13.2	13.1	13.0	12.8
49	16.3	16.0	15.7	15.5	15.2	15.0	14.8	14.6	14.4	14.2	14.0	13.9	13.7	13.6	13.4	13.3
50	16.9	16.6	16.3	16.0	15.8	15.6	15.3	15.1	14.9	14.7	14.5	14.4	14.2	14.1	13.9	13.8
51	17.5	17.2	16.9	16.6	16.4	16.1	15.9	15.7	15.5	15.3	15.1	14.9	14.7	14.6	14.4	14.3
52	18.1	17.8	17.5	17.2	17.0	16.7	16.5	16.2	16.0	15.8	15.6	15.4	15.3	15.1	14.9	14.8
53	18.8	18.4	18.1	17.9	17.6	17.3	17.1	16.8	16.6	16.4	16.2	16.0	15.8	15.6	15.5	15.3
54	19.5	19.1	18.8	18.5	18.2	18.0	17.7	17.5	17.2	17.0	16.8	16.6	16.4	16.2	16.1	15.9
55	20.2	19.9	19.5	19.2	18.9	18.6	18.4	18.1	17.9	17.7	17.4	17.2	17.0	16.8	16.7	16.5
56	21.0	20.6	20.3	19.9	19.6	19.4	19.1	18.8	18.6	18.3	18.1	17.9	17.7	17.5	17.3	17.1
57	21.8	21.4	21.1	20.7	20.4	20.1	19.8	19.5	19.3	19.0	18.8	18.6	18.4	18.2	18.0	17.8
58	22.6	22.2	21.9	21.5	21.2	20.9	20.6	20.3	20.0	19.8	19.5	19.3	19.1	18.9	18.7	18.5
59	23.5	23.1	22.8	22.4	22.1	21.7	21.4	21.1	20.8	20.6	20.3	20.1	19.8	19.6	19.4	19.2
60	24.5	24.1	23.7	23.3	22.9	22.6	22.3	22.0	21.7	21.4	21.1	20.9	20.7	20.4	20.2	20.0
61	25.5	25.1	24.7	24.3	23.9	23.6	23.2	22.9	22.6	22.3	22.0	21.8	21.5	21.3	21.1	20.8
62	26.6	26.2	25.7	25.3	24.9	24.6	24.2	23.9	23.6	23.3	23.0	22.7	22.4	22.2	21.9	21.7
63	27.8	27.3	26.8	26.4	26.0	25.6	25.3	24.9	24.6	24.3	24.0	23.7	23.4	23.1	22.9	22.7
64	29.0	28.5	28.0	27.6	27.2	26.8	26.4	26.0	25.7	25.3	25.0	24.7	24.5	24.2	23.9	23.7
65	30.3	29.8	29.3	28.9	28.4	28.0	27.6	27.2	26.9	26.5	26.2	25.9	25.6	25.3	25.0	24.8
66	31.8	31.2	30.7	30.2	29.8	29.3	28.9	28.5	28.1	27.8	27.4	27.1	26.8	26.5	26.2	25.9
67	33.3	32.8	32.2	31.7	31.2	30.8	30.3	29.9	29.5	29.1	28.8	28.4	28.1	27.8	27.5	27.2
68	35.0	34.4	33.8	33.3	32.8	32.3	31.8	31.4	31.0	30.6	30.2	29.9	29.5	29.2	28.9	28.6
69	36.8	36.2	35.6	35.1	34.5	34.0	33.5	33.1	32.6	32.2	31.8	31.4	31.1	30.7	30.4	30.1
70	38.9	38.2	37.6	37.0	36.4	35.9	35.4	34.9	34.4	34.0	33.5	33.1	32.8	32.4	32.0	31.7
71	41.1	40.4	39.7	39.1	38.5	37.9	37.4	36.8	36.4	35.9	35.4	35.0	34.6	34.2	33.9	33.5
72	43.5	42.8	42.1	41.4	40.8	40.2	39.6	39.1	38.5	38.0	37.6	37.1	36.7	36.3	35.9	35.5
73	46.3	45.5	44.7	44.0	43.3	42.7	42.1	41.5	41.0	40.4	39.9	39.5	39.0	38.6	38.2	37.8
74	49.3	48.5	47.7	46.9	46.2	45.5	44.9	44.3	43.7	43.1	42.6	42.1	41.6	41.1	40.7	40.3
75	52.8	51.9	51.0	50.2	49.5	48.7	48.0	47.4	46.7	46.1	45.6	45.0	44.5	44.0	43.5	43.1
	135°	134°	133°	132°	131°	130°	129°	128°	127°	126°	125°	124°	123°	122°	121°	120°
	225°	226°	227°	228°	229°	230°	231°	232°	233°	234°	235°	236°	237°	238°	239°	240°

	300°	299°	298°	297°	296°	295°	294°	293°	292°	291°	290°	289°	288°	287°	286°	285°
③	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	71°	72°	73°	74°	75°
0°	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1
4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2
5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2
6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3
7	0.7	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3
8	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4
9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.4
10	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5
11	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.5
12	1.2	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6
13	1.3	1.3	1.2	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.6
14	1.4	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7
15	1.5	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7
16	1.7	1.6	1.5	1.5	1.4	1.3	1.3	1.2	1.2	1.1	1.0	1.0	0.9	0.9	0.8	0.8
17	1.8	1.7	1.6	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.0	0.9	0.9	0.8
18	1.9	1.8	1.7	1.7	1.6	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.0	0.9	0.9
19	2.0	1.9	1.8	1.8	1.7	1.6	1.5	1.5	1.4	1.3	1.3	1.2	1.1	1.1	1.0	0.9
20	2.1	2.0	1.9	1.9	1.8	1.7	1.6	1.5	1.5	1.4	1.3	1.3	1.2	1.1	1.0	1.0
21	2.2	2.1	2.0	2.0	1.9	1.8	1.7	1.6	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0
22	2.3	2.2	2.1	2.1	2.0	1.9	1.8	1.7	1.6	1.6	1.5	1.4	1.3	1.2	1.2	1.1
23	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.5	1.4	1.3	1.2	1.1
24	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.4	1.3	1.2
25	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2
26	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3
27	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4
28	3.1	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4
29	3.2	3.1	2.9	2.8	2.7	2.6	2.5	2.4	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5
30	3.3	3.2	3.1	2.9	2.8	2.7	2.6	2.5	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.5
31	3.5	3.3	3.2	3.1	2.9	2.8	2.7	2.6	2.4	2.3	2.2	2.1	1.9	1.8	1.7	1.6
32	3.6	3.5	3.3	3.2	3.0	2.9	2.8	2.7	2.5	2.4	2.3	2.2	2.0	1.9	1.8	1.7
33	3.7	3.6	3.5	3.3	3.2	3.0	2.9	2.8	2.6	2.5	2.4	2.2	2.1	2.0	1.9	1.7
34	3.9	3.7	3.6	3.4	3.3	3.1	3.0	2.9	2.7	2.6	2.5	2.3	2.2	2.1	1.9	1.8
35	4.0	3.9	3.7	3.6	3.4	3.3	3.1	3.0	2.8	2.7	2.5	2.4	2.3	2.1	2.0	1.9
36	4.2	4.0	3.9	3.7	3.5	3.4	3.2	3.1	2.9	2.8	2.6	2.5	2.4	2.2	2.1	1.9
37	4.4	4.2	4.0	3.8	3.7	3.5	3.4	3.2	3.0	2.9	2.7	2.6	2.4	2.3	2.2	2.0
38	4.5	4.3	4.2	4.0	3.8	3.6	3.5	3.3	3.2	3.0	2.8	2.7	2.5	2.4	2.2	2.1
39	4.7	4.5	4.3	4.1	3.9	3.8	3.6	3.4	3.3	3.1	2.9	2.8	2.6	2.5	2.3	2.2
40	4.8	4.7	4.5	4.3	4.1	3.9	3.7	3.6	3.4	3.2	3.1	2.9	2.7	2.6	2.4	2.2
41	5.0	4.8	4.6	4.4	4.2	4.1	3.9	3.7	3.5	3.3	3.2	3.0	2.8	2.7	2.5	2.3
42	5.2	5.0	4.8	4.6	4.4	4.2	4.0	3.8	3.6	3.5	3.3	3.1	2.9	2.8	2.6	2.4
43	5.4	5.2	5.0	4.8	4.5	4.3	4.2	4.0	3.8	3.6	3.4	3.2	3.0	2.9	2.7	2.5
44	5.6	5.4	5.1	4.9	4.7	4.5	4.3	4.1	3.9	3.7	3.5	3.3	3.1	3.0	2.8	2.6
45	5.8	5.5	5.3	5.1	4.9	4.7	4.5	4.2	4.0	3.8	3.6	3.4	3.2	3.1	2.9	2.7
46	6.0	5.7	5.5	5.3	5.1	4.8	4.6	4.4	4.2	4.0	3.8	3.6	3.4	3.2	3.0	2.8
47	6.2	5.9	5.7	5.5	5.2	5.0	4.8	4.6	4.3	4.1	3.9	3.7	3.5	3.3	3.1	2.9
48	6.4	6.2	5.9	5.7	5.4	5.2	4.9	4.7	4.5	4.3	4.0	3.8	3.6	3.4	3.2	3.0
49	6.6	6.4	6.1	5.9	5.6	5.4	5.1	4.9	4.6	4.4	4.2	4.0	3.7	3.5	3.3	3.1
50	6.9	6.6	6.3	6.1	5.8	5.6	5.3	5.1	4.8	4.6	4.3	4.1	3.9	3.6	3.4	3.2
51	7.1	6.8	6.6	6.3	6.0	5.8	5.5	5.2	5.0	4.7	4.5	4.3	4.0	3.8	3.5	3.3
52	7.4	7.1	6.8	6.5	6.2	6.0	5.7	5.4	5.2	4.9	4.7	4.4	4.2	3.9	3.7	3.4
53	7.7	7.4	7.1	6.8	6.5	6.2	5.9	5.6	5.4	5.1	4.8	4.6	4.3	4.1	3.8	3.6
54	7.9	7.6	7.3	7.0	6.7	6.4	6.1	5.8	5.6	5.3	5.0	4.7	4.5	4.2	3.9	3.7
55	8.2	7.9	7.6	7.3	7.0	6.7	6.4	6.1	5.8	5.5	5.2	4.9	4.6	4.4	4.1	3.8
56	8.6	8.2	7.9	7.6	7.2	6.9	6.6	6.3	6.0	5.7	5.4	5.1	4.8	4.5	4.3	4.0
57	8.9	8.5	8.2	7.8	7.5	7.2	6.9	6.5	6.2	5.9	5.6	5.3	5.0	4.7	4.4	4.1
58	9.2	8.9	8.5	8.2	7.8	7.5	7.1	6.8	6.5	6.1	5.8	5.5	5.2	4.9	4.6	4.3
59	9.6	9.2	8.8	8.5	8.1	7.8	7.4	7.1	6.7	6.4	6.1	5.7	5.4	5.1	4.8	4.5
60	10.0	9.6	9.2	8.8	8.4	8.1	7.7	7.4	7.0	6.6	6.3	6.0	5.6	5.3	5.0	4.6
61	10.4	10.0	9.6	9.2	8.8	8.4	8.0	7.7	7.3	6.9	6.6	6.2	5.9	5.5	5.2	4.8
62	10.9	10.4	10.0	9.6	9.2	8.8	8.4	8.0	7.6	7.2	6.9	6.5	6.1	5.8	5.4	5.0
63	11.3	10.9	10.4	10.0	9.6	9.2	8.7	8.3	7.9	7.5	7.2	6.8	6.4	6.0	5.6	5.3
64	11.8	11.4	10.9	10.5	10.0	9.6	9.1	8.7	8.3	7.9	7.5	7.1	6.7	6.3	5.9	5.5
65	12.4	11.9	11.4	10.9	10.5	10.0	9.6	9.1	8.7	8.2	7.8	7.4	7.0	6.6	6.2	5.8
66	13.0	12.5	11.9	11.4	11.0	10.5	10.0	9.5	9.1	8.6	8.2	7.7	7.3	6.9	6.4	6.0
67	13.6	13.1	12.5	12.0	11.5	11.0	10.5	10.0	9.5	9.0	8.6	8.1	7.7	7.2	6.8	6.3
68	14.3	13.7	13.2	12.6	12.1	11.5	10.9	10.5	10.0	9.5	9.0	8.5	8.0	7.6	7.1	6.6
69	15.0	14.4	13.9	13.3	12.7	12.2	11.6	11.1	10.5	10.0	9.5	9.0	8.5	8.0	7.5	7.0
70	15.9	15.2	14.6	14.0	13.4	12.8	12.2	11.7	11.1	10.5	10.0	9.5	8.9	8.4	7.9	7.4
71	16.8	16.1	15.4	14.8	14.2	13.5	12.9	12.3	11.7	11.1	10.6	10.0	9.4	8.9	8.3	7.8
72	17.8	17.1	16.4	15.7	15.0	14.4	13.7	13.1	12.4	11.8	11.2	10.6	10.0	9.4	8.8	8.2
73	18.9	18.1	17.4	16.7	16.0	15.3	14.6	13.9	13.2	12.6	11.9	11.3	10.6	10.0	9.4	8.8
74	20.1	19.3	18.5	17.8	17.0	16.3	15.5	14.8	14.1	13.4	12.7	12.0	11.3	10.7	10.0	9.3
75	21.6	20.7	19.8	19.0	18.2	17.4	16.6	15.8	15.1	14.3	13.6	12.9	12.1	11.4	10.7	10.0
	120°	119°	118°	117°	116°	115°	114°	113°	112°	111°	110°	109°	108°	107°	106°	105°
	240°	241°	242°	243°	244°	245°	246°	247°	248°	249°	250°	251°	252°	253°	254°	255°

	300°	299°	298°	297°	296°	295°	294°	293°	292°	291°	290°	289°	288°	287°	286°	285°
(3)	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	71°	72°	73°	74°	75°
0°	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
3	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5
4	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7
5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
6	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
7	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
8	1.6	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
9	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.6
10	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8
11	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0
12	2.5	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
13	2.7	2.6	2.6	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4
14	2.9	2.9	2.8	2.8	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.6	2.6
15	3.1	3.1	3.0	3.0	3.0	3.0	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.8
16	3.3	3.3	3.2	3.2	3.2	3.2	3.1	3.1	3.1	3.1	3.1	3.0	3.0	3.0	3.0	3.0
17	3.5	3.5	3.5	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.2	3.2	3.2	3.2	3.2
18	3.8	3.7	3.7	3.6	3.6	3.6	3.6	3.5	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.4
19	4.0	3.9	3.9	3.9	3.8	3.8	3.8	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.6	3.6
20	4.2	4.2	4.1	4.1	4.0	4.0	4.0	4.0	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.8
21	4.4	4.4	4.3	4.3	4.3	4.2	4.2	4.2	4.1	4.1	4.1	4.1	4.0	4.0	4.0	4.0
22	4.7	4.6	4.6	4.5	4.5	4.5	4.4	4.4	4.4	4.3	4.3	4.3	4.2	4.2	4.2	4.2
23	4.9	4.9	4.8	4.8	4.7	4.7	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.4	4.4	4.4
24	5.1	5.1	5.0	5.0	5.0	4.9	4.9	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.6	4.6
25	5.4	5.3	5.3	5.2	5.2	5.1	5.1	5.1	5.0	5.0	5.0	4.9	4.9	4.9	4.9	4.8
26	5.6	5.6	5.5	5.5	5.4	5.4	5.3	5.3	5.3	5.2	5.2	5.2	5.1	5.1	5.1	5.0
27	5.9	5.8	5.8	5.7	5.7	5.6	5.6	5.5	5.5	5.5	5.4	5.4	5.4	5.3	5.3	5.3
28	6.1	6.1	6.0	6.0	5.9	5.9	5.8	5.8	5.7	5.7	5.7	5.6	5.6	5.6	5.5	5.5
29	6.4	6.3	6.3	6.2	6.2	6.1	6.1	6.0	6.0	5.9	5.9	5.9	5.8	5.8	5.8	5.7
30	6.7	6.6	6.5	6.5	6.4	6.4	6.3	6.3	6.2	6.2	6.1	6.1	6.1	6.0	6.0	6.0
31	6.9	6.9	6.8	6.7	6.7	6.6	6.6	6.5	6.5	6.4	6.4	6.4	6.3	6.3	6.3	6.2
32	7.2	7.1	7.1	7.0	7.0	6.9	6.8	6.8	6.7	6.7	6.6	6.6	6.6	6.5	6.5	6.5
33	7.5	7.4	7.4	7.3	7.2	7.2	7.1	7.1	7.0	7.0	6.9	6.9	6.8	6.8	6.8	6.7
34	7.8	7.7	7.6	7.6	7.5	7.4	7.4	7.3	7.3	7.2	7.2	7.1	7.1	7.1	7.0	7.0
35	8.1	8.0	7.9	7.9	7.8	7.7	7.7	7.6	7.6	7.5	7.5	7.4	7.4	7.3	7.3	7.2
36	8.4	8.3	8.2	8.2	8.1	8.0	8.0	7.9	7.8	7.8	7.7	7.7	7.6	7.6	7.6	7.5
37	8.7	8.6	8.5	8.5	8.4	8.3	8.2	8.2	8.1	8.1	8.0	8.0	7.9	7.9	7.8	7.8
38	9.0	8.9	8.8	8.8	8.7	8.6	8.6	8.5	8.4	8.4	8.3	8.3	8.2	8.2	8.1	8.1
39	9.4	9.3	9.2	9.1	9.0	8.9	8.9	8.8	8.7	8.7	8.6	8.6	8.5	8.5	8.4	8.4
40	9.7	9.6	9.5	9.4	9.3	9.3	9.2	9.1	9.0	9.0	8.9	8.9	8.8	8.8	8.7	8.7
41	10.0	9.9	9.8	9.8	9.7	9.6	9.5	9.4	9.4	9.3	9.3	9.2	9.1	9.1	9.0	9.0
42	10.4	10.3	10.2	10.1	10.0	9.9	9.9	9.8	9.7	9.6	9.6	9.5	9.5	9.4	9.4	9.3
43	10.8	10.7	10.6	10.5	10.4	10.3	10.2	10.1	10.1	10.0	9.9	9.9	9.8	9.8	9.7	9.7
44	11.2	11.0	10.9	10.8	10.7	10.7	10.6	10.5	10.4	10.3	10.3	10.2	10.2	10.1	10.0	10.0
45	11.5	11.4	11.3	11.2	11.1	11.0	10.9	10.9	10.8	10.7	10.6	10.6	10.5	10.5	10.4	10.4
46	12.0	11.8	11.7	11.6	11.5	11.4	11.3	11.2	11.2	11.1	11.0	11.0	10.9	10.8	10.8	10.7
47	12.4	12.3	12.1	12.0	11.9	11.8	11.7	11.6	11.6	11.5	11.4	11.3	11.3	11.2	11.2	11.1
48	12.8	12.7	12.6	12.5	12.4	12.3	12.2	12.1	12.0	11.9	11.8	11.7	11.7	11.6	11.6	11.5
49	13.3	13.2	13.0	12.9	12.8	12.7	12.6	12.5	12.4	12.3	12.2	12.2	12.1	12.0	12.0	11.9
50	13.8	13.6	13.5	13.4	13.3	13.1	13.0	12.9	12.9	12.8	12.7	12.6	12.5	12.5	12.4	12.3
51	14.3	14.1	14.0	13.9	13.7	13.6	13.5	13.4	13.3	13.2	13.1	13.1	13.0	12.9	12.8	12.8
52	14.8	14.6	14.5	14.4	14.2	14.1	14.0	13.9	13.8	13.7	13.6	13.5	13.5	13.4	13.3	13.3
53	15.3	15.2	15.0	14.9	14.8	14.6	14.5	14.4	14.3	14.2	14.1	14.0	14.0	13.9	13.8	13.7
54	15.9	15.7	15.6	15.4	15.3	15.2	15.1	15.0	14.8	14.7	14.6	14.6	14.5	14.4	14.3	14.2
55	16.5	16.3	16.2	16.0	15.9	15.8	15.6	15.5	15.4	15.3	15.2	15.1	15.0	14.9	14.9	14.8
56	17.1	17.0	16.8	16.6	16.5	16.4	16.2	16.1	16.0	15.9	15.8	15.7	15.6	15.5	15.4	15.3
57	17.8	17.6	17.4	17.3	17.1	17.0	16.9	16.7	16.6	16.5	16.4	16.3	16.2	16.1	16.0	15.9
58	18.5	18.3	18.1	18.0	17.8	17.7	17.5	17.4	17.3	17.1	17.0	16.9	16.8	16.7	16.6	16.6
59	19.2	19.0	18.8	18.7	18.5	18.4	18.2	18.1	17.9	17.8	17.7	17.6	17.5	17.4	17.3	17.2
60	20.0	19.8	19.6	19.4	19.3	19.1	19.0	18.8	18.7	18.6	18.4	18.3	18.2	18.1	18.0	17.9
61	20.8	20.6	20.4	20.3	20.1	19.9	19.8	19.6	19.5	19.3	19.2	19.1	19.0	18.9	18.8	18.7
62	21.7	21.5	21.3	21.1	20.9	20.8	20.6	20.4	20.3	20.2	20.0	19.9	19.8	19.7	19.6	19.5
63	22.7	22.4	22.2	22.0	21.8	21.7	21.5	21.3	21.2	21.0	20.9	20.8	20.6	20.5	20.4	20.3
64	23.7	23.4	23.2	23.0	22.8	22.6	22.4	22.3	22.1	22.0	21.8	21.7	21.6	21.4	21.3	21.2
65	24.8	24.5	24.3	24.1	23.9	23.7	23.5	23.3	23.1	23.0	22.8	22.7	22.6	22.4	22.3	22.2
66	25.9	25.7	25.4	25.2	25.0	24.8	24.6	24.4	24.2	24.1	23.9	23.8	23.6	23.5	23.4	23.3
67	27.2	26.9	26.7	26.4	26.2	26.0	25.8	25.6	25.4	25.2	25.1	24.9	24.8	24.6	24.5	24.4
68	28.6	28.3	28.0	27.8	27.5	27.3	27.1	26.9	26.7	26.5	26.3	26.2	26.0	25.9	25.7	25.6
69	30.1	29.8	29.5	29.2	29.0	28.7	28.5	28.3	28.1	27.9	27.7	27.6	27.4	27.2	27.1	27.0
70	31.7	31.4	31.1	30.8	30.6	30.3	30.1	29.8	29.6	29.4	29.2	29.1	28.9	28.7	28.6	28.4
71	33.5	33.2	32.9	32.6	32.3	32.0	31.8	31.6	31.3	31.1	30.9	30.7	30.5	30.4	30.2	30.1
72	35.5	35.2	34.9	34.5	34.2	34.0	33.7	33.4	33.2	33.0	32.8	32.6	32.4	32.2	32.0	31.9
73	37.8	37.4	37.0	36.7	36.4	36.1	35.8	35.5	35.3	35.0	34.8	34.6	34.4	34.2	34.0	33.9
74	40.3	39.9	39.5	39.1	38.8	38.5	38.2	37.9	37.6	37.4	37.1	36.9	36.7	36.5	36.3	36.1
75	43.1	42.7	42.3	41.9	41.5	41.2	40.9	40.5	40.3	40.0	39.7	39.5	39.2	39.0	38.8	38.6
	120°	119°	118°	117°	116°	115°	114°	113°	112°	111°	110°	109°	108°	107°	106°	105°
	240°	241°	242°	243°	244°	245°	246°	247°	248°	249°	250°	251°	252°	253°	254°	255°

A ③	285°	284°	283°	282°	281°	280°	279°	278°	277°	276°	275°	274°	273°	272°	271°	270°
	75°	76°	77°	78°	79°	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°
0°	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
4	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
5	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
6	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
7	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0
8	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0
9	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0
10	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0
11	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0
12	0.6	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.0	0.0
13	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.0	0.0
14	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.0	0.0
15	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0.3	0.1	0.1	0.0	0.0
16	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.0
17	0.8	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.0
18	0.9	0.8	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.0
19	0.9	0.9	0.8	0.7	0.7	0.6	0.5	0.5	0.4	0.4	0.3	0.2	0.2	0.1	0.1	0.0
20	1.0	0.9	0.8	0.8	0.7	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.1	0.1	0.0
21	1.0	1.0	0.9	0.8	0.7	0.7	0.6	0.5	0.5	0.4	0.3	0.3	0.2	0.1	0.1	0.0
22	1.1	1.0	0.9	0.9	0.8	0.7	0.6	0.6	0.5	0.4	0.4	0.3	0.2	0.1	0.1	0.0
23	1.1	1.1	1.0	0.9	0.8	0.7	0.7	0.6	0.5	0.4	0.4	0.3	0.2	0.1	0.1	0.0
24	1.2	1.1	1.0	0.9	0.9	0.8	0.7	0.6	0.5	0.5	0.4	0.3	0.2	0.2	0.1	0.0
25	1.2	1.2	1.1	1.0	0.9	0.8	0.7	0.7	0.6	0.5	0.4	0.3	0.2	0.2	0.1	0.0
26	1.3	1.2	1.1	1.0	0.9	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.3	0.2	0.1	0.0
27	1.4	1.3	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.5	0.4	0.4	0.3	0.2	0.1	0.0
28	1.4	1.3	1.2	1.1	1.0	0.9	0.8	0.7	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0.0
29	1.5	1.4	1.3	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0.0
30	1.5	1.4	1.3	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0.0
31	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0.0
32	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.9	0.8	0.7	0.5	0.4	0.3	0.2	0.1	0.0
33	1.7	1.6	1.5	1.4	1.3	1.1	1.0	0.9	0.8	0.7	0.6	0.5	0.3	0.2	0.1	0.0
34	1.8	1.7	1.6	1.4	1.3	1.2	1.1	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.1	0.0
35	1.9	1.7	1.6	1.5	1.4	1.2	1.1	1.0	0.9	0.7	0.6	0.5	0.4	0.2	0.1	0.0
36	1.9	1.8	1.7	1.5	1.4	1.3	1.2	1.0	0.9	0.8	0.6	0.5	0.4	0.3	0.1	0.0
37	2.0	1.9	1.7	1.6	1.5	1.3	1.2	1.1	0.9	0.8	0.7	0.5	0.4	0.3	0.1	0.0
38	2.1	1.9	1.8	1.7	1.5	1.4	1.2	1.1	1.0	0.8	0.7	0.5	0.4	0.3	0.1	0.0
39	2.2	2.0	1.9	1.7	1.6	1.4	1.3	1.1	1.0	0.9	0.7	0.6	0.4	0.3	0.1	0.0
40	2.2	2.1	1.9	1.8	1.6	1.5	1.3	1.2	1.0	0.9	0.7	0.6	0.4	0.3	0.1	0.0
41	2.3	2.2	2.0	1.8	1.7	1.5	1.4	1.2	1.1	0.9	0.8	0.6	0.5	0.3	0.2	0.0
42	2.4	2.2	2.1	1.9	1.8	1.6	1.4	1.3	1.1	0.9	0.8	0.6	0.5	0.3	0.2	0.0
43	2.5	2.3	2.2	2.0	1.8	1.6	1.5	1.3	1.1	1.0	0.8	0.7	0.5	0.3	0.2	0.0
44	2.6	2.4	2.2	2.1	1.9	1.7	1.5	1.4	1.2	1.0	0.8	0.7	0.5	0.3	0.2	0.0
45	2.7	2.5	2.3	2.1	1.9	1.8	1.6	1.4	1.2	1.1	0.9	0.7	0.5	0.3	0.2	0.0
46	2.8	2.6	2.4	2.2	2.0	1.8	1.6	1.5	1.3	1.1	0.9	0.7	0.5	0.4	0.2	0.0
47	2.9	2.7	2.5	2.3	2.1	1.9	1.7	1.5	1.3	1.1	0.9	0.7	0.6	0.4	0.2	0.0
48	3.0	2.8	2.6	2.4	2.2	2.0	1.8	1.6	1.4	1.2	1.0	0.8	0.6	0.4	0.2	0.0
49	3.1	2.9	2.7	2.4	2.2	2.0	1.8	1.6	1.4	1.2	1.0	0.8	0.6	0.4	0.2	0.0
50	3.2	3.0	2.8	2.5	2.3	2.1	1.9	1.7	1.5	1.3	1.0	0.8	0.6	0.4	0.2	0.0
51	3.3	3.1	2.9	2.6	2.4	2.2	2.0	1.7	1.5	1.3	1.1	0.9	0.6	0.4	0.2	0.0
52	3.4	3.2	3.0	2.7	2.5	2.3	2.0	1.8	1.6	1.3	1.1	0.9	0.7	0.4	0.2	0.0
53	3.6	3.3	3.1	2.8	2.6	2.3	2.1	1.9	1.6	1.4	1.2	0.9	0.7	0.5	0.2	0.0
54	3.7	3.4	3.2	2.9	2.7	2.4	2.2	1.9	1.7	1.4	1.2	1.0	0.7	0.5	0.2	0.0
55	3.8	3.6	3.3	3.0	2.8	2.5	2.3	2.0	1.8	1.5	1.2	1.0	0.7	0.5	0.2	0.0
56	4.0	3.7	3.4	3.2	2.9	2.6	2.3	2.1	1.8	1.6	1.3	1.0	0.8	0.5	0.3	0.0
57	4.1	3.8	3.6	3.3	3.0	2.7	2.4	2.2	1.9	1.6	1.3	1.1	0.8	0.5	0.3	0.0
58	4.3	4.0	3.7	3.4	3.1	2.8	2.5	2.2	2.0	1.7	1.4	1.1	0.8	0.6	0.3	0.0
59	4.5	4.1	3.8	3.5	3.2	2.9	2.6	2.3	2.0	1.7	1.5	1.2	0.9	0.6	0.3	0.0
60	4.6	4.3	4.0	3.7	3.4	3.1	2.7	2.4	2.1	1.8	1.5	1.2	0.9	0.6	0.3	0.0
61	4.8	4.5	4.2	3.8	3.5	3.2	2.9	2.5	2.2	1.9	1.6	1.3	1.0	0.6	0.3	0.0
62	5.0	4.7	4.3	4.0	3.7	3.3	3.0	2.6	2.3	2.0	1.7	1.3	1.0	0.7	0.3	0.0
63	5.3	4.9	4.5	4.2	3.8	3.5	3.1	2.8	2.4	2.1	1.7	1.4	1.0	0.7	0.3	0.0
64	5.5	5.1	4.7	4.4	4.0	3.6	3.3	2.9	2.5	2.2	1.8	1.4	1.1	0.7	0.4	0.0
65	5.8	5.4	5.0	4.6	4.2	3.8	3.4	3.0	2.6	2.3	1.9	1.5	1.1	0.8	0.4	0.0
66	6.0	5.6	5.2	4.8	4.4	4.0	3.6	3.2	2.8	2.4	2.0	1.6	1.2	0.8	0.4	.00
67	6.3	5.9	5.4	5.0	4.6	4.2	3.7	3.3	2.9	2.5	2.1	1.7	1.2	0.8	0.4	.00
68	6.6	6.2	5.7	5.3	4.8	4.4	3.9	3.5	3.0	2.6	2.2	1.7	1.3	0.9	0.4	.00
69	7.0	6.5	6.0	5.5	5.1	4.6	4.1	3.7	3.2	2.7	2.3	1.8	1.4	0.9	0.5	.00
70	7.4	6.9	6.3	5.8	5.3	4.8	4.4	3.9	3.4	2.8	2.4	1.9	1.4	1.0	0.5	.00
71	7.8	7.2	6.7	6.2	5.7	5.1	4.6	4.1	3.6	3.1	2.5	2.0	1.5	1.0	0.5	.00
72	8.2	7.7	7.1	6.5	6.0	5.4	4.9	4.3	3.8	3.2	2.7	2.2	1.6	1.1	0.5	.00
73	8.8	8.2	7.8	7.8	6.4	5.8	5.2	4.6	4.0	3.4	2.9	2.3	1.7	1.1	0.6	.00
74	9.3	8.7	8.1	7.4	6.8	6.1	5.5	4.9	4.3	3.7	3.1	2.4	1.8	1.2	0.6	.00
75	10.0	9.3	8.6	7.9	7.3	6.6	5.9	5.3	4.6	3.9	3.3	2.6	2.0	1.3	0.7	.00
	105°	104°	103°	102°	101°	100°	99°	98°	97°	96°	95°	94°	93°	92°	91°	90°
92	255°	256°	257°	258°	259°	260°	261°	262°	263°	264°	265°	266°	267°	268°	269°	270°

③	285°	284°	283°	282°	281°	280°	279°	278°	277°	276°	275°	274°	273°	272°	271°	270°
	75°	76°	77°	78°	79°	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°
0°	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3
3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
4	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
6	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
7	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
8	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
9	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
10	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
11	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9
12	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
13	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
14	2.6	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
15	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
16	3.0	3.0	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
17	3.2	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
18	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.2	3.2
19	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.4	3.4	3.4
20	3.8	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6	3.6	3.6	3.6
21	4.0	4.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.8
22	4.2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.0	4.0	4.0	4.0	4.0
23	4.4	4.4	4.4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.2	4.2	4.2
24	4.6	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
25	4.8	4.8	4.8	4.8	4.8	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
26	5.0	5.0	5.0	5.0	5.0	5.0	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
27	5.3	5.3	5.2	5.2	5.2	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
28	5.5	5.5	5.5	5.4	5.4	5.4	5.4	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.3
29	5.7	5.7	5.7	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.5	5.5	5.5
30	6.0	5.9	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
31	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.0	6.0	6.0	6.0	6.0	6.0	6.0
32	6.5	6.4	6.4	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.2	6.2
33	6.7	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
34	7.0	7.0	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.7	6.7	6.7
35	7.2	7.2	7.2	7.2	7.1	7.1	7.1	7.1	7.1	7.0	7.0	7.0	7.0	7.0	7.0	7.0
36	7.5	7.5	7.5	7.4	7.4	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3
37	7.8	7.8	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.5	7.5	7.5	7.5
38	8.1	8.1	8.0	8.0	8.0	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.8
39	8.4	8.3	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1
40	8.7	8.6	8.6	8.6	8.5	8.5	8.5	8.5	6.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4
41	9.0	9.0	8.9	8.9	8.9	8.8	8.8	8.8	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7
42	9.3	9.3	9.2	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9.0	9.0	9.0	9.0	9.0	9.0
43	9.7	9.6	9.6	9.5	9.5	9.5	9.4	9.4	9.4	9.4	9.4	9.3	9.3	9.3	9.3	9.3
44	10.0	10.0	9.9	9.9	9.8	9.8	9.8	9.8	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
45	10.3	10.3	10.3	10.2	10.2	10.2	10.1	10.1	10.1	10.1	10.0	10.0	10.0	10.0	10.0	10.0
46	10.7	10.7	10.6	10.6	10.6	10.5	10.5	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4
47	11.1	11.1	11.0	11.0	10.9	10.9	10.9	10.8	10.8	10.8	10.8	10.7	10.7	10.7	10.7	10.7
48	11.5	11.4	11.4	11.4	11.3	11.3	11.2	11.2	11.2	11.2	11.1	11.1	11.1	11.1	11.1	11.1
49	11.9	11.9	11.8	11.8	11.7	11.7	11.6	11.6	11.6	11.6	11.5	11.5	11.5	11.5	11.5	11.5
50	12.3	12.3	12.2	12.2	12.1	12.1	12.1	12.0	12.0	12.0	12.0	11.9	11.9	11.9	11.9	11.9
51	12.8	12.7	12.7	12.6	12.6	12.5	12.5	12.5	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.3
52	13.3	13.2	13.1	13.1	13.0	13.0	13.0	12.9	12.9	12.9	12.8	12.8	12.8	12.8	12.8	12.8
53	13.7	13.7	13.6	13.6	13.5	13.5	13.4	13.4	13.4	13.3	13.3	13.3	13.3	13.3	13.3	13.3
54	14.2	14.2	14.1	14.1	14.0	14.0	13.9	13.9	13.9	13.8	13.8	13.8	13.8	13.8	13.8	13.8
55	14.8	14.7	14.7	14.6	14.5	14.5	14.5	14.4	14.4	14.4	14.3	14.3	14.3	14.3	14.3	14.3
56	15.3	15.3	15.2	15.2	15.1	15.1	15.0	15.0	14.9	14.9	14.9	14.9	14.8	14.8	14.8	14.8
57	15.9	15.9	15.8	15.7	15.7	15.6	15.6	15.6	15.5	15.5	15.5	15.4	15.4	15.4	15.4	15.4
58	16.6	16.5	16.4	16.4	16.3	16.3	16.2	16.2	16.1	16.1	16.1	16.0	16.0	16.0	16.0	16.0
59	17.2	17.2	17.1	17.0	17.0	16.9	16.9	16.8	16.8	16.7	16.7	16.7	16.7	16.7	16.6	16.6
60	17.9	17.9	17.8	17.7	17.6	17.6	17.5	17.5	17.5	17.4	17.4	17.4	17.3	17.3	17.3	17.3
61	18.7	18.6	18.5	18.4	18.4	18.3	18.3	18.2	18.2	18.1	18.1	18.1	18.1	18.1	18.0	18.0
62	19.5	19.4	19.3	19.2	19.2	19.1	19.0	19.0	19.0	18.9	18.9	18.9	18.8	18.8	18.8	18.8
63	20.3	20.2	20.1	20.1	20.0	19.9	19.9	19.8	19.8	19.7	19.7	19.7	19.7	19.6	19.6	19.6
64	21.2	21.1	21.0	21.0	20.9	20.8	20.8	20.7	20.7	20.6	20.6	20.6	20.5	20.5	20.5	20.5
65	22.2	22.1	22.0	21.9	21.9	21.8	21.7	21.7	21.6	21.6	21.5	21.5	21.5	21.5	21.5	21.5
66	23.3	23.1	23.1	23.0	22.9	22.8	22.7	22.7	22.6	22.6	22.5	22.5	22.5	22.5	22.5	22.5
67	24.4	24.3	24.2	24.1	24.0	23.9	23.9	23.8	23.7	23.7	23.6	23.6	23.6	23.6	23.6	23.6
68	25.6	25.5	25.4	25.3	25.2	25.1	25.1	25.0	24.9	24.9	24.8	24.8	24.8	24.8	24.8	24.8
69	27.0	26.8	26.7	26.6	26.5	26.5	26.4	26.3	26.2	26.2	26.2	26.1	26.1	26.1	26.1	26.1
70	28.4	28.3	28.2	28.1	28.0	27.9	27.8	27.8	27.7	27.6	27.6	27.5	27.5	27.5	27.5	27.5
71	30.1	29.9	29.8	29.7	29.6	29.5	29.4	29.3	29.3	29.2	29.2	29.1	29.1	29.0	29.0	29.0
72	31.9	31.7	31.6	31.5	31.4	31.3	31.2	31.1	31.0	30.9	30.9	30.9	30.8	30.8	30.8	30.8
73	33.9	33.7	33.6	33.4	33.3	33.2	33.1	33.0	33.0	32.9	32.8	32.8	32.8	32.7	32.7	32.7
74	36.1	35.9	35.8	35.7	35.5	35.4	35.3	35.2	35.1	35.1	35.0	35.0	34.9	34.9	34.9	34.9
75	38.6	38.5	38.3	38.2	38.0	37.9	37.8	37.7	37.6	37.5	37.5	37.4	37.4	37.3	37.3	37.3
	105°	104°	103°	102°	101°	100°	99°	98°	97°	96°	95°	94°	93°	92°	91°	90°
	255°	256°	257°	258°	259°	260°	261°	262°	263°	264°	265°	266°	267°	268°	269°	270°

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°	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	90.0	89.4	88.9	88.3	87.7	87.1	86.6	86.0	85.4	84.9	84.3	83.7	83.2	82.6	82.0	81.5
2	90.0	89.4	88.9	88.3	87.7	87.1	86.6	86.0	85.4	84.9	84.3	83.7	83.2	82.6	82.0	81.5
4	90.0	89.4	88.9	88.3	87.7	87.1	86.6	86.0	85.4	84.9	84.3	83.7	83.2	82.6	82.0	81.5
5	90.0	89.4	88.9	88.3	87.7	87.2	86.6	86.0	85.5	84.9	84.3	83.8	83.2	82.6	82.1	81.5
6	90.0	89.4	88.9	88.3	87.7	87.2	86.6	86.0	85.5	84.9	84.3	83.8	83.2	82.7	82.1	81.6
10	90.0	89.4	88.9	88.3	87.7	87.2	86.6	86.1	85.5	84.9	84.4	83.8	83.3	82.7	82.1	81.6
11	90.0	89.4	88.9	88.3	87.7	87.2	86.6	86.1	85.5	85.0	84.4	83.8	83.3	82.7	82.2	81.6
12	90.0	89.4	88.9	88.3	87.8	87.2	86.6	86.1	85.5	85.0	84.4	83.9	83.3	82.8	82.2	81.7
13	90.0	89.4	88.9	88.3	87.8	87.2	86.7	86.1	85.5	85.0	84.4	83.9	83.3	82.8	82.2	81.7
14	90.0	89.4	88.9	88.3	87.8	87.2	86.7	86.1	85.6	85.0	84.5	83.9	83.4	82.8	82.3	81.7
15	90.0	89.4	88.9	88.3	87.8	87.2	86.7	86.1	85.6	85.0	84.5	83.9	83.4	82.9	82.3	81.8
16	90.0	89.4	88.9	88.3	87.8	87.2	86.7	86.2	85.6	85.1	84.5	84.0	83.4	82.9	82.3	81.8
17	90.0	89.4	88.9	88.4	87.8	87.3	86.7	86.2	85.6	85.1	84.5	84.0	83.5	82.9	82.4	81.9
18	90.0	89.5	88.9	88.4	87.8	87.3	86.7	86.2	85.6	85.1	84.5	84.0	83.5	83.0	82.4	81.9
19	90.0	89.5	88.9	88.4	87.8	87.3	86.8	86.2	85.7	85.1	84.6	84.1	83.5	83.0	82.5	82.0
20	90.0	89.5	88.9	88.4	87.8	87.3	86.8	86.2	85.7	85.2	84.6	84.1	83.6	83.0	82.5	82.0
21	90.0	89.5	88.9	88.4	87.9	87.3	86.8	86.3	85.7	85.2	84.7	84.1	83.6	83.1	82.6	82.1
22	90.0	89.5	88.9	88.4	87.9	87.3	86.8	86.3	85.8	85.2	84.7	84.2	83.7	83.1	82.6	82.1
23	90.0	89.5	88.9	88.4	87.9	87.4	86.8	86.3	85.8	85.3	84.7	84.2	83.7	83.2	82.7	82.2
24	90.0	89.5	89.0	88.4	87.9	87.4	86.9	86.3	85.8	85.3	84.8	84.3	83.7	83.2	82.7	82.2
25	90.0	89.5	89.0	88.4	87.9	87.4	86.9	86.4	85.9	85.3	84.8	84.3	83.8	83.3	82.8	82.3
26	90.0	89.5	89.0	88.5	87.9	87.4	86.9	86.4	85.9	85.4	84.9	84.4	83.8	83.3	82.8	82.3
27	90.0	89.5	89.0	88.5	88.0	87.4	86.9	86.4	85.9	85.4	84.9	84.4	83.9	83.4	82.9	82.4
28	90.0	89.5	89.0	88.5	88.0	87.5	87.0	86.5	86.0	85.5	85.0	84.5	84.0	83.5	83.0	82.5
29	90.0	89.5	89.0	88.5	88.0	87.5	87.0	86.5	86.0	85.5	85.0	84.5	84.0	83.5	83.0	82.5
30	90.0	89.5	89.0	88.5	88.0	87.5	87.0	86.5	86.0	85.5	85.1	84.6	84.1	83.6	83.1	82.6
31	90.0	89.5	89.0	88.5	88.0	87.5	87.1	86.6	86.1	85.6	85.1	84.6	84.1	83.6	83.2	82.7
32	90.0	89.5	89.0	88.5	88.1	87.6	87.1	86.6	86.1	85.6	85.2	84.7	84.2	83.7	83.2	82.8
33	90.0	89.5	89.0	88.6	88.1	87.6	87.1	86.6	86.2	85.7	85.2	84.7	84.3	83.8	83.3	82.8
34	90.0	89.5	89.1	88.6	88.1	87.6	87.2	86.7	86.2	85.7	85.3	84.8	84.3	83.8	83.4	82.9
35	90.0	89.5	89.1	88.6	88.1	87.7	87.2	86.7	86.3	85.8	85.3	84.9	84.4	83.9	83.5	83.0
36	90.0	89.5	89.1	88.6	88.1	87.7	87.2	86.8	86.3	85.8	85.4	84.9	84.5	84.0	83.5	83.1
37	90.0	89.5	89.1	88.6	88.2	87.7	87.3	86.8	86.3	85.9	85.4	85.0	84.5	84.1	83.6	83.2
38	90.0	89.5	89.1	88.6	88.2	87.7	87.3	86.8	86.4	85.9	85.5	85.0	84.6	84.2	83.7	83.3
39	90.0	89.6	89.1	88.7	88.2	87.8	87.3	86.9	86.4	86.0	85.6	85.1	84.7	84.2	83.8	83.4
40	90.0	89.6	89.1	88.7	88.2	87.8	87.4	86.9	86.5	86.1	85.6	85.2	84.7	84.3	83.9	83.4
41	90.0	89.6	89.1	88.7	88.3	87.8	87.4	87.0	86.5	86.1	85.7	85.3	84.8	84.4	84.0	83.5
42	90.0	89.6	89.1	88.7	88.3	87.9	87.4	87.0	86.6	86.2	85.7	85.3	84.9	84.5	84.1	83.6
43	90.0	89.6	89.2	88.7	88.3	87.9	87.5	87.1	86.7	86.2	85.8	85.4	85.0	84.6	84.2	83.7
44	90.0	89.6	89.2	88.8	88.4	87.9	87.5	87.1	86.7	86.3	85.9	85.5	85.1	84.7	84.2	83.8
45	90.0	89.6	89.2	88.8	88.4	88.0	87.6	87.2	86.8	86.4	86.0	85.6	85.1	84.7	84.3	83.9
46	90.0	89.6	89.2	88.8	88.4	88.0	87.6	87.2	86.8	86.4	86.0	85.6	85.2	84.8	84.4	84.1
47	90.0	89.6	89.2	88.8	88.4	88.0	87.7	87.3	86.9	86.5	86.1	85.7	85.3	84.9	84.5	84.2
48	90.0	89.6	89.2	88.9	88.5	88.1	87.7	87.3	86.9	86.6	86.2	85.8	85.4	85.0	84.6	84.3
49	90.0	89.6	89.2	88.9	88.5	88.1	87.7	87.4	87.0	86.6	86.2	85.9	85.5	85.1	84.8	84.4
50	90.0	89.6	89.3	88.9	88.5	88.2	87.8	87.4	87.1	86.7	86.3	86.0	85.6	85.2	84.9	84.5
51	90.0	89.6	89.3	88.9	88.6	88.2	87.8	87.5	87.1	86.8	86.4	86.0	85.7	85.3	85.0	84.6
52	90.0	89.6	89.3	88.9	88.6	88.2	87.9	87.5	87.2	86.8	86.5	86.1	85.8	85.4	85.1	84.7
53	90.0	89.7	89.3	89.0	88.6	88.3	87.9	87.6	87.2	86.9	86.6	86.2	85.9	85.5	85.2	84.8
54	90.0	89.7	89.3	89.0	88.7	88.3	88.0	87.6	87 3	87.0	86.6	86.3	86.0	85.6	85.3	85.0
55	90.0	89.7	89.3	89.0	88.7	88.4	88.0	87.7	87.4	87.0	86.7	86.4	86.1	85.7	85.4	85.1
56	90.0	89.7	89.4	89.0	88.7	88.4	88.1	87.8	87.4	87.1	86.8	86.5	86.2	85.8	85.5	85.2
57	90.0	89.7	89.4	89.1	88.8	88.4	88.1	87.8	87.5	87.2	86.9	86.6	86.3	86.0	85.6	85.3
58	90.0	89.7	89.4	89.1	88.8	88.5	88.2	87.9	87.6	87.3	87.0	86.7	86.4	86.1	85.8	85.5
59	90.0	89.7	89.4	89.1	88.8	88.5	88.2	87.9	87.6	87.3	87.1	86.8	86.5	86.2	85.9	85.6
60	90.0	89.7	89.4	89.1	88.9	88.6	88.3	88.0	87.7	87.4	87.1	86.9	86.6	86.3	86.0	85.7
61	90.0	89.7	89.4	89.2	88.9	88.6	88.3	88.1	87.8	87.5	87.2	86.9	86.7	86.4	86.1	85.8
62	90.0	89.7	89.5	89.2	88.9	88.7	88.4	88.1	87.8	87.6	87.3	87.0	86.8	86.5	86.2	86.0
63	90.0	89.7	89.5	89.2	89.0	88.7	88.4	88.2	87.9	87.7	87.4	87.1	86.9	86.6	86.4	86.1
64	90.0	89.7	89.5	89.2	89.0	88.7	88.5	88.2	88.0	87.7	87.5	87.2	87.0	86.7	86.5	86.2
65	90.0	89.8	89.5	89.3	89.0	88.8	88.5	88.3	88.1	87.8	87.6	87.3	87.1	86.9	86.6	86.4
66	90.0	89.8	89.5	89.3	89.1	88.8	88.6	88.4	88.1	87.9	87.7	87.4	87.2	87.0	86.7	86.5
67	90.0	89.8	89.6	89.3	89.1	88.9	88.7	88.4	88.2	88.0	87.8	87.5	87.3	87.1	86.9	86.6
68	90.0	89.8	89.6	89.4	89.1	88.9	88.7	88.5	88.3	88.1	87.9	87.6	87.4	87.2	87.0	86.8
69	90.0	89.8	89.6	89.4	89.2	89.0	88.8	88.6	88.4	88.2	88.0	87.7	87.5	87.3	87.1	86.9
70	90.0	89.8	89.6	89.4	89.2	89.0	88.8	88.6	88.4	88.2	88.0	87.8	87.7	87.5	87.3	87.1
71	90.0	89.8	89.6	89.4	89.3	89.1	88.9	88.7	88.5	88.3	88.1	87.9	87.8	87.6	87.4	87.2
72	90.0	89.8	89.6	89.5	89.3	89.1	88.9	88.8	88.6	88.4	88.2	88.1	87.9	87.7	87.5	87.3
73	90.0	89.8	89.7	89.5	89.3	89.2	89.0	88.8	88.7	88.5	88.3	88.2	88.0	87.8	87.7	87.5
74	90.0	89.8	89.7	89.5	89.4	89.2	89.0	88.9	88.7	88.6	88.4	88.3	88.1	87.9	87.8	87.6
75	90.0	89.9	89.7	89.6	89.4	89.3	89.1	89.0	88.8	88.7	88.5	88.4	88.2	88.1	87.9	87.8

③	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	C
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	
0	81.5	80.9	80.4	79.8	79.2	78.7	78.1	77.6	77.0	76.5	76.0	75.4	74.9	74.4	73.8	73.3	
2	81.5	80.9	80.4	79.8	79.2	78.7	78.1	77.6	77.1	76.5	76.0	75.4	74.9	74.4	73.8	73.3	
4	81.5	80.9	80.4	79.8	79.3	78.7	78.2	77.6	77.1	76.5	76.0	75.5	74.9	74.4	73.9	73.3	
6	81.5	81.0	80.4	79.8	79.3	78.8	78.2	77.7	77.1	76.6	76.0	75.5	75.0	74.4	73.9	73.4	
8	81.6	81.0	80.4	79.9	79.3	78.8	78.3	77.7	77.2	76.6	76.1	75.6	75.0	74.5	74.0	73.5	
10	81.6	81.0	80.5	79.9	79.4	78.9	78.3	77.8	77.2	76.7	76.2	75.6	75.1	74.6	74.1	73.5	
11	81.6	81.1	80.5	80.0	79.4	78.9	78.4	77.8	77.3	76.7	76.2	75.7	75.2	74.6	74.1	73.6	
12	81.7	81.1	80.6	80.0	79.5	78.9	78.4	77.9	77.3	76.8	76.3	75.7	75.2	74.7	74.2	73.6	
13	81.7	81.1	80.6	80.1	79.5	79.0	78.4	77.9	77.4	76.8	76.3	75.8	75.3	74.7	74.2	73.7	
14	81.7	81.2	80.6	80.1	79.6	79.0	78.5	78.0	77.4	76.9	76.4	75.8	75.3	74.8	74.3	73.8	
15	81.8	81.2	80.7	80.1	79.6	79.1	78.5	78.0	77.5	76.9	76.4	75.9	75.4	74.9	74.4	73.8	
16	81.8	81.3	80.7	80.2	79.6	79.1	78.6	78.1	77.5	77.0	76.5	76.0	75.5	74.9	74.4	73.9	
17	81.9	81.3	80.8	80.2	79.7	79.2	78.6	78.1	77.6	77.1	76.6	76.0	75.5	75.0	74.5	74.0	
18	81.9	81.3	80.8	80.3	79.8	79.2	78.7	78.2	77.7	77.1	76.6	76.1	75.6	75.1	74.6	74.1	
19	82.0	81.4	80.9	80.3	79.8	79.3	78.8	78.2	77.7	77.2	76.7	76.2	75.7	75.2	74.7	74.2	
20	82.0	81.4	80.9	80.4	79.9	79.4	78.8	78.3	77.8	77.3	76.8	76.3	75.8	75.3	74.8	74.3	
21	82.1	81.5	81.0	80.5	79.9	79.4	78.9	78.4	77.9	77.4	76.9	76.4	75.9	75.3	74.9	74.4	
22	82.1	81.6	81.0	80.5	80.0	79.5	79.0	78.5	78.0	77.5	76.9	76.4	75.9	75.4	75.0	74.5	
23	82.2	81.6	81.1	80.6	80.1	79.6	79.1	78.6	78.0	77.5	77.0	76.5	76.0	75.5	75.1	74.6	
24	82.2	81.7	81.2	80.7	80.2	79.6	79.1	78.6	78.1	77.6	77.1	76.6	76.1	75.7	75.2	74.7	
25	82.3	81.7	81.2	80.7	80.2	79.7	79.2	78.7	78.2	77.7	77.2	76.7	76.2	75.8	75.3	74.8	
26	82.3	81.8	81.3	80.8	80.3	79.8	79.3	78.8	78.3	77.8	77.3	76.8	76.4	75.9	75.4	74.9	
27	82.4	81.9	81.4	80.9	80.4	79.9	79.4	78.9	78.4	77.9	77.4	77.0	76.5	76.0	75.5	75.0	
28	82.5	82.0	81.5	81.0	80.5	80.0	79.5	79.0	78.5	78.0	77.6	77.1	76.6	76.1	75.6	75.2	
29	82.5	82.0	81.5	81.1	80.6	80.1	79.6	79.1	78.6	78.1	77.7	77.2	76.7	76.2	75.8	75.3	
30	82.6	82.1	81.6	81.1	80.7	80.2	79.7	79.2	78.7	78.3	77.8	77.3	76.8	76.4	75.9	75.4	
31	82.7	82.2	81.7	81.2	80.7	80.3	79.8	79.3	78.8	78.4	77.9	77.4	77.0	76.5	76.0	75.6	
32	82.8	82.3	81.8	81.3	80.8	80.4	79.9	79.4	79.0	78.5	78.0	77.6	77.1	76.6	76.2	75.7	
33	82.8	82.4	81.9	81.4	80.9	80.5	80.0	79.5	79.1	78.6	78.2	77.7	77.2	76.8	76.3	75.9	
34	82.9	82.4	82.0	81.5	81.0	80.6	80.1	79.7	79.2	78.7	78.3	77.8	77.4	76.9	76.5	76.0	
35	83.0	82.5	82.1	81.6	81.2	80.7	80.2	79.8	79.3	78.9	78.4	78.0	77.5	77.1	76.6	76.2	
36	83.1	82.6	82.2	81.7	81.3	80.8	80.4	79.9	79.5	79.0	78.6	78.1	77.7	77.2	76.8	76.4	
37	83.2	82.7	82.3	81.8	81.4	80.9	80.5	80.0	79.6	79.1	78.7	78.3	77.8	77.4	77.0	76.5	
38	83.3	82.8	82.4	81.9	81.5	81.0	80.6	80.2	79.7	79.3	78.9	78.4	78.0	77.6	77.1	76.7	
39	83.4	82.9	82.5	82.0	81.6	81.2	80.7	80.3	79.9	79.4	79.0	78.6	78.1	77.7	77.3	76.9	
40	83.4	83.0	82.6	82.1	81.7	81.3	80.9	80.4	80.0	79.6	79.2	78.7	78.3	77.9	77.5	77.1	
41	83.5	83.1	82.7	82.3	81.8	81.4	81.0	80.6	80.2	79.7	79.3	78.9	78.5	78.1	77.7	77.2	
42	83.6	83.2	82.8	82.4	82.0	81.5	81.1	80.7	80.3	79.9	79.5	79.1	78.7	78.2	77.8	77.4	
43	83.7	83.3	82.9	82.5	82.1	81.7	81.3	80.9	80.5	80.0	79.6	79.2	78.8	78.4	78.0	77.6	
44	83.8	83.4	83.0	82.6	82.2	81.8	81.4	81.0	80.6	80.2	79.8	79.4	79.0	78.6	78.2	77.8	
45	83.9	83.5	83.1	82.7	82.3	82.0	81.6	81.2	80.8	80.4	80.0	79.6	79.2	78.8	78.4	78.0	
46	84.1	83.7	83.3	82.9	82.5	82.1	81.7	81.3	80.9	80.5	80.1	79.8	79.4	79.0	78.6	78.2	
47	84.2	83.8	83.4	83.0	82.6	82.2	81.8	81.5	81.1	80.7	80.3	79.9	79.6	79.2	78.8	78.4	
48	84.3	83.9	83.5	83.1	82.8	82.4	82.0	81.6	81.3	80.9	80.5	80.1	79.8	79.4	79.0	78.6	
49	84.4	84.0	83.6	83.3	82.9	82.5	82.2	81.8	81.4	81.1	80.7	80.3	80.0	79.6	79.2	78.9	
50	84.5	84.1	83.8	83.4	83.0	82.7	82.3	82.0	81.6	81.2	80.9	80.5	80.2	79.8	79.4	79.1	
51	84.6	84.3	83.9	83.5	83.2	82.8	82.5	82.1	81.8	81.4	81.1	80.7	80.4	80.0	79.7	79.3	
52	84.7	84.4	84.0	83.7	83.3	83.0	82.6	82.3	81.9	81.6	81.2	80.9	80.6	80.2	79.9	79.5	
53	84.8	84.5	84.2	83.8	83.5	83.1	82.8	82.5	82.1	81.8	81.4	81.1	80.8	80.4	80.1	79.8	
54	85.0	84.6	84.3	84.0	83.6	83.3	83.0	82.6	82.3	82.0	81.6	81.3	81.0	80.7	80.3	80.0	
55	85.1	84.8	84.4	84.1	83.8	83.5	83.1	82.8	82.5	82.2	81.8	81.5	81.2	80.9	80.6	80.2	
56	85.2	84.9	84.6	84.3	83.9	83.6	83.3	83.0	82.7	82.4	82.0	81.7	81.4	81.1	80.8	80.5	
57	85.3	85.0	84.7	84.4	84.1	83.8	83.5	83.2	82.9	82.6	82.2	81.9	81.6	81.3	81.0	80.7	
58	85.5	85.2	84.9	84.6	84.3	84.0	83.7	83.4	83.1	82.8	82.5	82.2	81.9	81.6	81.3	81.0	
59	85.6	85.3	85.0	84.7	84.4	84.1	83.8	83.5	83.2	83.0	82.7	82.4	82.1	81.8	81.5	81.2	
60	85.7	85.4	85.1	84.9	84.6	84.3	84.0	83.7	83.4	83.2	82.9	82.6	82.3	82.0	81.7	81.5	
61	85.8	85.6	85.3	85.0	84.7	84.5	84.2	83.9	83.6	83.4	83.1	82.8	82.5	82.3	82.0	81.7	
62	86.0	85.7	85.4	85.2	84.9	84.6	84.4	84.1	83.8	83.6	83.3	83.0	82.8	82.5	82.2	82.0	
63	86.1	85.8	85.6	85.3	85.1	84.8	84.6	84.3	84.0	83.8	83.5	83.3	83.0	82.8	82.5	82.2	
64	86.2	86.0	85.7	85.5	85.2	85.0	84.7	84.5	84.2	84.0	83.7	83.5	83.2	83.0	82.8	82.5	
65	86.4	86.1	85.9	85.6	85.4	85.2	84.9	84.7	84.4	84.2	84.0	83.7	83.5	83.3	83.0	82.8	
66	86.5	86.3	86.0	85.8	85.6	85.3	85.1	84.9	84.7	84.4	84.2	84.0	83.7	83.5	83.3	83.0	
67	86.6	86.4	86.2	86.0	85.8	85.5	85.3	85.1	84.9	84.6	84.4	84.2	84.0	83.8	83.5	83.3	
68	86.8	86.6	86.4	86.1	85.9	85.7	85.5	85.3	85.1	84.9	84.6	84.4	84.2	84.0	83.8	83.6	
69	86.9	86.7	86.5	86.3	86.1	85.9	85.7	85.5	85.3	85.1	84.9	84.7	84.5	84.3	84.1	83.9	
70	87.1	86.9	86.7	86.5	86.3	86.1	85.9	85.7	85.5	85.3	85.1	84.9	84.7	84.5	84.3	84.1	
71	87.2	87.0	86.8	86.6	86.5	86.3	86.1	85.9	85.7	85.5	85.3	85.2	85.0	84.8	84.6	84.4	
72	87.3	87.2	87.0	86.8	86.6	86.5	86.3	86.1	85.9	85.8	85.6	85.4	85.2	85.1	84.9	84.7	
73	87.5	87.3	87.2	87.0	86.8	86.7	86.5	86.3	86.2	86.0	85.8	85.6	85.5	85.3	85.2	85.0	
74	87.6	87.5	87.3	87.2	87.0	86.8	86.7	86.5	86.4	86.2	86.1	85.9	85.7	85.6	85.4	85.3	
75	87.8	87.6	87.5	87.3	87.2	87.0	86.9	86.7	86.6	86.4	86.3	86.2	86.0	85.9	85.7	85.6	

(3)	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0	c
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	
0	65.8	65.3	64.8	64.4	63.9	63.4	63.0	62.5	62.1	61.6	61.2	60.8	60.3	59.9	59.5	59.0	
3	65.8	65.3	64.8	64.4	63.9	63.4	63.0	62.5	62.1	61.6	61.2	60.8	60.3	59.9	59.5	59.1	
4	65.8	65.3	64.9	64.4	63.9	63.5	63.0	62.6	62.1	61.7	61.3	60.8	60.4	60.0	59.5	59.1	
6	65.9	65.4	65.0	64.5	64.0	63.6	63.1	62.7	62.2	61.8	61.4	60.9	60.5	60.1	59.6	59.2	
8	66.0	65.5	65.1	64.6	64.1	63.7	63.2	62.8	62.3	61.9	61.5	61.0	60.6	60.2	59.7	59.3	
10	66.1	65.6	65.2	64.7	64.2	63.8	63.3	62.9	62.4	62.0	61.6	61.1	60.7	60.3	59.8	59.4	
11	66.2	65.7	65.2	64.8	64.3	63.9	63.4	63.0	62.5	62.1	61.6	61.2	60.8	60.3	59.9	59.5	
12	66.2	65.8	65.3	64.9	64.4	63.9	63.5	63.0	62.6	62.2	61.7	61.3	60.9	60.4	60.0	59.6	
13	66.3	65.9	65.4	64.9	64.5	64.0	63.6	63.1	62.7	62.2	61.8	61.4	61.0	60.5	60.1	59.7	
14	66.4	65.9	65.5	65.0	64.6	64.1	63.7	63.2	62.8	62.3	61.9	61.5	61.1	60.6	60.2	59.8	
15	66.5	66.0	65.6	65.1	64.7	64.2	63.8	63.3	62.9	62.5	62.0	61.6	61.2	60.7	60.3	59.9	
16	66.6	66.1	65.7	65.2	64.8	64.3	63.9	63.4	63.0	62.6	62.1	61.7	61.3	60.9	60.4	60.0	
17	66.7	66.3	65.8	65.3	64.9	64.4	64.0	63.6	63.1	62.7	62.3	61.8	61.4	61.0	60.6	60.2	
18	66.8	66.4	65.9	65.5	65.0	64.6	64.1	63.7	63.2	62.8	62.4	62.0	61.5	61.1	60.7	60.3	
19	67.0	66.5	66.0	65.6	65.1	64.7	64.3	63.8	63.4	63.0	62.5	62.1	61.7	61.2	60.8	60.4	
20	67.1	66.6	66.2	65.7	65.3	64.8	64.4	64.0	63.5	63.1	62.7	62.2	61.8	61.4	61.0	60.6	
21	67.2	66.8	66.3	65.9	65.4	65.0	64.5	64.1	63.7	63.2	62.8	62.4	62.0	61.6	61.2	60.7	
22	67.4	66.9	66.5	66.0	65.6	65.1	64.7	64.3	63.8	63.4	63.0	62.6	62.1	61.7	61.3	60.9	
23	67.5	67.1	66.6	66.2	65.7	65.3	64.9	64.4	64.0	63.6	63.1	62.7	62.3	61.9	61.5	61.1	
24	67.7	67.2	66.8	66.3	65.9	65.5	65.0	64.6	64.2	63.7	63.3	62.9	62.5	62.1	61.7	61.3	
25	67.8	67.4	66.9	66.5	66.1	65.6	65.2	64.8	64.3	63.9	63.5	63.1	62.7	62.3	61.9	61.5	
26	68.0	67.5	67.1	66.7	66.2	65.8	65.4	64.9	64.5	64.1	63.7	63.3	62.9	62.5	62.1	61.7	
27	68.2	67.7	67.3	66.8	66.4	66.0	65.6	65.1	64.7	64.3	63.9	63.5	63.1	62.7	62.3	61.9	
28	68.3	67.9	67.5	67.0	66.6	66.2	65.8	65.3	64.9	64.5	64.1	63.7	63.3	62.9	62.5	62.1	
29	68.5	68.1	67.7	67.2	66.8	66.4	66.0	65.5	65.1	64.7	64.3	63.9	63.5	63.1	62.7	62.3	
30	68.7	68.3	67.9	67.4	67.0	66.6	66.2	65.8	65.3	64.9	64.5	64.1	63.7	63.3	62.9	62.5	
31	68.9	68.5	68.1	67.6	67.2	66.8	66.4	66.0	65.6	65.2	64.8	64.4	64.0	63.6	63.2	62.8	
32	69.1	68.7	68.3	67.9	67.4	67.0	66.6	66.2	65.8	65.4	65.0	64.6	64.2	63.8	63.4	63.0	
33	69.3	68.9	68.5	68.1	67.7	67.2	66.8	66.4	66.0	65.6	65.2	64.8	64.5	64.1	63.7	63.3	
34	69.5	69.1	68.7	68.3	67.9	67.5	67.1	66.7	66.3	65.9	65.5	65.1	64.7	64.3	63.9	63.6	
35	69.8	69.4	68.9	68.5	68.1	67.7	67.3	66.9	66.5	66.1	65.7	65.4	65.0	64.6	64.2	63.8	
36	70.0	69.6	69.2	68.8	68.4	68.0	67.6	67.2	66.8	66.4	66.0	65.6	65.2	64.9	64.5	64.1	
37	70.2	69.8	69.4	69.0	68.6	68.2	67.8	67.4	67.1	66.7	66.3	65.9	65.5	65.1	64.8	64.4	
38	70.5	70.1	69.7	69.3	68.9	68.5	68.1	67.7	67.3	66.9	66.6	66.2	65.8	65.4	65.1	64.7	
39	70.7	70.3	69.9	69.5	69.2	68.8	68.4	68.0	67.6	67.2	66.9	66.5	66.1	65.7	65.4	65.0	
40	71.0	70.6	70.2	69.8	69.4	69.0	68.7	68.3	67.9	67.5	67.2	66.8	66.4	66.0	65.7	65.3	
41	71.2	70.9	70.5	70.1	69.7	69.3	68.9	68.6	68.2	67.8	67.5	67.1	66.7	66.4	66.0	65.6	
42	71.5	71.1	70.7	70.4	70.0	69.6	69.2	68.9	68.5	68.1	67.8	67.4	67.0	66.7	66.3	66.0	
43	71.8	71.4	71.0	70.7	70.3	69.9	69.5	69.2	68.8	68.4	68.1	67.7	67.4	67.0	66.7	66.3	
44	72.1	71.7	71.3	71.0	70.6	70.2	69.9	69.5	69.1	68.8	68.4	68.1	67.7	67.4	67.0	66.7	
45	72.3	72.0	71.6	71.3	70.9	70.5	70.2	69.8	69.5	69.1	68.7	68.4	68.0	67.7	67.4	67.0	
46	72.6	72.3	71.9	71.6	71.2	70.8	70.5	70.1	69.8	69.4	69.1	68.7	68.4	68.1	67.7	67.4	
47	72.9	72.6	72.2	71.9	71.5	71.2	70.8	70.5	70.1	69.8	69.4	69.1	68.8	68.4	68.1	67.7	
48	73.2	72.9	72.5	72.2	71.8	71.5	71.2	70.8	70.5	70.1	69.8	69.5	69.1	68.8	68.5	68.1	
49	73.6	73.2	72.9	72.5	72.2	71.8	71.5	71.2	70.8	70.5	70.2	69.8	69.5	69.2	68.8	68.5	
50	73.9	73.5	73.2	72.9	72.5	72.2	71.8	71.5	71.2	70.9	70.5	70.2	69.9	69.6	69.2	68.9	
51	74.2	73.9	73.5	73.2	72.9	72.5	72.2	71.9	71.6	71.2	70.9	70.6	70.3	69.9	69.6	69.3	
52	74.5	74.2	73.9	73.5	73.2	72.9	72.6	72.2	71.9	71.6	71.3	71.0	70.7	70.3	70.0	69.7	
53	74.8	74.5	74.2	73.9	73.6	73.3	72.9	72.6	72.3	72.0	71.7	71.4	71.1	70.8	70.5	70.1	
54	75.2	74.9	74.6	74.2	73.9	73.6	73.3	73.0	72.7	72.4	72.1	71.8	71.5	71.2	70.9	70.6	
55	75.5	75.2	74.9	74.6	74.3	74.0	73.7	73.4	73.1	72.8	72.5	72.2	71.9	71.6	71.3	71.0	
56	75.9	75.6	75.3	75.0	74.7	74.4	74.1	73.8	73.5	73.2	72.9	72.6	72.3	72.0	71.7	71.5	
57	76.2	75.9	75.6	75.3	75.1	74.8	74.5	74.2	73.9	73.6	73.3	73.0	72.8	72.5	72.2	71.9	
58	76.6	76.3	76.0	75.7	75.4	75.2	74.9	74.6	74.3	74.0	73.8	73.5	73.2	72.9	72.6	72.4	
59	77.0	76.7	76.4	76.1	75.8	75.6	75.3	75.0	74.7	74.5	74.2	73.9	73.6	73.4	73.1	72.8	
60	77.3	77.0	76.8	76.5	76.2	76.0	75.7	75.4	75.2	74.9	74.6	74.4	74.1	73.8	73.6	73.3	
61	77.7	77.4	77.2	76.9	76.6	76.4	76.1	75.9	75.6	75.3	75.1	74.8	74.6	74.3	74.0	73.8	
62	78.1	77.8	77.6	77.3	77.0	76.8	76.5	76.3	76.0	75.8	75.5	75.3	75.0	74.8	74.5	74.3	
63	78.5	78.2	78.0	77.7	77.5	77.2	77.0	76.7	76.5	76.2	76.0	75.7	75.5	75.2	75.0	74.8	
64	78.8	78.6	78.4	78.1	77.9	77.6	77.4	77.2	76.9	76.7	76.4	76.2	76.0	75.7	75.5	75.3	
65	79.2	79.0	78.8	78.5	78.3	78.1	77.8	77.6	77.4	77.1	76.9	76.7	76.5	76.2	76.0	75.8	
66	79.6	79.4	79.2	79.0	78.7	78.5	78.3	78.1	77.8	77.6	77.4	77.2	76.9	76.7	76.5	76.3	
67	80.0	79.8	79.6	79.4	79.2	78.9	78.7	78.5	78.3	78.1	77.9	77.7	77.4	77.2	77.0	76.8	
68	80.4	80.2	80.0	79.8	79.6	79.4	79.2	79.0	78.8	78.6	78.4	78.2	77.9	77.7	77.5	77.3	
69	80.8	80.6	80.4	80.2	80.0	79.8	79.6	79.5	79.3	79.1	78.9	78.7	78.5	78.3	78.1	77.9	
70	81.3	81.1	80.9	80.7	80.5	80.3	80.1	79.9	79.7	79.5	79.4	79.2	79.0	78.8	78.6	78.4	
71	81.7	81.5	81.3	81.1	80.9	80.8	80.6	80.4	80.2	80.0	79.9	79.7	79.5	79.3	79.1	79.0	
72	82.1	81.9	81.7	81.6	81.4	81.2	81.0	80.9	80.7	80.5	80.4	80.2	80.0	79.8	79.7	79.5	
73	82.5	82.3	82.2	82.0	81.9	81.7	81.5	81.4	81.2	81.0	80.9	80.7	80.5	80.4	80.2	80.1	
74	82.9	82.8	82.6	82.5	82.3	82.2	82.0	81.9	81.7	81.5	81.4	81.2	81.1	80.9	80.8	80.6	
75	83.4	83.2	83.1	82.9	82.8	82.6	82.5	82.3	82.2	82.1	81.9	81.8	81.6	81.5	81.3	81.2	

c(3)	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	73.3	72.8	72.3	71.7	71.2	70.7	70.2	69.7	69.2	68.7	68.2	67.7	67.2	66.7	66.3	65.8
2	73.3	72.8	72.3	71.7	71.2	70.7	70.2	69.7	69.2	68.7	68.2	67.7	67.2	66.7	66.3	65.8
4	73.3	72.8	72.3	71.8	71.3	70.8	70.2	69.7	69.2	68.7	68.2	67.8	67.3	66.8	66.3	65.8
6	73.4	72.9	72.3	71.8	71.3	70.8	70.3	69.8	69.3	68.8	68.3	67.8	67.3	66.8	66.4	65.9
8	73.5	72.9	72.4	71.9	71.4	70.9	70.4	69.9	69.4	68.9	68.4	67.9	67.4	66.9	66.5	66.0
10	73.5	73.0	72.5	72.0	71.5	71.0	70.5	70.0	69.5	69.0	68.5	68.0	67.5	67.0	66.6	66.1
11	73.6	73.1	72.6	72.1	71.5	71.0	70.5	70.0	69.5	69.1	68.6	68.1	67.6	67.1	66.8	66.2
12	73.6	73.1	72.6	72.1	71.6	71.1	70.6	70.4	69.6	69.1	68.6	68.1	67.7	67.2	66.7	66.2
13	73.7	73.2	72.7	72.2	71.7	71.2	70.7	70.2	69.7	69.2	68.7	68.2	67.7	67.3	66.8	66.3
14	73.8	73.3	72.8	72.2	71.7	71.2	70.7	70.3	69.8	69.3	68.8	68.3	67.8	67.4	66.9	66.4
15	73.8	73.3	72.8	72.3	71.8	71.3	70.8	70.3	69.8	69.4	68.9	68.4	67.9	67.4	67.0	66.5
16	73.9	73.4	72.9	72.4	71.9	71.4	70.9	70.4	69.9	69.4	69.0	68.5	68.0	67.5	67.1	66.6
17	74.0	73.5	73.0	72.5	72.0	71.5	71.0	70.5	70.0	69.5	69.1	68.6	68.1	67.6	67.2	66.7
18	74.1	73.6	73.1	72.6	72.1	71.6	71.1	70.6	70.1	69.6	69.2	68.7	68.2	67.8	67.3	66.8
19	74.2	73.7	73.2	72.7	72.2	71.7	71.2	70.7	70.2	69.8	69.3	68.8	68.3	67.9	67.4	67.0
20	74.3	73.8	73.3	72.8	72.3	71.8	71.3	70.8	70.3	69.9	69.4	68.9	68.5	68.0	67.5	67.1
21	74.4	73.9	73.4	72.9	72.4	71.9	71.4	70.9	70.5	70.0	69.5	69.1	68.6	68.1	67.6	67.2
22	74.5	74.0	73.5	73.0	72.5	72.0	71.5	71.1	70.6	70.1	69.7	69.2	68.7	68.3	67.8	67.4
23	74.6	74.1	73.6	73.1	72.6	72.1	71.7	71.2	70.7	70.3	69.8	69.3	68.9	68.4	68.0	67.5
24	74.7	74.2	73.7	73.2	72.7	72.3	71.8	71.3	70.9	70.4	69.9	69.5	69.0	68.6	68.1	67.7
25	74.8	74.3	73.8	73.3	72.9	72.4	71.9	71.5	71.0	70.5	70.1	69.6	69.2	68.7	68.3	67.8
26	74.9	74.4	74.0	73.5	73.0	72.5	72.1	71.6	71.1	70.7	70.2	69.8	69.3	68.9	68.4	68.0
27	75.0	74.6	74.1	73.6	73.1	72.7	72.2	71.8	71.3	70.8	70.4	69.9	69.5	69.0	68.6	68.2
28	75.2	74.7	74.2	73.8	73.3	72.8	72.4	71.9	71.5	71.0	70.5	70.1	69.7	69.2	68.8	68.3
29	75.3	74.8	74.4	73.9	73.4	73.0	72.5	72.1	71.6	71.2	70.7	70.3	69.8	69.4	69.0	68.5
30	75.4	75.0	74.5	74.1	73.6	73.1	72.7	72.2	71.8	71.3	70.9	70.5	70.0	69.6	69.1	68.7
31	75.6	75.1	74.7	74.2	73.8	73.3	72.9	72.4	72.0	71.5	71.1	70.6	70.2	69.8	69.3	68.9
32	75.7	75.3	74.8	74.4	73.9	73.5	73.0	72.6	72.1	71.7	71.3	70.8	70.4	70.0	69.5	69.1
33	75.9	75.4	75.0	74.5	74.1	73.6	73.2	72.8	72.3	71.9	71.5	71.0	70.6	70.2	69.7	69.3
34	76.0	75.6	75.1	74.7	74.3	73.8	73.4	72.9	72.5	72.1	71.7	71.2	70.8	70.4	70.0	69.5
35	76.2	75.8	75.3	74.9	74.4	74.0	73.6	73.1	72.7	72.3	71.9	71.4	71.0	70.6	70.2	69.8
36	76.4	75.9	75.5	75.1	74.6	74.2	73.8	73.3	72.9	72.5	72.1	71.6	71.2	70.8	70.4	70.0
37	76.5	76.1	75.7	75.2	74.8	74.4	74.0	73.5	73.1	72.7	72.3	71.9	71.5	71.0	70.6	70.2
38	76.7	76.3	75.8	75.4	75.0	74.6	74.2	73.7	73.3	72.9	72.5	72.1	71.7	71.3	70.9	70.5
39	76.9	76.5	76.0	75.6	75.2	74.8	74.4	74.0	73.5	73.1	72.7	72.3	71.9	71.5	71.1	70.7
40	77.1	76.6	76.2	75.8	75.4	75.0	74.6	74.2	73.8	73.4	73.0	72.6	72.2	71.8	71.4	71.0
41	77.2	76.8	76.4	76.0	75.6	75.2	74.8	74.4	74.0	73.6	73.2	72.8	72.4	72.0	71.6	71.2
42	77.4	77.0	76.6	76.2	75.8	75.4	75.0	74.6	74.2	73.8	73.4	73.1	72.7	72.3	71.9	71.5
43	77.6	77.2	76.8	76.4	76.0	75.6	75.2	74.9	74.5	74.1	73.7	73.3	72.9	72.5	72.2	71.8
44	77.8	77.4	77.0	76.6	76.3	75.9	75.5	75.1	74.7	74.3	73.9	73.6	73.2	72.8	72.4	72.1
45	78.0	77.6	77.3	76.9	76.5	76.1	75.7	75.3	75.0	74.6	74.2	73.8	73.5	73.1	72.7	72.3
46	78.2	77.8	77.5	77.1	76.7	76.3	76.0	75.6	75.2	74.8	74.5	74.1	73.7	73.4	73.0	72.6
47	78.4	78.1	77.7	77.3	76.9	76.6	76.2	75.8	75.5	75.1	74.7	74.4	74.0	73.7	73.3	72.9
48	78.6	78.3	77.9	77.5	77.2	76.8	76.5	76.1	75.7	75.4	75.0	74.7	74.3	73.9	73.6	73.2
49	78.9	78.5	78.1	77.8	77.4	77.1	76.7	76.4	76.0	75.6	75.3	74.9	74.6	74.2	73.9	73.6
50	79.1	78.7	78.4	78.0	77.7	77.3	77.0	76.6	76.3	75.9	75.6	75.2	74.9	74.5	74.2	73.9
51	79.3	79.0	78.6	78.3	77.9	77.6	77.2	76.9	76.6	76.2	75.9	75.5	75.2	74.9	74.5	74.2
52	79.5	79.2	78.9	78.5	78.2	77.8	77.5	77.2	76.8	76.5	76.2	75.8	75.5	75.2	74.8	74.5
53	79.8	79.4	79.1	78.8	78.4	78.1	77.8	77.4	77.1	76.8	76.5	76.1	75.8	75.5	75.2	74.8
54	80.0	79.7	79.3	79.0	78.7	78.4	78.1	77.7	77.4	77.1	76.8	76.5	76.1	75.8	75.5	75.2
55	80.2	79.9	79.6	79.3	79.0	78.6	78.3	78.0	77.7	77.4	77.1	76.8	76.5	76.1	75.8	75.5
56	80.5	80.2	79.9	79.5	79.2	78.9	78.6	78.3	78.0	77.7	77.4	77.1	76.8	76.5	76.2	75.9
57	80.7	80.4	80.1	79.8	79.5	79.2	78.9	78.6	78.3	78.0	77.7	77.4	77.1	76.8	76.5	76.2
58	81.0	80.7	80.4	80.1	79.8	79.5	79.2	78.9	78.6	78.3	78.0	77.7	77.5	77.2	76.9	76.6
59	81.2	80.9	80.6	80.4	80.1	79.8	79.5	79.2	78.9	78.6	78.4	78.1	77.8	77.5	77.2	77.0
60	81.5	81.2	80.9	80.6	80.4	80.1	79.8	79.5	79.2	79.0	78.7	78.4	78.1	77.9	77.6	77.3
61	81.7	81.5	81.2	80.9	80.6	80.4	80.1	79.8	79.6	79.3	79.0	78.8	78.5	78.2	78.0	77.7
62	82.0	81.7	81.5	81.2	80.9	80.7	80.4	80.1	79.9	79.6	79.4	79.1	78.8	78.6	78.3	78.1
63	82.2	82.0	81.7	81.5	81.2	81.0	80.7	80.5	80.2	80.0	79.7	79.5	79.2	79.0	78.7	78.5
64	82.5	82.3	82.0	81.8	81.5	81.3	81.0	80.8	80.5	80.3	80.1	79.8	79.6	79.3	79.1	78.8
65	82.8	82.5	82.3	82.1	81.8	81.6	81.3	81.1	80.9	80.6	80.4	80.2	79.9	79.7	79.5	79.2
66	83.0	82.8	82.6	82.4	82.1	81.9	81.7	81.4	81.2	81.0	80.8	80.5	80.3	80.1	79.9	79.6
67	83.3	83.1	82.9	82.7	82.4	82.2	82.0	81.8	81.6	81.3	81.1	80.9	80.7	80.5	80.2	80.0
68	83.6	83.4	83.2	83.0	82.7	82.5	82.3	82.1	81.9	81.7	81.5	81.3	81.1	80.8	80.6	80.4
69	83.9	83.7	83.5	83.3	83.1	82.9	82.7	82.5	82.3	82.0	81.8	81.6	81.4	81.2	81.0	80.8
70	84.1	83.9	83.7	83.6	83.4	83.2	83.0	82.8	82.6	82.4	82.2	82.0	81.8	81.6	81.4	81.3
71	84.4	84.2	84.0	83.9	83.7	83.5	83.3	83.1	83.0	82.8	82.6	82.4	82.2	82.0	81.9	81.7
72	84.7	84.5	84.4	84.2	84.0	83.8	83.7	83.5	83.3	83.1	83.0	82.8	82.6	82.4	82.3	82.1
73	85.0	84.8	84.7	84.5	84.3	84.2	84.0	83.8	83.7	83.5	83.3	83.2	83.0	82.8	82.7	82.5
74	85.3	85.1	85.0	84.8	84.6	84.5	84.3	84.2	84.0	83.9	83.7	83.6	83.4	83.2	83.1	82.9
75	85.6	85.4	85.3	85.1	85.0	84.8	84.7	84.5	84.4	84.2	84.1	83.9	83.8	83.7	83.5	83.4

C (3)

°	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	59.0	58.6	58.2	57.8	57.4	57.0	56.6	56.2	55.8	55.4	55.0	54.6	54.2	53.9	53.5	53.1
2	59.1	58.8	58.2	57.8	57.4	57.0	56.6	56.2	55.8	55.4	55.0	54.6	54.3	53.9	53.5	53.1
4	59.1	58.7	58.3	57.9	57.5	57.1	56.7	56.3	55.9	55.5	55.1	54.7	54.3	54.0	53.6	53.2
6	59.2	58.8	58.4	58.0	57.6	57.2	56.8	56.4	56.0	55.6	55.2	54.8	54.4	54.1	53.7	53.3
8	59.3	58.9	58.5	58.1	57.7	57.3	56.9	56.5	56.1	55.7	55.3	54.9	54.5	54.2	53.8	53.4
10	59.4	59.0	58.6	58.2	57.8	57.4	57.0	56.6	56.2	55.8	55.4	55.0	54.6	54.3	53.9	53.5
11	59.5	59.1	58.7	58.3	57.9	57.5	57.1	56.7	56.3	55.9	55.5	55.1	54.7	54.4	54.0	53.6
12	59.6	59.2	58.8	58.4	58.0	57.6	57.2	56.8	56.4	56.0	55.6	55.2	54.8	54.5	54.1	53.7
13	59.7	59.3	58.9	58.5	58.1	57.7	57.3	56.9	56.5	56.1	55.6	55.3	54.9	54.6	54.2	53.8
14	59.8	59.4	59.0	58.6	58.2	57.8	57.4	57.0	56.6	56.2	55.8	55.4	55.1	54.7	54.3	54.0
15	59.9	59.5	59.1	58.7	58.3	57.9	57.5	57.1	56.7	56.3	55.9	55.6	55.2	54.8	54.4	54.1
16	60.0	59.6	59.2	58.8	58.4	58.0	57.6	57.2	56.8	56.4	56.1	55.7	55.3	54.9	54.6	54.2
17	60.2	59.7	59.3	58.9	58.5	58.1	57.7	57.4	57.0	56.6	56.2	55.8	55.5	55.1	54.7	54.4
18	60.3	59.9	59.5	59.1	58.7	58.3	57.9	57.5	57.1	56.7	56.3	56.0	55.6	55.2	54.9	54.5
19	60.4	60.0	59.6	59.2	58.8	58.4	58.0	57.6	57.3	56.9	56.5	56.1	55.8	55.4	55.0	54.7
20	60.6	60.2	59.8	59.4	59.0	58.6	58.2	57.8	57.4	57.0	56.7	56.3	55.9	55.6	55.2	54.8
21	60.7	60.3	59.9	59.5	59.1	58.7	58.4	58.0	57.6	57.2	56.8	56.5	56.1	55.7	55.4	55.0
22	60.9	60.5	60.1	59.7	59.3	58.9	58.5	58.2	57.8	57.4	57.0	56.6	56.3	55.9	55.5	55.2
23	61.1	60.7	60.3	59.9	59.5	59.1	58.7	58.3	58.0	57.6	57.2	56.8	56.5	56.1	55.7	55.4
24	61.3	60.9	60.5	60.1	59.7	59.3	58.9	58.5	58.2	57.8	57.4	57.0	56.7	56.3	55.9	55.6
25	61.5	61.1	60.7	60.3	59.9	59.5	59.1	58.7	58.4	58.0	57.6	57.2	56.9	56.5	56.2	55.8
26	61.7	61.3	60.9	60.5	60.1	59.7	59.3	58.9	58.6	58.2	57.8	57.5	57.1	56.7	56.4	56.0
27	61.9	61.5	61.1	60.7	60.3	59.9	59.5	59.2	58.8	58.4	58.0	57.7	57.3	57.0	56.6	56.2
28	62.1	61.7	61.3	60.9	60.5	60.1	59.8	59.4	59.0	58.6	58.3	57.9	57.6	57.2	56.8	56.5
29	62.3	61.9	61.5	61.1	60.8	60.4	60.0	59.6	59.3	58.9	58.5	58.2	57.8	57.4	57.1	56.7
30	62.5	62.2	61.8	61.4	61.0	60.6	60.2	59.9	59.5	59.1	58.8	58.4	58.1	57.7	57.3	57.0
31	62.8	62.4	62.0	61.6	61.3	60.9	60.5	60.1	59.8	59.4	59.0	58.7	58.3	58.0	57.6	57.3
32	63.0	62.6	62.3	61.9	61.5	61.1	60.8	60.4	60.0	59.7	59.3	58.9	58.6	58.2	57.9	57.5
33	63.3	62.9	62.5	62.1	61.8	61.4	61.0	60.7	60.3	59.9	59.6	59.2	58.9	58.5	58.2	57.8
34	63.6	63.2	62.8	62.4	62.1	61.7	61.3	60.9	60.6	60.2	59.9	59.5	59.2	58.8	58.5	58.1
35	63.8	63.4	63.1	62.7	62.3	62.0	61.6	61.2	60.9	60.5	60.2	59.8	59.5	59.1	58.8	58.4
36	64.1	63.7	63.4	63.0	62.6	62.3	61.9	61.5	61.2	60.8	60.5	60.1	59.8	59.4	59.1	58.8
37	64.4	64.0	63.7	63.3	62.9	62.6	62.2	61.8	61.5	61.1	60.8	60.4	60.1	59.8	59.4	59.1
38	64.7	64.3	64.0	63.6	63.2	62.9	62.5	62.2	61.8	61.5	61.1	60.8	60.4	60.1	59.8	59.4
39	65.0	64.6	64.3	63.9	63.6	63.2	62.8	62.5	62.1	61.8	61.5	61.1	60.8	60.4	60.1	59.8
40	65.3	65.0	64.6	64.2	63.9	63.5	63.2	62.8	62.5	62.1	61.8	61.5	61.1	60.8	60.5	60.1
41	65.6	65.3	64.9	64.6	64.2	63.9	63.5	63.2	62.8	62.5	62.2	61.8	61.5	61.1	60.8	60.5
42	66.0	65.6	65.3	64.9	64.6	64.2	63.9	63.5	63.2	62.9	62.5	62.2	61.9	61.5	61.2	60.9
43	66.3	66.0	65.6	65.3	64.9	64.6	64.2	63.9	63.6	63.2	62.9	62.6	62.2	61.9	61.6	61.3
44	66.7	66.3	66.0	65.6	65.3	64.9	64.6	64.3	63.9	63.6	63.3	62.9	62.6	62.3	62.0	61.7
45	67.0	66.7	66.3	66.0	65.7	65.3	65.0	64.7	64.3	64.0	63.7	63.3	63.0	62.7	62.4	62.1
46	67.4	67.0	66.7	66.4	66.0	65.7	65.4	65.0	64.7	64.4	64.1	63.7	63.4	63.1	62.8	62.5
47	67.7	67.4	67.1	66.7	66.4	66.1	65.8	65.4	65.1	64.8	64.5	64.2	63.8	63.5	63.2	62.9
48	68.1	67.8	67.5	67.1	66.8	66.5	66.2	65.9	65.5	65.2	64.9	64.6	64.3	64.0	63.7	63.4
49	68.5	68.2	67.9	67.5	67.2	66.9	66.6	66.3	66.0	65.6	65.3	65.0	64.7	64.4	64.1	63.8
50	68.9	68.6	68.3	68.0	67.6	67.3	67.0	66.7	66.4	66.1	65.8	65.5	65.2	64.9	64.6	64.3
51	69.3	69.0	68.7	68.4	68.1	67.8	67.4	67.1	66.8	66.5	66.2	65.9	65.6	65.3	65.0	64.7
52	69.7	69.4	69.1	68.8	68.5	68.2	67.9	67.6	67.3	67.0	66.7	66.4	66.1	65.8	65.5	65.2
53	70.1	69.8	69.5	69.2	68.9	68.6	68.3	68.0	67.7	67.4	67.2	66.9	66.6	66.3	66.0	65.7
54	70.6	70.3	70.0	69.7	69.4	69.1	68.8	68.5	68.2	67.9	67.6	67.3	67.1	66.8	66.5	66.2
55	71.0	70.7	70.4	70.1	69.8	69.6	69.3	69.0	68.7	68.4	68.1	67.8	67.6	67.3	67.0	66.7
56	71.5	71.2	70.9	70.6	70.3	70.0	69.7	69.5	69.2	68.9	68.6	68.3	68.1	67.8	67.5	67.2
57	71.9	71.6	71.3	71.1	70.8	70.5	70.2	70.0	69.7	69.4	69.1	68.9	68.6	68.3	68.0	67.8
58	72.4	72.1	71.8	71.5	71.3	71.0	70.7	70.5	70.2	69.9	69.6	69.4	69.1	68.9	68.6	68.3
59	72.8	72.6	72.3	72.0	71.8	71.5	71.2	71.0	70.7	70.4	70.2	69.9	69.7	69.4	69.1	68.9
60	73.3	73.0	72.8	72.5	72.3	72.0	71.7	71.5	71.2	71.0	70.7	70.5	70.2	69.9	69.7	69.4
61	73.8	73.5	73.3	73.0	72.8	72.5	72.3	72.0	71.8	71.5	71.3	71.0	70.8	70.5	70.3	70.0
62	74.3	74.0	73.8	73.5	73.3	73.0	72.8	72.5	72.3	72.1	71.8	71.6	71.3	71.1	70.8	70.6
63	74.8	74.5	74.3	74.0	73.8	73.6	73.3	73.1	72.8	72.6	72.4	72.1	71.9	71.7	71.4	71.2
64	75.3	75.0	74.8	74.6	74.3	74.1	73.9	73.6	73.4	73.2	72.9	72.7	72.5	72.3	72.0	71.8
65	75.8	75.5	75.3	75.1	74.9	74.6	74.4	74.2	74.0	73.7	73.5	73.3	73.1	72.9	72.6	72.4
66	76.3	76.1	75.8	75.6	75.4	75.2	75.0	74.8	74.5	74.3	74.1	73.9	73.7	73.5	73.2	73.0
67	76.8	76.6	76.4	76.2	76.0	75.8	75.5	75.3	75.1	74.9	74.7	74.5	74.3	74.1	73.9	73.7
68	77.3	77.6	76.9	76.7	76.5	76.3	76.1	75.9	75.7	75.5	75.3	75.1	74.9	74.7	74.5	74.3
69	77.9	77.7	77.5	77.3	77.1	76.9	76.7	76.5	76.3	76.1	75.9	75.7	75.5	75.4	75.2	75.0
70	78.4	78.2	78.0	77.9	77.7	77.5	77.3	77.1	76.9	76.7	76.5	76.4	76.2	76.0	75.8	75.6
71	79.0	78.8	78.6	78.4	78.2	78.1	77.9	77.7	77.5	77.4	77.2	77.0	76.8	76.7	76.5	76.3
72	79.5	79.4	79.2	79.0	78.8	78.7	78.5	78.3	78.1	78.0	77.8	77.7	77.5	77.3	77.1	77.0
73	80.1	79.9	79.7	79.6	79.4	79.3	79.1	79.0	78.8	78.6	78.4	78.3	78.1	78.0	77.8	77.7
74	80.6	80.5	80.3	80.2	80.0	79.9	79.7	79.6	79.4	79.2	79.1	79.0	78.8	78.7	78.5	78.4
75	81.2	81.1	80.9	80.8	80.6	80.5	80.3	80.2	80.0	79.9	79.7	79.6	79.4	79.3	79.2	79.1

(3)	7.5	7.6	7.7	7.8	7.9	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	C
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	
0	53.1	52.8	52.4	52.0	51.7	51.3	51.0	50.6	50.3	50.0	49.6	49.3	49.0	48.7	48.3	48.0	
2	53.1	52.8	52.4	52.1	51.7	51.4	51.0	50.7	50.3	50.0	49.7	49.3	49.0	48.7	48.3	48.0	
4	53.2	52.9	52.5	52.1	51.8	51.4	51.1	50.7	50.4	50.1	49.7	49.4	49.1	48.8	48.4	48.1	
6	53.3	53.0	52.6	52.2	51.9	51.5	51.2	50.8	50.5	50.2	49.8	49.5	49.2	48.9	48.5	48.2	
8	53.4	53.1	52.7	52.3	52.0	51.6	51.3	50.9	50.6	50.3	49.9	49.6	49.3	49.0	48.6	48.3	
10	53.5	53.2	52.8	52.5	52.1	51.8	51.4	51.1	50.7	50.4	50.1	49.7	49.4	49.1	48.8	48.4	
11	53.6	53.3	52.9	52.6	52.2	51.9	51.5	51.2	50.8	50.5	50.2	49.8	49.5	49.2	48.9	48.5	
12	53.7	53.4	53.0	52.7	52.3	52.0	51.6	51.3	50.9	50.6	50.3	49.9	49.6	49.3	49.0	48.6	
13	53.8	53.5	53.1	52.8	52.4	52.1	51.7	51.4	51.0	50.7	50.4	50.0	49.7	49.4	49.1	48.8	
14	54.0	53.6	53.2	52.9	52.5	52.2	51.8	51.5	51.2	50.8	50.5	50.2	49.8	49.5	49.2	48.9	
15	54.1	53.7	53.4	53.0	52.7	52.3	52.0	51.6	51.3	50.9	50.6	50.3	50.0	49.6	49.3	49.0	
16	54.2	53.8	53.5	53.1	52.8	52.4	52.1	51.8	51.4	51.1	50.7	50.4	50.1	49.8	49.5	49.1	
17	54.4	54.0	53.6	53.3	52.9	52.6	52.2	51.9	51.6	51.2	50.9	50.6	50.2	49.9	49.6	49.3	
18	54.5	54.1	53.8	53.4	53.1	52.7	52.4	52.1	51.7	51.4	51.0	50.7	50.4	50.1	49.8	49.4	
19	54.7	54.3	53.9	53.6	53.2	52.9	52.6	52.2	51.9	51.5	51.2	50.9	50.6	50.2	49.9	49.6	
20	54.8	54.5	54.1	53.8	53.4	53.1	52.7	52.4	52.0	51.7	51.4	51.1	50.7	50.4	50.1	49.8	
21	55.0	54.6	54.3	53.9	53.6	53.2	52.9	52.6	52.2	51.9	51.6	51.2	50.9	50.6	50.3	50.0	
22	55.2	54.8	54.5	54.1	53.8	53.4	53.1	52.8	52.4	52.1	51.8	51.4	51.1	50.8	50.5	50.2	
23	55.4	55.0	54.7	54.3	54.0	53.6	53.3	53.0	52.6	52.3	52.0	51.6	51.3	51.0	50.7	50.4	
24	55.6	55.2	54.9	54.5	54.2	53.8	53.5	53.2	52.8	52.5	52.2	51.8	51.5	51.2	50.9	50.6	
25	55.8	55.4	55.1	54.7	54.4	54.1	53.7	53.4	53.0	52.7	52.4	52.1	51.7	51.4	51.1	50.8	
26	56.0	55.7	55.3	55.0	54.6	54.3	53.9	53.6	53.3	52.9	52.6	52.3	52.0	51.7	51.3	51.0	
27	56.2	55.9	55.5	55.2	54.9	54.5	54.2	53.8	53.5	53.2	52.9	52.5	52.2	51.9	51.6	51.3	
28	56.5	56.1	55.8	55.4	55.1	54.8	54.4	54.1	53.8	53.4	53.1	52.8	52.5	52.2	51.8	51.5	
29	56.7	56.4	56.0	55.7	55.4	55.0	54.7	54.4	54.0	53.7	53.4	53.1	52.7	52.4	52.1	51.8	
30	57.0	56.6	56.3	56.0	55.6	55.3	55.0	54.6	54.3	54.0	53.6	53.3	53.0	52.7	52.4	52.1	
31	57.3	56.9	56.6	56.2	55.9	55.6	55.2	54.9	54.6	54.2	53.9	53.6	53.3	53.0	52.7	52.4	
32	57.5	57.2	56.9	56.5	56.2	55.8	55.5	55.2	54.9	54.5	54.2	53.9	53.6	53.3	53.0	52.7	
33	57.8	57.5	57.1	56.8	56.5	56.1	55.8	55.5	55.2	54.8	54.5	54.2	53.9	53.6	53.3	53.0	
34	58.1	57.8	57.4	57.1	56.8	56.4	56.1	55.8	55.5	55.1	54.8	54.5	54.2	53.9	53.6	53.3	
35	58.4	58.1	57.8	57.4	57.1	56.8	56.4	56.1	55.8	55.5	55.2	54.8	54.5	54.2	53.9	53.6	
36	58.8	58.4	58.1	57.7	57.4	57.1	56.8	56.4	56.1	55.8	55.5	55.2	54.9	54.6	54.2	53.9	
37	59.1	58.7	58.4	58.1	57.8	57.4	57.1	56.8	56.5	56.1	55.8	55.5	55.2	54.9	54.6	54.3	
38	59.4	59.1	58.8	58.4	58.1	57.8	57.4	57.1	56.8	56.5	56.2	55.9	55.6	55.3	55.0	54.7	
39	59.8	59.4	59.1	58.8	58.5	58.1	57.8	57.5	57.2	56.9	56.6	56.2	55.9	55.6	55.3	55.0	
40	60.1	59.8	59.5	59.1	58.8	58.5	58.2	57.9	57.6	57.2	56.9	56.6	56.3	56.0	55.7	55.4	
41	60.5	60.2	59.8	59.5	59.2	58.9	58.6	58.2	57.9	57.6	57.3	57.0	56.7	56.4	56.1	55.8	
42	60.9	60.5	60.2	59.9	59.6	59.3	59.0	58.6	58.3	58.0	57.7	57.4	57.1	56.8	56.5	56.2	
43	61.3	60.9	60.6	60.3	60.0	59.7	59.4	59.0	58.7	58.4	58.1	57.8	57.5	57.2	56.9	56.6	
44	61.7	61.3	61.0	60.7	60.4	60.1	59.8	59.5	59.2	58.9	58.6	58.3	58.0	57.7	57.4	57.1	
45	62.1	61.7	61.4	61.1	60.8	60.5	60.2	59.9	59.6	59.3	59.0	58.7	58.4	58.1	57.8	57.5	
46	62.5	62.2	61.9	61.5	61.2	60.9	60.6	60.3	60.0	59.7	59.4	59.1	58.9	58.6	58.3	58.0	
47	62.9	62.6	62.3	62.0	61.7	61.4	61.1	60.8	60.5	60.2	59.9	59.6	59.3	59.0	58.7	58.5	
48	63.4	63.0	62.7	62.4	62.1	61.8	61.5	61.2	61.0	60.7	60.4	60.1	59.8	59.5	59.2	58.9	
49	63.8	63.5	63.2	62.9	62.6	62.3	62.0	61.7	61.4	61.1	60.9	60.6	60.3	60.0	59.7	59.4	
50	64.3	64.0	63.7	63.4	63.1	62.8	62.5	62.2	61.9	61.6	61.4	61.1	60.8	60.5	60.2	60.0	
51	64.7	64.4	64.1	63.9	63.6	63.3	63.0	62.7	62.4	62.1	61.9	61.6	61.3	61.0	60.7	60.5	
52	65.2	64.9	64.6	64.4	64.1	63.8	63.5	63.2	62.9	62.7	62.4	62.1	61.8	61.6	61.3	61.0	
53	65.7	65.4	65.1	64.9	64.6	64.3	64.0	63.7	63.5	63.2	62.9	62.6	62.4	62.1	61.8	61.6	
54	66.2	65.9	65.6	65.4	65.1	64.8	64.5	64.3	64.0	63.7	63.5	63.2	62.9	62.6	62.4	62.1	
55	66.7	66.4	66.2	65.9	65.6	65.4	65.1	64.8	64.5	64.3	64.0	63.7	63.5	63.2	63.0	62.7	
56	67.2	67.0	66.7	66.4	66.2	65.9	65.6	65.4	65.1	64.9	64.6	64.3	64.1	63.8	63.5	63.3	
57	67.8	67.5	67.2	67.0	66.7	66.5	66.2	65.9	65.7	65.4	65.2	64.9	64.6	64.4	64.1	63.9	
58	68.3	68.1	67.8	67.5	67.3	67.0	66.8	66.5	66.3	66.0	65.8	65.5	65.2	65.0	64.8	64.5	
59	68.9	68.6	68.4	68.1	67.9	67.6	67.4	67.1	66.9	66.6	66.4	66.1	65.9	65.6	65.4	65.1	
60	69.4	69.2	68.9	68.7	68.4	68.2	68.0	67.7	67.5	67.2	67.0	66.7	66.5	66.3	66.0	65.8	
61	70.0	69.8	69.5	69.3	69.0	68.8	68.6	68.3	68.1	67.8	67.6	67.4	67.1	66.9	66.7	66.4	
62	70.6	70.4	70.1	69.9	69.7	69.4	69.2	68.9	68.7	68.5	68.2	68.0	67.8	67.6	67.3	67.1	
63	71.2	71.0	70.7	70.5	70.3	70.0	69.8	69.6	69.4	69.1	68.9	68.7	68.4	68.2	68.0	67.8	
64	71.8	71.6	71.3	71.1	70.9	70.7	70.5	70.2	70.0	69.8	69.6	69.3	69.1	68.9	68.7	68.5	
66	72.4	72.2	72.0	71.8	71.5	71.3	71.1	70.9	70.7	70.5	70.2	70.0	69.8	69.6	69.4	69.2	
66	73.0	72.8	72.6	72.4	72.2	72.0	71.8	71.6	71.4	71.1	70.9	70.7	70.5	70.3	70.1	69.9	
67	73.7	73.5	73.3	73.1	72.9	72.6	72.4	72.2	72.0	71.8	71.6	71.4	71.2	71.0	70.8	70.6	
68	74.3	74.1	73.9	73.7	73.5	73.3	73.1	72.9	72.7	72.5	72.3	72.1	72.0	71.8	71.6	71.4	
69	75.0	74.8	74.6	74.4	74.2	74.0	73.8	73.6	73.5	73.3	73.1	72.9	72.7	72.5	72.3	72.1	
70	75.6	75.4	75.3	75.1	74.9	74.7	74.5	74.3	74.1	74.0	73.8	73.6	73.5	73.3	73.1	72.9	
71	76.3	76.1	76.0	75.8	75.6	75.4	75.3	75.1	74.9	74.7	74.6	74.4	74.2	74.0	73.9	73.7	
72	77.0	76.8	76.7	76.5	76.3	76.1	76.0	75.8	75.7	75.5	75.3	75.1	75.0	74.8	74.7	74.5	
73	77.7	77.5	77.9	77.2	77.0	76.8	76.7	76.5	76.4	76.2	76.1	75.9	75.8	75.6	75.5	75.3	
74	78.4	78.2	78.1	77.9	77.8	77.6	77.7	77.3	77.1	77.0	76.9	76.7	76.6	76.4	76.3	76.1	

ΓΠ: 16-ΤΟΛΟ ΤΟΙΧΟ ΜΕΣΟ. ΤΟΙΧΟ | ΓΜ: ΜΕΣ GR-ΜΕΣ

③	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10.0	10.2	10.4	10.6	10.8	11.0
•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
0	48.0	47.7	47.4	47.1	46.8	46.5	46.2	45.9	45.6	45.3	45.0	44.4	43.9	43.3	42.8	42.3
2	48.8	47.7	47.4	47.1	46.8	46.5	46.2	45.9	45.6	45.3	45.0	44.4	43.9	43.4	42.8	42.3
4	48.1	47.0	47.5	47.3	46.9	46.6	46.3	46.0	45.7	45.4	45.1	44.5	44.0	43.4	42.8	42.4
6	48.2	47.9	47.6	47.3	47.8	46.7	46.4	46.1	45.8	45.5	45.2	44.4	44.1	43.5	43.0	42.5
8	48.3	48.0	47.7	47.4	47.1	46.8	46.5	46.2	45.9	45.8	45.3	44.7	44.3	43.6	43.1	42.6
10	48.4	48.1	47.0	47.5	47.2	46.9	46.6	46.3	46.0	45.7	45.4	44.9	44.3	43.8	43.3	42.7
11	48.5	48.2	47.9	47.6	47.3	47.8	46.7	46.4	46.1	45.8	45.5	45.0	44.4	43.9	43.3	42.8
12	48.6	48.3	48.0	47.7	47.4	47.1	46.8	46.5	46.3	45.9	45.6	45.1	44.5	44.0	43.4	42.9
13	48.8	48.4	48.1	47.8	47.5	47.3	46.9	46.6	46.5	46.0	45.7	45.2	44.6	44.1	43.5	43.0
14	48.9	48.6	48.2	47.9	47.6	47.3	47.0	46.7	46.4	46.2	45.8	45.3	44.7	44.2	43.6	43.1
15	49.0	48.7	48.4	48.1	47.8	47.5	47.2	46.9	46.6	46.8	46.0	45.4	44.0	44.3	43.8	43.2
16	49.1	48.8	48.5	48.2	47.9	47.6	47.3	47.8	46.7	46.4	46.1	45.6	45.0	44.5	43.9	43.4
17	49.3	49.0	48.7	48.4	48.0	47.7	47.6	47.3	46.9	46.6	46.3	45.7	45.2	44.6	44.1	43.6
18	49.4	49.1	48.8	48.5	48.3	47.9	47.6	47.5	47.8	46.7	46.4	45.9	45.3	44.8	44.2	43.7
19	49.6	49.3	49.0	48.7	48.4	48.1	47.8	47.5	47.2	46.9	46.6	46.0	45.5	44.9	44.4	43.9
20	49.8	49.5	49.2	48.8	48.5	48.2	47.9	47.7	47.4	47.1	46.8	46.3	45.7	45.1	44.6	44.1
21	50.0	49.7	49.4	49.0	48.7	48.4	48.1	47.8	47.5	47.3	47.0	46.4	45.9	45.3	44.8	44.3
22	50.2	49.8	49.3	49.3	48.9	48.6	48.3	48.0	47.7	47.5	47.3	46.6	46.0	45.5	45.0	44.5
23	50.4	50.0	49.7	49.4	49.1	48.8	48.5	48.2	47.9	47.7	47.4	46.6	46.3	45.7	45.2	44.7
24	50.6	50.3	50.0	49.6	49.3	49.0	48.7	48.5	48.5	47.9	47.4	47.0	46.5	45.9	45.4	44.9
25	50.8	50.5	50.3	49.9	49.6	49.3	49.0	48.7	48.4	48.1	47.8	47.2	46.7	46.1	45.6	45.1
26	51.0	50.7	50.4	50.1	49.8	49.5	49.2	48.9	48.6	48.3	48.1	47.5	46.9	46.4	45.9	45.2
27	51.3	51.0	50.7	50.4	50.1	49.8	49.5	49.3	48.9	48.6	48.3	47.7	47.2	46.6	46.1	45.6
28	51.5	51.3	50.9	50.6	50.3	50.0	49.7	49.4	49.1	48.8	48.6	48.0	47.4	46.8	46.4	45.8
29	51.8	51.5	51.2	50.9	50.6	50.3	50.0	49.7	49.4	49.1	48.8	48.3	47.7	47.2	46.8	46.1
30	52.1	51.8	51.5	51.2	50.9	50.6	50.5	50.0	49.7	49.4	49.1	48.5	48.0	47.4	46.9	46.4
31	52.4	52.0	51.7	51.4	51.1	50.8	50.8	50.3	50.8	49.7	49.4	88.8	48.3	47.7	47.2	46.7
32	53.7	52.5	52.0	51.7	51.4	51.1	50.9	50.6	50.2	50.0	49.7	49.1	48.8	48.0	47.5	47.0
33	53.0	52.4	52.3	52.0	51.7	51.5	51.2	50.9	50.6	50.3	50.0	49.5	48.9	48.4	47.8	47.3
34	53.3	53.0	52.7	52.4	52.1	51.8	51.5	51.3	50.9	50.6	50.3	49.8	49.3	48.7	48.2	47.6
35	53.8	53.3	53.0	52.7	52.4	52.1	51.8	51.5	51.2	51.0	50.7	50.1	49.6	19.0	48.5	48.0
36	53.9	53.6	53.3	53.0	53.7	52.3	53.2	51.9	51.5	51.2	51.0	50.5	49.9	49.4	48.9	48.3
37	54.3	54.0	53.7	53.4	53.1	52.8	52.5	52.3	52.8	51.7	51.4	50.8	50.3	49.8	49.2	48.7
38	54.7	54.4	54.1	53.8	53.5	53.2	52.9	52.6	53.3	52.0	51.8	51.3	50.7	50.1	49.6	49.1
39	55.0	54.7	54.4	54.1	53.9	53.6	53.3	53.0	53.7	52.4	52.1	51.8	51.1	50.5	50.0	49.5
40	55.4	55.1	54.8	54.5	54.2	54.8	53.7	53.4	53.1	52.8	52.5	52.0	51.5	50.9	50.4	49.9
41	55.8	55.5	55.2	54.9	54.6	54.4	54.1	53.8	53.5	53.2	53.0	52.4	51.9	51.3	50.9	50.3
42	56.2	55.9	55.6	55.4	55.1	54.8	54.3	54.3	53.9	53.7	53.4	53.6	52.3	51.8	51.2	50.7
43	56.4	56.4	56.1	55.8	55.5	55.2	54.9	54.6	54.4	54.1	53.8	53.3	52.7	52.3	51.7	51.2
44	57.1	56.8	56.5	56.2	55.9	55.7	55.4	55.1	54.8	54.5	54.3	53.7	53.2	52.7	52.2	51.4
45	57.3	57.2	57.0	56.7	56.4	56.1	55.8	55.6	55.3	55.0	54.7	54.2	53.7	53.1	52.8	52.1
46	58.0	57.7	57.4	57.1	56.9	56.6	56.3	56.8	55.8	55.5	55.3	54.7	54.2	53.6	53.1	52.6
47	58.5	58.3	57.9	57.6	57.3	57.1	56.6	56.5	56.2	56.8	55.7	55.2	54.7	54.1	53.6	53.1
48	58.9	58.7	58.4	58.1	57.8	57.6	57.3	57.6	56.7	56.5	56.3	55.7	55.3	54.7	54.1	53.6
49	59.6	59.2	58.9	58.4	58.3	58.1	57.8	57.5	57.3	57.0	56.7	56.2	55.7	55.2	54.7	54.2
50	60.0	59.7	59.4	59.1	58.8	58.6	58.3	58.1	57.8	57.5	57.8	56.7	56.2	55.7	55.2	54.7
51	60.3	60.2	59.9	59.7	59.4	59.1	58.9	58.6	58.3	58.1	57.8	57.3	56.8	56.3	55.8	55.3
52	61.0	60.7	60.3	60.2	59.9	59.7	59.4	59.3	58.9	58.6	58.4	57.8	57.6	56.9	56.3	55.9
53	61.4	61.3	61.0	60.8	60.5	60.3	60.0	89.7	59.5	59.2	89.0	58.5	58.0	57.3	57.0	56.5
54	62.1	61.9	61.6	61.3	61.1	60.8	60.8	60.3	60.1	59.8	59.6	59.1	58.6	58.1	57.6	57.1
55	62.7	62.4	62.3	61.9	61.7	61.4	61.2	60.9	60.7	60.4	60.2	59.7	59.3	58.7	58.2	57.8
56	62.3	63.0	62.8	62.5	62.3	62.0	61.8	61.5	61.3	61.0	60.8	60.3	59.6	59.2	58.9	58.4
57	63.9	63.8	63.4	63.1	62.9	62.6	62.4	62.2	61.9	61.7	61.4	60.9	60.5	60.0	59.5	59.1
58	64.3	64.3	64.0	63.8	63.5	63.3	63.0	62.6	63.6	62.3	62.1	61.4	61.1	60.7	60.3	59.8
59	65.1	64.9	64.6	64.4	64.2	65.9	63.7	63.5	63.2	63.0	62.7	62.3	61.8	61.4	60.9	60.5
60	65.8	65.5	65.3	65.1	64.6	64.6	64.4	64.1	63.9	63.7	63.4	63.0	62.5	63.1	61.8	61.3
61	66.4	66.2	66.0	65.7	65.5	65.3	65.0	64.8	64.6	64.4	64.1	63.7	63.2	62.8	62.4	61.9
62	67.1	66.9	66.6	66.4	66.3	66.0	65.7	65.5	65.3	65.1	64.9	64.4	64.0	63.5	63.1	62.7
63	67.8	67.6	67.3	67.1	66.9	66.7	66.3	66.3	66.0	65.8	65.6	65.3	64.7	64.3	63.9	63.5
64	68.5	68.3	68.0	67.9	67.6	67.6	67.3	67.0	66.5	66.8	66.3	65.9	65.5	65.1	64.7	64.3
65	69.2	69.0	68.8	68.5	68.3	68.1	67.9	67.7	67.6	67.3	67.1	66.7	66.2	65.9	65.8	65.1
66	69.9	69.7	69.5	69.3	69.1	68.9	68.7	68.5	68.3	68.1	67.9	67.5	67.1	66.7	66.3	65.9
67	70.6	70.4	70.2	70.0	69.8	69.6	69.4	69.2	69.0	68.9	68.7	68.3	67.9	67.5	67.1	66.7
68	71.4	71.2	71.0	70.8	70.6	70.4	70.2	70.0	69.8	69.7	69.5	69.1	68.7	68.3	68.0	67.6
69	72.1	72.0	71.8	71.6	71.4	71.2	71.0	70.8	70.6	70.5	70.3	69.9	69.5	69.2	68.9	68.5
70	72.9	72.7	72.5	72.4	72.2	72.0	71.8	71.7	71.5	71.3	71.1	70.8	70.4	70.1	69.7	69.4
71	73.7	73.5	73.3	73.2	73.0	72.8	72.6	72.5	72.3	72.1	72.0	71.6	71.3	71.0	70.6	70.3
72	74.5	74.3	74.1	74.0	73.8	73.7	73.5	73.4	73.2	73.0	72.8	72.5	72.2	71.9	71.5	71.2
73	75.3	75.1	74.9	74.8	74.6	74.5	74.3	74.2	74.0	73.9	73.7	73.4	73.1	72.8	72.5	72.2
74	76.1	76.0	75.8	75.7	75.5	75.4	75.2	75.1	74.9	74.8	74.6	74.3	74.0	73.7	73.4	73.1
75	76.9	76.8	76.6	76.5	76.3	76.2	76.0	75.1	75.0	75.7	75.5	75.2	74.9	74.7	74.4	74.1

	11.0	11.2	11.4	11.6	11.8	12.0	12.2	12.4	12.6	12.8	13.0	13.2	13.4	13.6	13.8	14.0
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	42.3	41.8	41.3	40.8	40.3	39.8	39.3	38.9	38.4	38.0	37.6	37.1	36.7	36.3	35.9	35.5
2	42.3	41.8	41.3	40.8	40.3	39.8	39.4	38.9	38.5	38.0	37.6	37.2	36.7	36.3	35.9	35.6
4	42.4	41.9	41.4	40.9	40.4	39.9	39.4	39.0	38.5	38.1	37.7	37.2	36.8	36.4	36.0	35.6
6	42.5	42.0	41.5	41.0	40.5	40.0	39.5	39.1	38.6	38.2	37.8	37.3	36.9	36.5	36.1	35.7
8	42.6	42.1	41.6	41.1	40.6	40.1	39.6	39.2	38.7	38.3	38.9	37.4	37.0	36.6	36.2	35.8
10	42.7	42.2	41.7	41.2	40.7	40.2	39.8	39.3	38.9	38.4	38.0	37.6	37.1	36.7	36.3	35.9
11	42.8	42.3	41.8	41.3	40.8	40.3	39.9	39.4	39.0	38.5	38.1	37.7	37.2	36.8	36.4	36.0
12	42.9	42.4	41.9	41.4	40.9	40.4	40.0	39.5	39.1	38.6	38.2	37.8	37.3	36.9	36.5	36.1
13	43.0	42.5	42.0	41.5	41.0	40.5	40.1	39.6	39.2	38.7	38.3	37.9	37.4	37.0	36.6	36.2
14	43.1	42.6	42.1	41.6	41.1	40.7	40.2	39.7	39.3	38.8	38.4	38.0	37.6	37.2	36.7	36.4
15	43.2	42.8	42.2	41.8	41.3	40.8	40.3	39.9	39.4	39.0	38.3	38.1	37.7	37.3	36.9	36.5
16	43.4	42.9	42.4	41.9	41.4	40.9	40.5	40.0	39.5	39.1	38.7	38.2	37.8	37.4	37.0	36.6
17	43.6	43.0	42.5	42.0	41.5	41.1	40.6	40.1	39.7	39.2	38.8	38.4	38.0	37.6	37.2	36.8
18	43.7	43.2	42.7	42.2	41.7	41.2	40.8	40.3	39.8	39.4	39.0	38.5	38.1	37.7	37.3	36.9
19	43.9	43.4	42.9	42.4	41.9	41.4	40.9	40.5	40.0	39.6	39.1	38.7	38.3	37.9	37.5	37.1
20	44.1	43.5	43.0	42.5	42.0	41.6	41.1	40.6	40.2	39.7	39.3	38.9	38.5	38.0	37.6	37.2
21	44.3	43.7	43.2	42.7	42.2	41.8	41.3	40.8	40.4	39.9	39.5	39.1	38.6	38.2	37.8	37.4
22	44.5	43.9	43.4	42.9	42.4	42.0	41.5	41.0	40.6	40.1	39.7	39.3	38.8	38.4	38.0	37.6
23	44.7	44.1	43.6	43.1	42.6	42.2	41.7	41.2	40.8	40.3	39.9	39.5	39.0	38.6	38.2	37.8
24	44.9	44.3	43.8	43.3	42.9	42.4	41.9	41.4	41.0	40.5	40.1	39.7	39.2	38.8	38.4	38.0
25	45.1	44.6	44.1	43.6	43.1	42.6	42.1	41.7	41.2	40.8	40.3	39.9	39.5	39.1	38.6	38.2
26	45.3	44.8	44.3	43.8	43.3	42.8	42.4	41.9	41.4	41.0	40.6	40.1	39.7	39.3	38.9	38.5
27	45.6	45.1	44.6	44.1	43.6	43.1	42.6	42.1	41.7	41.2	40.8	40.4	39.9	39.5	39.1	38.7
28	45.8	45.3	44.8	44.3	43.8	43.3	42.9	42.4	42.0	41.5	41.1	40.6	40.2	39.8	39.4	39.0
29	46.1	45.6	45.1	44.6	44.1	43.6	43.1	42.7	42.2	41.8	41.3	40.9	40.5	40.1	39.6	39.2
30	46.4	45.9	45.4	44.9	44.4	43.9	43.4	43.0	42.5	42.1	41.6	41.2	40.8	40.3	39.9	39.5
31	46.7	46.2	45.7	45.2	44.7	44.2	43.7	43.3	42.8	42.4	41.9	41.5	41.0	40.6	40.2	39.8
32	47.0	46.5	46.0	45.5	45.0	44.5	44.0	43.6	43.1	42.7	42.2	41.8	41.3	40.9	40.5	40.1
33	47.3	46.8	46.3	45.8	45.3	44.8	44.3	43.9	43.4	43.0	42.5	42.1	41.7	41.2	40.8	40.4
34	47.6	47.1	46.6	46.1	45.6	45.1	44.7	44.2	43.8	43.3	42.9	42.4	42.0	41.6	41.2	40.7
35	48.0	47.5	47.0	46.5	46.0	45.5	45.0	44.6	44.1	43.6	43.2	42.8	42.3	41.9	41.5	41.1
36	48.3	47.8	47.3	46.8	46.3	45.8	45.4	44.9	44.5	44.0	43.6	43.1	42.7	42.3	41.9	41.4
37	48.7	48.2	47.7	47.2	46.7	46.2	45.7	45.3	44.8	44.4	43.9	43.5	43.1	42.6	42.2	41.8
38	49.1	48.6	48.1	47.6	47.1	46.6	46.1	45.7	45.2	44.8	44.3	43.9	43.4	43.0	42.6	42.2
39	49.5	49.0	48.5	48.0	47.5	47.0	46.5	46.1	45.6	45.2	44.7	44.3	43.8	43.4	43.0	42.6
40	49.9	49.4	48.9	48.4	47.9	47.4	46.9	46.5	46.0	45.6	45.1	44.7	44.3	43.8	43.4	43.0
41	50.3	49.8	49.3	48.8	48.3	47.8	47.4	46.9	46.4	46.0	45.5	45.1	44.7	44.3	43.8	43.4
42	50.7	50.2	49.7	49.2	48.8	48.3	47.8	47.3	46.9	46.4	46.0	45.6	45.1	44.7	44.3	43.9
43	51.2	50.7	50.2	49.7	49.2	48.7	48.3	47.8	47.3	46.9	46.4	46.0	45.6	45.2	44.7	44.3
44	51.6	51.1	50.6	50.2	49.7	49.2	48.7	48.3	47.8	47.4	46.9	46.5	46.1	45.6	45.2	44.8
45	52.1	51.6	51.1	50.6	50.2	49.7	49.2	48.8	48.3	47.9	47.4	47.0	46.6	46.1	45.7	45.3
46	52.6	52.1	51.6	51.1	50.7	50.2	49.7	49.3	48.8	48.4	47.9	47.5	47.1	46.6	46.2	45.8
47	53.1	52.6	52.1	51.7	51.2	50.7	50.2	49.8	49.3	48.9	48.4	48.0	47.6	47.2	46.7	46.3
48	53.6	53.2	52.7	52.2	51.7	51.2	50.8	50.3	49.9	49.4	49.0	48.5	48.1	47.7	47.3	46.9
49	54.2	53.7	53.2	52.7	52.3	51.8	51.3	50.9	50.4	50.0	49.5	49.1	48.7	48.3	47.8	47.4
50	54.7	54.2	53.8	53.3	52.8	52.4	51.9	51.4	51.0	50.6	50.1	49.7	49.3	48.8	48.4	48.0
51	55.3	54.8	54.3	53.9	53.4	52.9	52.5	52.0	51.6	51.2	50.7	50.3	49.9	49.4	49.0	48.6
52	55.9	55.4	54.9	54.5	54.0	53.5	53.1	52.6	52.2	51.8	51.3	50.9	50.5	50.1	49.6	49.2
53	56.5	56.0	55.5	55.1	54.6	54.2	53.7	53.3	52.8	52.4	52.0	51.5	51.1	50.7	50.3	49.9
54	57.1	56.6	56.2	55.7	55.3	54.8	54.4	53.9	53.5	53.0	52.6	52.2	51.8	51.4	51.0	50.5
55	57.8	57.3	56.8	56.4	55.9	55.5	55.0	54.6	54.1	53.7	53.3	52.9	52.5	52.0	51.6	51.2
56	58.4	57.9	57.5	57.0	56.6	56.1	55.7	55.3	54.8	54.4	54.0	53.6	53.2	52.7	52.3	51.9
57	59.1	58.6	58.2	57.7	57.3	56.8	56.4	56.0	55.5	55.1	54.7	54.3	53.9	53.5	53.1	52.7
58	59.8	59.3	58.9	58.4	58.0	57.5	57.1	56.7	56.3	55.9	55.4	55.0	54.6	54.2	53.8	53.4
59	60.5	60.0	59.6	59.1	58.7	58.3	57.9	57.4	57.0	56.6	56.2	55.8	55.4	55.0	54.6	54.2
60	61.2	60.8	60.3	59.9	59.5	59.0	58.6	58.2	57.8	57.4	57.0	56.6	56.2	55.8	55.4	55.0
61	61.9	61.5	61.1	60.6	60.2	59.8	59.4	59.0	58.6	58.2	57.8	57.4	57.0	56.6	56.2	55.8
62	62.7	62.3	61.8	61.4	61.0	60.6	60.2	59.8	59.4	59.0	58.6	58.2	57.8	57.4	57.1	56.7
63	63.5	63.0	62.6	62.2	61.8	61.4	61.0	60.6	60.2	59.8	59.5	59.1	58.7	58.3	57.9	57.6
64	64.3	63.9	63.4	63.0	62.6	62.3	61.9	61.5	61.1	60.7	60.3	59.9	59.6	59.2	58.8	58.5
65	65.1	64.7	64.3	63.9	63.5	63.1	62.7	62.3	62.0	61.6	61.2	60.8	60.5	60.1	59.7	59.4
66	65.9	65.5	65.1	64.7	64.4	64.0	63.6	63.2	62.9	62.5	62.1	61.8	61.5	61.1	60.7	60.3
67	66.7	66.4	66.0	65.6	65.2	64.9	64.5	64.1	63.8	63.4	63.1	62.7	62.4	62.0	61.7	61.3
68	67.6	67.2	66.9	66.5	66.2	65.8	65.5	65.1	64.8	64.4	64.1	63.7	63.4	63.0	62.7	62.3
69	68.5	68.1	67.8	67.4	67.1	66.7	66.4	66.0	65.7	65.4	65.1	64.7	64.4	64.0	63.7	63.4
70	69.4	69.0	68.7	68.4	68.0	67.7	67.4	67.0	66.7	66.4	66.1	65.7	65.4	65.0	64.7	64.4
71	70.3	70.0	69.6	69.3	69.0	68.7	68.4	68.0	67.7	67.4	67.1	66.7	66.4	66.1	65.8	65.5
72	71.2	70.9	70.6	70.3	70.0	69.7	69.4	69.0	68.7	68.4	68.1	67.8	67.5	67.2	66.9	66.6
73	72.2	71.9	71.6	71.3	71.0	70.7	70.4	70.1	69.8	69.5	69.2	68.9	68.6	68.3	68.0	67.7
74	73.1	72.8	72.6	72.3	72.0	71.7	71.4	71.1	70.9	70.6	70.3	70.0	69.8	69.5	69.2	68.9
75	74.1	73.8	73.6	73.3	73.0	72.7	72.5	72.2	72.0	71.7	71.4	71.1	70.9	70.6	70.4	70.1

C (3)	14.0	14.2	14.4	14.6	14.8	15.0	15.2	15.4	15.6	15.8	16.0	16.2	16.4	16.6	16.8	17.0
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	35.5	35.2	34.8	34.4	34.0	33.7	33.3	33.0	32.7	32.3	32.0	31.7	31.4	31.1	30.8	30.5
2	35.6	35.2	34.8	34.4	34.1	33.7	33.3	33.0	32.7	32.3	32.0	31.7	31.4	31.1	30.8	30.5
4	35.6	35.3	34.9	34.5	34.1	33.8	33.4	33.1	32.8	32.4	32.1	31.8	31.5	31.2	30.8	30.6
6	35.7	35.4	35.0	34.6	34.2	33.9	33.5	33.2	32.9	32.5	32.2	31.9	31.6	31.3	30.9	30.7
8	35.8	35.5	35.1	34.7	34.3	34.0	33.6	33.3	33.0	32.6	32.3	32.0	31.7	31.4	31.0	30.8
10	35.9	35.6	35.2	34.8	34.4	34.1	33.7	33.4	33.1	32.7	32.4	32.1	31.8	31.5	31.1	30.9
11	36.0	35.7	35.3	34.9	34.5	34.2	33.8	33.5	33.1	32.8	32.5	32.2	31.9	31.5	31.2	30.9
12	36.1	35.8	35.4	35.0	34.6	34.3	33.9	33.6	33.2	32.9	32.6	32.3	31.9	31.6	31.3	31.0
13	36.2	35.9	35.5	35.1	34.7	34.4	34.0	33.7	33.3	33.0	32.7	32.4	32.0	31.7	31.3	31.1
14	36.4	36.0	35.6	35.2	34.9	34.5	34.1	33.8	33.5	33.1	32.8	32.5	32.1	31.8	31.5	31.2
15	36.5	36.1	35.7	35.3	35.0	34.6	34.3	33.9	33.6	33.2	32.9	32.6	32.3	31.9	31.6	31.3
16	36.6	36.2	35.8	35.5	35.1	34.7	34.4	34.0	33.7	33.4	33.0	32.7	32.4	32.1	31.8	31.5
17	36.8	36.4	36.0	35.6	35.2	34.9	34.5	34.2	33.8	83.5	33.2	32.8	32.5	32.2	31.9	31.6
18	36.9	36.5	36.1	35.8	38.4	35.0	34.7	34.3	34.0	33.6	33.3	33.0	32.7	32.4	32.0	31.7
19	37.1	36.7	36.3	35.9	35.5	35.2	34.8	34.5	34.1	33.8	33.3	33.1	32.8	32.5	32.2	31.9
20	37.2	36.8	36.5	36.1	35.7	35.4	35.0	34.6	34.3	34.0	33.6	33.3	33.0	32.7	32.4	32.0
21	37.4	37.0	36.6	36.3	35.9	35.5	35.2	34.8	34.5	34.1	33.8	33.5	33.1	32.8	32.5	32.2
22	37.6	37.2	36.8	36.5	36.1	35.7	35.4	35.0	34.7	34.3	34.0	33.7	33.3	33.0	32.7	32.4
23	37.8	37.4	37.0	36.7	36.3	35.9	35.6	35.2	34.9	34.5	34.2	33.8	33.5	33.2	32.9	32.6
24	38.0	37.6	37.2	36.9	36.5	36.1	35.8	35.4	35.1	34.7	34.4	34.0	33.7	33.4	33.1	32.8
25	38.2	37.8	37.5	37.1	36.7	36.3	36.0	35.6	35.3	34.9	34.6	34.3	33.9	33.6	33.3	33.0
26	38.5	38.1	37.7	37.3	36.9	36.6	36.2	35.8	35.5	35.1	34.8	34.5	34.2	33.8	33.5	33.2
27	38.7	38.3	37.9	37.6	37.2	36.8	36.4	36.1	35.7	35.4	35.0	34.7	34.4	34.1	33.7	33.4
28	39.0	38.6	38.2	37.8	37.4	37.1	36.7	36.3	36.0	35.6	35.3	35.0	34.6	34.3	34.0	33.7
29	39.2	38.8	38.4	38.1	37.7	37.3	36.9	36.6	36.2	35.9	35.5	35.2	34.9	34.6	34.2	33.9
30	39.5	39.1	38.7	38.3	38.0	37.6	37.2	36.9	36.5	36.2	35.8	35.5	35.1	34.8	34.5	34.2
31	39.8	39.4	39.0	38.6	38.2	37.9	37.5	37.1	36.8	36.4	36.1	35.8	35.4	35.1	34.8	34.5
32	40.1	39.7	39.3	38.9	38.5	38.2	37.8	37.4	37.1	36.7	36.4	36.1	35.7	35.4	35.1	34.7
33	40.4	40.0	39.6	39.2	38.9	38.5	38.1	37.7	37.4	37.0	36.7	36.4	36.0	35.7	35.4	35.0
34	40.7	40.3	39.9	39.6	39.2	38.8	38.4	38.1	37.7	37.4	37.0	36.7	36.3	36.0	35.7	35.4
35	41.1	40.7	40.3	39.9	39.5	39.1	38.8	38.4	38.0	37.7	37.3	37.0	36.7	36.3	36.0	35.7
36	41.4	41.0	40.6	40.3	39.9	39.5	39.1	38.8	38.4	38.0	37.7	37.3	37.0	36.7	36.3	36.0
37	41.8	41.4	41.0	40.6	40.2	39.9	39.5	39.1	38.8	38.4	38.0	37.7	37.4	37.0	36.7	36.4
38	42.2	41.8	41.4	41.0	40.6	40.2	39.9	39.5	39.1	38.8	38.4	38.1	37.7	37.4	37.1	36.7
39	42.6	42.2	41.8	41.4	41.0	40.6	40.3	39.9	39.5	39.2	38.8	38.5	38.1	37.8	37.4	37.1
40	43.0	42.6	42.2	41.8	41.4	41.0	40.7	40.3	39.9	39.6	39.2	38.9	38.5	38.2	37.8	37.5
41	43.4	43.0	42.6	42.2	41.8	41.5	41.1	40.7	40.3	40.0	39.6	39.3	38.9	38.6	38.3	37.9
42	43.9	43.5	43.1	42.7	42.3	41.9	41.5	41.1	40.8	40.4	40.1	39.7	39.4	39.0	38.7	38.4
43	44.3	43.9	43.5	43.1	42.7	42.4	42.0	41.6	41.2	40.9	40.5	40.2	39.8	39.5	39.1	38.8
44	44.8	44.4	44.0	43.6	43.2	42.8	42.4	42.1	41.7	41.3	41.0	40.6	40.3	39.9	39.6	39.3
45	45.3	44.9	44.5	44.1	43.7	43.3	42.9	42.6	42.2	41.8	41.5	41.1	40.8	40.4	40.1	39.8
46	45.8	45.4	45.0	44.6	44.2	43.8	43.4	43.1	42.7	42.3	42.0	41.6	41.3	40.9	40.6	40.3
47	46.3	45.9	45.5	45.1	44.7	44.3	44.0	43.6	43.2	42.9	42.5	42.1	41.8	41.5	41.1	40.8
48	46.9	46.5	46.1	45.7	45.3	44.9	44.5	44.1	43.8	43.4	43.0	42.7	42.3	42.0	41.7	41.3
49	47.4	47.0	46.6	46.2	45.8	45.5	45.1	44.7	44.3	44.0	43.6	43.3	42.9	42.6	42.2	41.9
50	48.0	47.6	47.2	46.8	46.4	46.1	45.7	45.3	44.9	44.6	44.2	43.8	43.5	43.1	42.8	42.5
51	48.6	48.2	47.8	47.4	47.0	46.7	46.3	45.9	45.5	45.2	44.8	44.4	44.1	43.7	43.4	43.1
52	49.2	48.8	48.4	48.0	47.7	47.3	46.9	46.5	46.2	45.8	45.4	45.1	44.7	44.4	44.0	43.7
53	49.9	49.5	49.1	48.7	48.3	47.9	47.5	47.2	46.8	46.4	46.1	45.7	45.4	45.0	44.7	44.3
54	50.5	50.1	49.8	49.4	49.0	48.6	48.2	47.8	47.5	47.1	46.8	46.4	46.1	45.7	45.4	45.0
55	51.2	50.8	50.5	50.1	49.7	49.3	48.9	48.5	48.2	47.8	47.5	47.1	46.8	46.4	46.1	45.7
56	51.9	51.5	51.2	50.8	50.4	50.0	49.6	49.3	48.9	48.5	48.2	47.8	47.5	47.1	46.8	46.4
57	52.7	52.3	51.9	51.5	51.1	50.8	50.4	50.0	49.6	49.3	48.9	48.6	48.2	47.9	47.5	47.2
58	53.4	53.0	52.7	52.3	51.9	51.5	51.1	50.8	50.4	50.1	49.7	49.4	49.0	48.7	48.3	48.0
59	54.2	53.8	53.4	53.1	52.7	52.3	51.9	51.6	51.2	50.9	50.5	50.2	49.8	49.5	49.1	48.8
60	55.0	54.6	54.2	53.9	53.5	53.1	52.8	52.4	52.0	51.7	51.3	51.0	50.6	50.3	50.0	49.6
61	55.8	55.5	55.1	54.7	54.3	54.0	53.6	53.3	52.9	52.5	52.2	51.9	51.5	51.2	50.8	50.5
62	56.7	56.3	55.9	55.6	55.2	54.8	54.5	54.1	53.8	53.4	53.1	52.8	52.4	52.1	51.7	51.4
63	57.6	57.2	56.8	56.5	56.1	55.7	55.4	55.0	54.7	54.3	54.0	53.7	53.3	53.0	52.7	52.3
64	58.5	58.1	57.7	57.4	57.0	56.7	56.3	56.0	55.6	55.3	55.0	54.6	54.3	54.0	53.6	53.3
65	59.4	59.0	58.7	58.3	58.0	57.6	57.3	56.9	56.6	56.3	55.9	55.6	55.3	54.9	54.6	54.3
66	60.3	60.0	59.6	59.3	59.0	58.7	58.3	58.0	57.6	57.3	56.9	56.6	56.3	56.0	55.7	55.4
67	61.3	61.0	60.6	60.3	60.0	59.7	59.3	59.0	58.6	58.3	58.0	57.7	57.3	57.0	56.7	56.4
68	62.3	62.0	61.7	61.3	61.0	60.7	60.3	60.0	59.7	59.4	59.1	58.8	58.4	58.1	57.8	57.5
69	63.4	63.1	62.7	62.4	62.1	61.8	61.4	61.1	60.8	60.5	60.2	59.9	59.6	59.3	59.0	58.6
70	64.4	64.1	63.8	63.5	63.2	62.9	62.5	62.2	61.9	61.6	61.3	61.0	60.7	60.4	60.1	59.8
71	65.5	65.2	64.9	64.6	64.3	64.0	63.7	63.4	63.1	62.8	62.5	62.2	61.9	61.6	61.3	60.0
72	66.6	66.3	66.0	65.7	65.4	65.2	64.9	64.6	64.3	64.0	63.7	63.4	63.1	62.9	62.6	62.3
73	67.7	67.5	67.2	66.9	66.6	66.3	66.0	65.8	65.5	65.2	64.9	64.7	64.4	64.1	63.8	63.6
74	68.9	68.7	68.4	68.1	67.8	67.5	67.2	67.0	66.7	66.5	66.2	66.0	65.7	65.5	65.2	64.9
75	70.1	69.9	69.6	69.3	69.0	68.8	68.5	68.3	68.0	67.8	67.5	67.2	67.0	66.8	66.5	66.2

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③	17.2	17.6	18.0	18.4	18.8	19.2	19.6	20.0	20.4	20.8	21.2	21.6	22.0	22.4	22.8	23.2	23.6		C
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	
0	30.2	29.6	29.1	28.5	28.0	27.5	27.0	26.6	26.1	25.7	25.2	24.8	24.4	24.0	23.7	23.3	23.0	0	
5	30.3	29.7	29.2	28.6	28.1	27.6	27.1	26.7	26.2	25.8	25.3	24.9	24.5	24.1	23.8	23.4	23.0	5	
10	30.6	30.0	29.4	28.9	28.4	27.9	27.4	26.9	26.5	26.0	25.6	25.2	24.8	24.4	24.0	23.6	23.3	10	
14	30.9	30.4	29.8	29.3	28.7	28.2	27.7	27.3	26.8	26.4	25.9	25.5	25.1	24.7	24.3	24.0	23.6	14	
18	31.4	30.9	30.3	29.7	29.2	28.7	28.2	27.7	27.3	26.8	26.4	26.0	25.6	25.2	24.8	24.4	24.0	18	
20	31.8	31.2	30.6	30.0	29.5	29.0	28.5	28.0	27.6	27.1	26.7	26.2	25.8	25.4	25.0	24.6	24.3	20	
22	32.1	31.5	30.9	30.4	29.8	29.3	28.8	28.3	27.9	27.4	27.0	26.5	26.1	25.7	25.3	24.9	24.6	22	
24	32.5	31.9	31.3	30.8	30.2	29.7	29.2	28.7	28.2	27.8	27.3	26.9	26.5	26.1	25.7	25.3	24.9	24	
26	32.9	32.3	31.7	31.2	30.6	30.1	29.6	29.1	28.6	28.2	27.7	27.3	26.8	26.4	26.0	25.6	25.2	26	
28	33.4	32.8	32.2	31.6	31.1	30.5	30.0	29.5	29.0	28.6	28.1	27.7	27.2	26.8	26.4	26.0	25.6	28	
30	33.9	33.3	32.7	32.1	31.6	31.0	30.5	30.0	29.5	29.0	28.6	28.1	27.7	27.3	26.9	26.5	26.1	30	
31	34.1	33.5	32.9	32.4	31.8	31.3	30.8	30.3	29.8	29.3	28.8	28.4	27.9	27.5	27.1	26.7	26.3	31	
32	34.4	33.8	33.2	32.7	32.1	31.6	31.0	30.5	30.0	29.6	29.1	28.6	28.2	27.8	27.3	26.9	26.5	32	
33	34.7	34.1	33.5	32.9	32.4	31.8	31.3	30.8	30.3	29.8	29.4	28.9	28.5	28.0	27.6	27.2	26.8	33	
34	35.0	34.4	33.8	33.2	32.7	32.1	31.6	31.1	30.6	30.1	29.6	29.2	28.7	28.3	27.9	27.5	27.1	34	
35	35.4	34.7	34.1	33.6	33.0	32.4	31.9	31.4	30.9	30.4	29.9	29.5	29.0	28.6	28.2	27.8	27.4	35	
36	35.7	35.1	34.5	33.9	33.3	32.8	32.2	31.7	31.2	30.7	30.3	29.8	29.3	28.9	28.5	28.1	27.7	36	
37	36.1	35.4	34.8	34.2	33.7	33.1	32.6	32.1	31.6	31.1	30.6	30.1	29.6	29.2	28.8	28.4	28.0	37	
38	36.4	35.8	35.2	34.6	34.0	33.5	32.9	32.4	31.9	31.4	30.9	30.4	30.0	29.5	29.1	28.7	28.3	38	
39	36.8	36.2	35.6	35.0	34.4	33.8	33.3	32.8	32.3	31.8	31.3	30.8	30.3	29.9	29.4	29.0	28.6	39	
40	37.2	36.6	36.0	35.4	34.8	34.2	33.7	33.1	32.6	32.1	31.6	31.2	30.7	30.2	29.8	29.4	28.9	40	
41	37.6	37.0	36.4	35.8	35.2	34.6	34.1	33.5	33.0	32.5	32.0	31.5	31.1	30.6	30.2	29.7	29.3	41	
42	38.0	37.4	36.8	36.2	35.6	35.0	34.5	33.9	33.4	32.9	32.4	31.9	31.5	31.0	30.5	30.1	29.7	42	
43	38.5	37.8	37.2	36.6	36.0	35.5	34.9	34.4	33.8	33.3	32.8	32.3	31.9	31.4	31.0	30.5	30.1	43	
44	38.9	38.3	37.7	37.1	36.5	35.9	35.3	34.8	34.3	33.8	33.3	32.8	32.3	31.8	31.4	30.9	30.5	44	
45	39.4	38.8	38.2	37.6	37.0	36.4	35.8	35.3	34.7	34.2	33.7	33.2	32.7	32.3	31.8	31.4	30.9	45	
46	39.9	39.3	38.7	38.1	37.5	36.9	36.3	35.7	35.2	34.7	34.2	33.7	33.2	32.7	32.3	31.8	31.4	46	
47	40.4	39.8	39.2	38.6	38.0	37.4	36.8	36.2	35.7	35.2	34.7	34.2	33.7	33.2	32.7	32.3	31.9	47	
48	41.0	40.3	39.7	39.1	38.5	37.9	37.3	36.8	36.2	35.7	35.2	34.7	34.2	33.7	33.2	32.8	32.4	48	
49	41.5	40.9	40.3	39.6	39.0	38.4	37.9	37.3	36.8	36.2	35.7	35.2	34.7	34.2	33.8	33.3	32.9	49	
50	42.1	41.5	40.8	40.2	39.6	39.0	38.4	37.9	37.3	36.8	36.3	35.8	35.3	34.8	34.3	33.8	33.4	50	
51	42.7	42.1	41.4	40.8	40.2	39.6	39.0	38.5	37.9	37.4	36.9	36.3	35.8	35.3	34.9	34.4	34.0	51	
52	43.4	42.7	42.1	41.4	40.8	40.2	39.6	39.1	38.5	38.0	37.5	36.9	36.4	35.9	35.5	35.0	34.5	52	
53	44.0	43.4	42.7	42.1	41.5	40.9	40.3	39.7	39.2	38.6	38.1	37.6	37.1	36.6	36.1	35.6	35.1	53	
54	44.7	44.0	43.4	42.8	42.1	41.5	41.0	40.4	39.8	39.3	38.7	38.2	37.7	37.2	36.7	36.3	35.8	54	
55	45.4	44.7	44.1	43.5	42.8	42.2	41.7	41.1	40.5	40.0	39.4	38.9	38.4	37.9	37.4	36.9	36.5	55	
56	46.1	45.5	44.8	44.2	43.6	43.0	42.4	41.8	41.2	40.7	40.1	39.6	39.1	38.6	38.1	37.6	37.2	56	
57	46.9	46.2	45.6	44.9	44.3	43.7	43.1	42.6	42.0	41.4	40.9	40.4	39.8	39.3	38.8	38.4	37.9	57	
58	47.7	47.0	46.4	45.7	45.1	44.5	43.9	43.4	42.8	42.2	41.7	41.2	40.6	40.1	39.6	39.1	38.6	58	
59	48.5	47.8	47.2	46.5	45.9	45.3	44.7	44.2	43.6	43.0	42.5	42.0	41.4	40.9	40.4	39.9	39.4	59	
60	49.3	48.7	48.0	47.4	46.8	46.2	45.6	45.0	44.4	43.9	43.3	42.8	42.3	41.8	41.3	40.8	40.3	60	
61	50.2	49.5	48.9	48.3	47.7	47.1	46.5	45.9	45.3	44.8	44.2	43.7	43.2	42.7	42.2	41.7	41.2	61	
62	51.1	50.4	49.8	49.2	48.6	48.0	47.4	46.8	46.2	45.7	45.1	44.6	44.1	43.6	43.1	42.6	42.1	62	
63	52.0	51.4	50.7	50.1	49.5	48.9	48.3	47.8	47.2	46.6	46.1	45.6	45.0	44.5	44.0	43.5	43.0	63	
64	53.0	52.4	51.7	51.1	50.5	49.9	49.3	48.8	48.2	47.6	47.1	46.6	46.0	45.5	45.0	44.5	44.0	64	
65	54.0	53.4	52.7	52.1	51.5	50.9	50.4	49.8	49.2	48.7	48.1	47.6	47.1	46.6	46.1	45.6	45.1	65	
66	55.0	54.4	53.8	53.2	52.6	52.0	51.4	50.9	50.3	49.8	49.2	48.7	48.2	47.7	47.2	46.7	46.2	66	
67	56.1	55.5	54.9	54.3	53.7	53.1	52.6	52.0	51.4	50.9	50.4	49.8	49.3	48.8	48.3	47.8	47.3	67	
68	57.2	56.6	56.0	55.4	54.8	54.3	53.7	53.2	52.6	52.1	51.5	51.0	50.5	50.0	49.5	49.0	48.5	68	
69	58.4	57.8	57.2	56.6	56.0	55.5	54.9	54.4	53.8	53.3	52.8	52.2	51.8	51.3	50.8	50.3	49.8	69	
70	59.5	58.9	58.4	57.8	57.2	56.7	56.2	55.6	55.1	54.6	54.0	53.5	53.0	52.6	52.1	51.6	51.1	70	
71	60.7	60.2	59.6	59.1	58.5	58.0	57.5	56.9	56.4	55.9	55.4	54.9	54.4	53.9	53.4	52.9	52.5	71	
72	62.0	61.4	60.9	60.4	59.8	59.3	58.8	58.3	57.8	57.3	56.8	56.3	55.8	55.3	54.8	54.4	53.9	72	
73	63.3	62.8	62.2	61.7	61.2	60.7	60.2	59.7	59.2	58.7	58.2	57.7	57.3	56.8	56.3	55.9	55.4	73	
74	64.6	64.1	63.6	63.1	62.6	62.1	61.6	61.1	60.6	60.2	59.7	59.2	58.8	58.3	57.9	57.4	56.9	74	
75	66.0	65.5	65.0	64.5	64.0	63.6	63.1	62.6	62.2	61.7	61.2	60.8	60.3	59.9	59.5	59.0	58.6	75	

C (3)

°	24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0	°
0	22.6	22.2	21.8	21.4	21.0	20.7	20.3	20.0	19.7	19.0	18.4	17.9	17.4	16.9	16.4	15.9	0
5	22.7	22.3	21.9	21.5	21.1	20.8	20.4	20.1	19.7	19.1	18.5	17.9	17.4	16.9	16.4	16.8	5
10	22.9	22.5	22.1	21.7	21.3	21.0	20.6	20.3	19.9	19.3	18.7	18.1	17.6	17.1	16.6	16.2	10
14	23.2	22.8	22.4	22.0	21.6	21.3	20.9	20.5	20.2	19.6	19.0	18.4	17.9	17.4	16.9	16.4	14
18	23.7	23.2	22.8	22.4	22.0	21.6	21.3	20.9	20.6	19.9	19.3	18.7	18.2	17.7	17.2	16.7	18
20	23.9	23.5	23.1	22.7	22.3	21.9	21.5	21.2	20.8	20.2	19.5	18.9	18.4	17.9	17.4	16.9	20
22	24.2	23.8	23.3	22.9	22.5	22.2	21.8	21.4	21.1	20.4	19.8	19.2	18.6	18.1	17.6	17.1	22
24	24.5	24.1	23.6	23.2	22.8	22.5	22.1	21.7	21.4	20.7	20.0	19.4	18.9	18.4	17.8	17.4	24
26	24.9	24.4	24.0	23.6	23.2	22.8	22.4	22.0	21.7	21.0	20.3	19.7	19.2	18.6	18.1	17.6	26
28	25.3	24.8	24.4	23.9	23.5	23.1	22.8	22.4	22.0	21.3	20.7	20.1	19.5	18.9	18.4	17.9	28
30	25.7	25.2	24.8	24.4	23.9	23.5	23.2	22.8	22.4	21.7	21.1	20.4	19.8	19.3	18.8	18.3	30
31	25.9	25.5	25.0	24.6	24.2	23.8	23.4	23.0	22.6	21.9	21.2	20.6	20.0	19.5	18.9	18.4	31
32	26.2	25.7	25.3	24.8	24.4	24.0	23.8	23.2	22.8	22.1	21.5	20.8	20.2	19.7	19.1	18.6	32
33	26.4	26.0	25.5	25.1	24.6	24.2	23.8	23.4	23.1	22.4	21.7	21.0	20.4	19.9	19.3	18.8	33
34	26.7	26.2	25.8	25.3	24.9	24.5	24.1	23.7	23.3	22.6	21.9	21.3	20.7	20.1	19.5	19.0	34
35	27.0	26.5	26.0	25.6	25.2	24.7	24.3	23.9	23.6	22.8	22.1	21.5	20.9	20.3	19.8	19.2	35
36	27.3	26.8	26.3	25.9	25.4	25.0	24.6	24.2	23.8	23.1	22.4	21.7	21.1	20.5	20.0	19.5	36
37	27.6	27.1	26.6	26.2	25.7	25.3	24.9	24.5	24.1	23.4	22.7	22.0	21.4	20.9	20.2	19.7	37
38	27.9	27.4	26.9	26.5	26.0	25.6	25.2	24.8	24.4	23.6	22.9	22.3	21.6	21.0	20.5	19.9	38
39	28.2	27.7	27.2	26.8	26.3	25.9	25.5	25.1	24.7	23.9	23.2	22.5	21.9	21.3	20.7	20.2	39
40	28.5	28.1	27.6	27.1	26.7	26.2	25.8	25.4	25.0	24.2	23.5	22.8	22.2	21.6	21.0	20.5	40
41	28.9	28.4	27.9	27.5	27.0	26.6	26.1	25.7	25.3	24.6	23.8	23.1	22.5	21.9	21.3	20.7	41
42	29.3	28.8	28.3	27.8	27.4	26.9	26.5	26.1	25.7	24.9	24.2	23.5	22.8	22.2	21.6	21.0	42
43	29.7	29.2	28.7	28.2	27.7	27.3	26.9	26.4	26.0	25.2	24.5	23.8	23.1	22.5	21.9	21.3	43
44	30.1	29.6	29.1	28.6	28.1	27.7	27.2	26.8	26.4	25.6	24.9	24.2	23.5	22.8	22.2	21.7	44
45	30.5	30.0	29.5	29.0	28.5	28.1	27.6	27.2	26.8	26.0	25.2	24.5	23.8	23.2	22.6	22.0	45
46	31.0	30.4	29.9	29.5	29.0	28.6	28.1	27.6	27.2	26.4	25.6	24.9	24.2	23.6	22.9	22.4	46
47	31.4	30.9	30.4	29.9	29.4	29.0	28.5	28.1	27.6	26.8	26.0	25.3	24.6	24.0	23.3	22.7	47
48	31.9	31.4	30.9	30.4	29.9	29.4	29.0	28.5	28.1	27.3	26.5	25.7	25.0	24.4	23.7	23.1	48
49	32.4	31.9	31.4	30.9	30.4	29.9	29.4	29.0	28.6	27.7	26.9	26.2	25.5	24.8	24.1	23.5	49
50	33.0	32.4	31.9	31.4	30.9	30.4	30.0	29.5	29.1	28.2	27.4	26.6	25.9	25.2	24.6	24.0	50
51	33.5	33.0	32.4	31.9	31.4	30.9	30.5	30.0	29.6	28.7	27.9	27.1	26.4	25.7	25.0	24.4	51
52	34.1	33.5	33.0	32.5	32.0	31.5	31.0	30.6	30.1	29.3	28.5	27.7	26.9	26.2	25.5	24.9	52
53	34.7	34.1	33.6	33.1	32.6	32.1	31.6	31.1	30.7	29.8	29.0	28.2	27.4	26.7	26.0	25.4	53
54	35.3	34.8	34.2	33.7	33.2	32.7	32.2	31.7	31.3	30.4	29.6	28.8	28.0	27.3	26.6	25.9	54
55	36.0	35.4	34.9	34.4	33.8	33.4	32.9	32.4	31.9	31.0	30.2	29.4	28.6	27.9	27.1	26.5	55
56	36.7	36.1	35.6	35.1	34.5	34.0	33.5	33.1	32.6	31.7	30.8	30.0	29.2	28.5	27.7	27.1	56
57	37.4	36.8	36.3	35.8	35.2	34.7	34.2	33.8	33.3	32.4	31.3	30.6	29.8	29.1	28.4	27.7	57
58	38.2	37.6	37.0	36.5	36.0	35.5	35.0	34.5	34.0	33.1	32.2	31.3	30.5	29.8	29.0	28.3	58
59	39.0	38.4	37.8	37.3	36.8	36.3	35.7	35.2	34.7	33.8	32.9	32.1	31.2	30.5	29.7	29.0	59
60	39.8	39.2	38.7	38.1	37.6	37.1	36.5	36.0	35.5	34.6	33.7	32.8	32.0	31.2	30.5	29.8	60
61	40.7	40.1	39.5	39.0	38.4	37.9	37.4	36.9	36.4	35.4	34.5	33.6	32.8	32.0	31.2	30.5	61
62	41.6	41.0	40.4	39.9	39.3	38.8	38.3	37.8	37.3	36.3	35.4	34.5	33.6	32.8	32.1	31.3	62
63	42.5	42.0	41.4	40.8	40.3	39.7	39.2	38.7	38.2	37.2	36.3	35.4	34.5	33.7	32.9	32.2	63
64	43.5	43.0	42.4	41.8	41.3	40.7	40.2	39.7	39.2	38.2	37.3	36.4	35.5	34.7	33.9	33.1	64
65	44.6	44.0	43.4	42.9	42.3	41.8	41.2	40.7	40.2	39.2	38.3	37.4	36.5	35.7	34.9	34.1	65
66	45.7	45.1	44.5	44.0	43.4	42.9	42.3	41.8	41.3	40.3	39.3	38.4	37.6	36.7	35.9	35.1	66
67	46.8	46.2	45.7	45.1	44.6	44.0	43.5	42.9	42.4	41.4	40.5	39.5	38.7	37.8	37.0	36.2	67
68	48.0	47.4	46.9	46.3	45.8	45.2	44.7	44.1	43.6	42.6	41.7	40.7	39.8	39.0	38.1	37.3	68
69	49.3	48.7	48.2	47.6	47.0	46.5	45.9	45.4	44.9	43.9	42.9	42.0	41.1	40.2	39.4	38.6	69
70	50.5	50.0	49.5	48.9	48.4	47.8	47.3	46.8	46.2	45.2	44.3	43.3	42.4	41.5	40.7	39.9	70
71	52.0	51.4	50.9	50.3	49.8	49.2	48.8	48.3	47.7	46.7	45.7	44.7	43.8	42.9	42.1	41.3	71
72	53.4	52.9	52.4	51.8	51.2	50.7	50.2	49.7	49.2	48.2	47.2	46.2	45.3	44.4	43.6	42.7	72
73	54.9	54.4	53.9	53.3	52.8	52.2	51.7	51.2	50.7	49.7	48.8	47.8	46.9	46.0	45.2	44.3	73
74	56.5	56.0	55.5	54.9	54.4	53.9	53.4	52.8	52.3	51.4	50.4	49.5	48.6	47.7	46.9	46.0	74
75	58.1	57.6	57.1	56.6	56.1	55.6	55.1	54.6	54.1	53.1	52.2	51.3	50.4	49.5	48.7	47.8	75

35.0	36.0	37.0	38.0	39.0	40.0	41.0	42.0	43.0	44.0	45.0	46.0	47.0	48.0	49.0	50.0	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
15.9	15.5	15.1	14.7	14.4	14.0	13.7	13.4	13.1	12.8	12.5	12.3	12.0	11.8	11.5	11.3	0
16.0	15.6	15.2	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.3	12.1	11.8	11.6	11.4	5
16.2	15.8	15.4	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.7	12.4	12.2	11.9	11.7	11.5	10
16.4	16.0	15.6	15.2	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.4	12.1	11.9	11.6	14
16.7	16.3	15.9	15.5	15.1	14.7	14.4	14.1	13.7	13.4	13.1	12.9	12.6	12.4	12.1	11.9	18
16.9	16.5	16.0	15.6	15.3	14.9	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.5	12.3	12.0	20
17.1	16.7	16.3	15.8	15.5	15.1	14.7	14.4	14.1	13.8	13.5	13.2	12.9	12.7	12.4	12.2	22
17.4	16.9	16.5	16.1	15.7	15.3	14.9	14.6	14.3	14.0	13.7	13.4	13.1	12.8	12.6	12.3	24
17.6	17.2	16.7	16.3	15.9	15.5	15.2	14.8	14.5	14.2	13.9	13.6	13.3	13.1	12.8	12.5	26
17.9	17.5	17.0	16.6	16.2	15.8	15.4	15.1	14.8	14.4	14.1	13.8	13.5	13.3	13.0	12.8	28
18.3	17.8	17.3	16.9	16.5	16.1	15.7	15.4	15.0	14.7	14.4	14.1	13.8	13.5	13.3	13.0	30
18.4	18.0	17.5	17.1	16.7	16.3	15.9	15.5	15.2	14.9	14.5	14.2	13.9	13.7	13.4	13.1	31
18.6	18.1	17.7	17.2	16.8	16.4	16.0	15.7	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.3	32
18.8	18.3	17.9	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.5	14.2	14.0	13.7	13.4	33
19.0	18.5	18.1	17.6	17.2	16.8	16.4	16.0	15.7	15.3	15.0	14.7	14.4	14.1	13.8	13.6	34
19.2	18.7	18.3	17.8	17.4	17.0	16.6	16.2	15.9	15.5	15.2	14.9	14.6	14.3	14.0	13.7	35
19.5	19.0	18.5	18.0	17.6	17.2	16.8	16.4	16.1	15.7	15.4	15.8	14.7	14.4	14.2	13.9	36
19.7	19.2	18.7	18.2	17.8	17.4	17.0	16.6	16.3	15.9	15.6	15.2	14.9	14.6	14.3	14.1	37
19.9	19.4	18.9	18.5	18.0	17.6	17.2	16.8	16.5	16.1	15.8	15.4	15.1	14.8	14.5	14.2	38
20.2	19.7	19.2	18.7	18.3	17.8	17.4	17.0	16.7	16.3	16.0	15.6	15.3	15.0	14.7	14.4	39
20.5	19.9	19.4	19.0	18.5	18.1	17.7	17.3	16.9	16.5	16.2	15.8	15.5	15.2	14.9	14.6	40
20.7	20.2	19.7	19.2	18.8	18.3	17.9	17.5	17.1	16.8	16.4	16.1	15.7	15.4	15.1	14.8	41
21.0	20.5	20.0	19.5	19.0	18.6	18.2	17.8	17.4	17.0	16.7	16.3	16.0	15.7	15.4	15.1	42
21.3	20.8	20.3	19.8	19.3	18.9	18.4	18.0	17.6	17.3	16.9	16.6	16.2	15.9	15.6	15.3	43
21.7	21.1	20.6	20.1	19.6	19.2	18.7	18.3	17.9	17.5	17.2	16.8	16.5	16.2	15.8	15.5	44
22.0	21.4	20.9	20.4	19.9	19.5	19.0	18.6	18.2	17.8	17.5	17.1	16.8	16.4	16.1	15.8	45
22.4	21.8	21.3	20.8	20.3	19.8	19.3	18.9	18.5	18.1	17.8	17.4	17.1	16.7	16.4	16.1	46
22.7	22.2	21.6	21.1	20.6	20.1	19.7	19.2	18.8	18.4	18.1	17.7	17.4	17.0	16.7	16.3	47
23.1	22.5	22.0	21.5	21.0	20.5	20.0	19.6	19.2	18.8	18.4	18.0	17.7	17.3	17.0	16.6	48
23.5	22.9	22.4	21.9	21.4	20.9	20.4	19.9	19.5	19.1	18.7	18.3	18.0	17.6	17.3	17.0	49
24.0	23.4	22.8	22.3	21.8	21.3	20.8	20.3	19.9	19.5	19.1	18.7	18.3	18.0	17.6	17.3	50
24.4	23.8	23.3	22.7	22.2	21.7	21.2	20.7	20.3	19.9	19.5	19.1	18.7	18.3	18.0	17.6	51
24.9	24.3	23.7	23.1	22.6	22.1	21.6	21.1	20.7	20.3	19.9	19.5	19.1	18.7	18.3	18.0	52
25.4	24.8	24.2	23.6	23.1	22.6	22.1	21.6	21.2	20.7	20.3	19.9	19.5	19.1	18.7	18.4	53
25.9	25.3	24.7	24.1	23.6	23.1	22.6	22.1	21.6	21.1	20.7	20.3	19.9	19.5	19.1	18.8	54
26.5	25.8	25.2	24.6	24.1	23.6	23.1	22.6	22.1	21.6	21.2	20.8	20.4	20.0	19.6	19.2	55
27.1	26.4	25.8	25.2	24.6	24.1	23.6	23.1	22.6	22.1	21.7	21.3	20.8	20.4	20.1	19.7	56
27.7	27.0	26.4	25.8	25.2	24.7	24.1	23.6	23.1	22.7	22.2	21.8	21.3	20.9	20.6	20.2	57
28.3	27.7	27.0	26.4	25.8	25.3	24.7	24.2	23.7	23.2	22.8	22.3	21.9	21.5	21.1	20.7	58
29.0	28.4	27.7	27.1	26.5	25.9	25.3	24.8	24.3	23.8	23.4	22.9	22.5	22.0	21.6	21.2	59
29.8	29.1	28.4	27.8	27.2	26.6	26.0	25.5	24.9	24.4	24.0	23.5	23.1	22.6	22.2	21.8	60
30.5	29.8	29.1	28.5	27.9	27.3	26.7	26.2	25.6	25.1	24.6	24.2	23.7	23.3	22.8	22.4	61
31.3	30.6	29.9	29.3	28.7	28.0	27.5	26.9	26.4	25.8	25.3	24.8	24.4	23.9	23.5	23.1	62
32.2	31.5	30.8	30.1	29.5	28.8	28.2	27.7	27.1	26.6	26.1	25.6	25.1	24.6	24.2	23.8	63
33.1	32.4	31.7	31.0	30.3	29.7	29.1	28.5	27.9	27.4	26.9	26.4	25.9	25.4	25.0	24.5	64
34.1	33.3	32.6	31.9	31.2	30.6	30.0	29.4	28.8	28.3	27.8	27.2	26.7	26.2	25.8	25.3	65
35.1	34.3	33.6	32.9	32.2	31.6	30.9	30.3	29.8	29.2	28.7	28.1	27.6	27.1	26.7	26.2	66
36.2	35.4	34.7	34.0	33.3	32.6	32.0	31.4	30.8	30.2	29.6	29.1	28.6	28.1	27.6	27.1	67
37.3	36.6	35.8	35.1	34.4	33.7	33.1	32.4	31.8	31.2	30.7	30.1	29.6	29.1	28.6	28.1	68
38.6	37.8	37.0	36.3	35.6	34.9	34.2	33.6	32.9	32.4	31.8	31.2	30.7	30.2	29.7	29.2	69
39.9	39.1	38.3	37.6	36.8	36.2	35.5	34.8	34.2	33.6	33.0	32.4	31.8	31.3	30.8	30.3	70
41.3	40.5	39.8	38.9	38.2	37.5	36.8	36.2	35.5	34.9	34.3	33.7	33.2	32.6	32.1	31.5	71
42.7	41.9	41.2	40.4	39.7	38.9	38.3	37.6	36.9	36.3	35.7	35.1	34.5	33.9	33.4	32.9	72
44.3	43.4	42.7	41.9	41.2	40.5	39.8	39.2	38.5	37.8	37.2	36.6	36.0	35.5	34.9	34.4	73
46.0	45.2	44.4	43.7	42.9	42.2	41.5	40.8	40.1	39.5	38.9	38.3	37.7	37.1	36.5	35.9	74
47.8	47.0	46.2	45.5	44.8	44.0	43.3	42.6	41.9	41.3	40.6	40.0	39.4	38.8	38.2	37.7	75

C (3)

°	50.0	60.0	70.0	80.0	90.0	100	110	120	130	140	150	160	170	180	190	200
0	11.3	9.5	8.1	7.1	6.3	5.7	5.2	4.8	4.4	4.1	3.8	3.6	3.4	3.2	3.0	2.9
5	11.4	9.5	8.2	7.2	6.4	5.7	5.2	4.8	4.4	4.1	3.8	3.6	3.4	3.2	3.0	2.9
10	11.5	9.6	8.3	7.2	6.4	5.8	5.3	4.8	4.5	4.1	3.9	3.6	3.4	3.2	3.1	2.9
14	11.6	9.7	8.4	7.3	6.5	5.9	5.4	4.9	4.5	4.2	3.9	3.7	3.5	3.3	3.1	2.9
18	11.9	9.9	8.5	7.5	6.7	6.0	5.5	5.0	4.6	4.3	4.0	3.8	3.5	3.3	3.2	3.0
20	12.0	10.1	8.6	7.6	6.7	6.1	5.5	5.1	4.7	4.3	4.1	3.8	3.6	3.4	3.2	3.0
22	12.2	10.2	8.8	7.7	6.8	6.2	5.6	5.1	4.7	4.4	4.1	3.9	3.6	3.4	3.3	3.1
24	12.3	10.3	8.9	7.8	6.9	6.2	5.7	5.2	4.8	4.5	4.2	3.9	3.7	3.5	3.3	3.1
26	12.5	10.5	9.0	7.9	7.0	6.3	5.8	5.3	4.9	4.5	4.2	4.0	3.7	3.5	3.4	3.2
28	12.8	10.7	9.2	8.1	7.2	6.5	5.9	5.4	5.0	4.6	4.3	4.0	3.8	3.6	3.4	3.2
30	13.0	10.9	9.4	8.2	7.3	6.6	6.0	5.5	5.1	4.7	4.4	4.1	3.9	3.7	3.5	3.3
31	13.1	11.0	9.5	8.3	7.4	6.7	6.1	5.6	5.1	4.8	4.4	4.2	3.9	3.7	3.5	3.3
32	13.3	11.1	9.6	8.4	7.5	6.7	6.1	5.6	5.2	4.8	4.5	4.2	4.0	3.7	3.6	3.4
33	13.4	11.2	9.7	8.5	7.5	6.8	6.2	5.7	5.2	4.9	4.5	4.3	4.0	3.8	3.6	3.4
34	13.6	11.4	9.8	8.6	7.6	6.9	6.3	5.7	5.3	4.9	4.6	4.3	4.1	3.8	3.6	3.5
35	13.7	11.5	9.9	8.7	7.7	7.0	6.3	5.8	5.4	5.0	4.7	4.4	4.1	3.9	3.7	3.5
36	13.9	11.6	10.0	8.8	7.8	7.0	6.4	5.9	5.4	5.0	4.7	4.4	4.2	3.9	3.7	3.5
37	14.1	11.8	10.1	8.9	7.9	7.1	6.5	6.0	5.5	5.1	4.8	4.5	4.2	4.0	3.8	3.6
38	14.2	11.9	10.3	9.0	8.0	7.2	6.6	6.0	5.6	5.2	4.8	4.5	4.3	4.0	3.8	3.6
39	14.4	12.1	10.4	9.1	8.1	7.3	6.7	6.1	5.7	5.3	4.9	4.6	4.3	4.1	3.9	3.7
40	14.6	12.3	10.6	9.3	8.3	7.4	6.8	6.2	5.7	5.3	5.0	4.7	4.4	4.1	3.9	3.7
41	14.8	12.5	10.7	9.4	8.4	7.5	6.9	6.3	5.8	5.4	5.0	4.7	4.5	4.2	4.0	3.8
42	15.1	12.6	10.9	9.5	8.5	7.7	7.0	6.4	5.9	5.5	5.1	4.8	4.5	4.3	4.1	3.8
43	15.3	12.8	11.1	9.7	8.6	7.8	7.1	6.5	6.0	5.6	5.2	4.9	4.6	4.3	4.1	3.9
44	15.5	13.0	11.2	9.9	8.8	7.9	7.2	6.6	6.1	5.7	5.3	5.0	4.7	4.4	4.2	4.0
45	15.8	13.3	11.4	10.0	8.9	8.0	7.3	6.7	6.2	5.8	5.4	5.1	4.8	4.5	4.3	4.0
46	16.1	13.5	11.6	10.2	9.1	8.2	7.5	6.8	6.3	5.9	5.5	5.1	4.8	4.6	4.3	4.1
47	16.3	13.7	11.8	10.4	9.3	8.3	7.6	7.0	6.4	6.0	5.6	5.2	4.9	4.7	4.4	4.2
48	16.6	14.0	12.1	10.6	9.4	8.5	7.7	7.1	6.6	6.1	5.7	5.3	5.0	4.7	4.5	4.3
49	17.0	14.3	12.3	10.8	9.6	8.7	7.9	7.2	6.7	6.2	5.8	5.4	5.1	4.8	4.6	4.4
50	17.3	14.5	12.5	11.0	9.8	8.8	8.0	7.4	6.8	6.3	5.9	5.6	5.2	4.9	4.7	4.4
51	17.6	14.8	12.8	11.2	10.0	9.0	8.2	7.5	7.0	6.5	6.0	5.7	5.3	5.0	4.8	4.5
52	18.0	15.1	13.1	11.5	10.2	9.2	8.4	7.7	7.1	6.6	6.2	5.8	5.5	5.2	4.9	4.6
53	18.4	15.5	13.4	11.7	10.5	9.4	8.6	7.9	7.3	6.8	6.3	5.9	5.6	5.3	5.0	4.7
54	18.8	15.8	13.7	12.0	10.7	9.7	8.8	8.1	7.5	6.9	6.5	6.1	5.7	5.4	5.1	4.9
55	19.2	16.2	14.0	12.3	11.0	9.9	9.0	8.3	7.6	7.1	6.6	6.2	5.9	5.5	5.2	5.0
56	19.7	16.6	14.3	12.6	11.2	10.1	9.2	8.5	7.8	7.3	6.8	6.4	6.0	5.7	5.4	5.1
57	20.2	17.0	14.7	12.9	11.5	10.4	9.5	8.7	8.0	7.5	7.0	6.5	6.2	5.8	5.5	5.2
58	20.7	17.5	15.1	13.3	11.8	10.7	9.7	8.9	8.3	7.7	7.2	6.7	6.3	6.0	5.7	5.4
59	21.2	17.9	15.5	13.6	12.2	11.0	10.0	9.2	8.5	7.9	7.4	6.9	6.5	6.2	5.8	5.5
60	21.8	18.4	15.9	14.0	12.5	11.3	10.3	9.5	8.7	8.1	7.6	7.1	6.7	6.3	6.0	5.7
61	22.4	19.0	16.4	14.5	12.9	11.7	10.6	9.8	9.0	8.4	7.8	7.3	6.9	6.5	6.2	5.9
62	23.1	19.6	16.9	14.9	13.3	12.0	11.0	10.1	9.3	8.7	8.1	7.6	7.1	6.7	6.4	6.1
63	23.8	20.2	17.5	15.4	13.8	12.4	11.3	10.4	9.6	8.9	8.4	7.8	7.4	7.0	6.6	6.3
64	24.5	20.8	18.1	15.9	14.2	12.9	11.7	10.8	10.0	9.3	8.6	8.1	7.6	7.2	6.8	6.5
65	25.3	21.5	18.7	16.5	14.7	13.3	12.1	11.2	10.3	9.6	9.0	8.4	7.9	7.5	7.1	6.7
66	26.2	22.3	19.4	17.1	15.3	13.8	12.6	11.6	10.7	10.0	9.3	8.7	8.2	7.8	7.4	7.0
67	27.1	23.1	20.1	17.8	15.9	14.4	13.1	12.0	11.1	10.4	9.7	9.1	8.6	8.1	7.7	7.3
68	28.1	24.0	20.9	18.5	16.5	14.9	13.6	12.5	11.6	10.8	10.1	9.5	8.9	8.4	8.0	7.6
69	29.2	24.9	21.7	19.2	17.2	15.5	14.2	13.1	12.1	11.3	10.5	9.9	9.4	8.8	8.4	7.9
70	30.3	25.9	22.7	20.1	18.0	16.3	14.9	13.7	12.7	11.8	11.0	10.4	9.8	9.2	8.7	8.3
71	31.5	27.1	23.7	21.0	18.8	17.1	15.6	14.4	13.3	12.4	11.6	10.9	10.2	9.7	9.2	8.7
72	32.9	28.3	24.8	22.0	19.8	17.9	16.4	15.1	14.0	13.0	12.2	11.4	10.8	10.2	9.7	9.2
73	34.4	29.7	26.1	23.1	20.8	18.9	17.3	15.9	14.7	13.7	12.8	12.1	11.4	10.8	10.2	9.7
74	35.9	31.2	27.4	24.4	21.9	19.9	18.3	16.8	15.6	14.5	13.6	12.8	12.1	11.4	10.8	10.3
75	37.7	32.8	28.9	25.8	23.2	21.1	19.4	17.9	16.6	15.4	14.5	13.6	12.8	12.1	11.5	10.9

C (3)

°	210	220	250	270	300	360	400	500	600	700	800	1000	1500	2000	4000	8000
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	2.7	2.6	2.3	2.1	1.9	1.6	1.4	1.1	1.0	0.8	0.7	0.6	0.4	0.3	0.1	0.1
5	2.7	2.6	2.3	2.1	1.9	1.6	1.4	1.2	1.0	0.8	0.7	0.6	0.4	0.3	0.1	0.1
10	2.8	2.6	2.3	2.2	1.9	1.6	1.5	1.2	1.0	0.8	0.7	0.6	0.4	0.3	0.1	0.1
14	2.8	2.7	2.4	2.2	2.0	1.6	1.5	1.2	1.0	0.8	0.7	0.6	0.4	0.3	0.1	0.1
18	2.9	2.7	2.4	2.2	2.0	1.7	1.5	1.2	1.0	0.9	0.8	0.6	0.4	0.3	0.2	0.1
20	2.9	2.8	2.4	2.2	2.0	1.7	1.5	1.2	1.0	0.9	0.8	0.6	0.4	0.3	0.2	0.1
22	2.9	2.8	2.5	2.3	2.1	1.7	1.5	1.2	1.0	0.9	0.8	0.6	0.4	0.3	0.2	0.1
24	3.0	2.8	2.5	2.3	2.1	1.7	1.6	1.3	1.0	0.9	0.8	0.6	0.4	0.3	0.2	0.1
26	3.0	2.9	2.5	2.4	2.1	1.8	1.6	1.3	1.1	0.9	0.8	0.6	0.4	0.3	0.2	0.1
28	3.1	2.9	2.6	2.4	2.2	1.8	1.6	1.3	1.1	0.9	0.8	0.6	0.4	0.3	0.2	0.1
30	3.1	3.0	2.6	2.4	2.2	1.8	1.7	1.3	1.1	0.9	0.8	0.7	0.4	0.3	0.2	0.1
31	3.2	3.0	2.7	2.5	2.2	1.9	1.7	1.3	1.1	1.0	0.8	0.7	0.4	0.3	0.2	0.1
32	3.2	3.1	2.7	2.5	2.3	1.9	1.7	1.4	1.1	1.0	0.8	0.7	0.5	0.3	0.2	0.1
33	3.2	3.1	2.7	2.5	2.3	1.9	1.7	1.4	1.1	1.0	0.9	0.7	0.5	0.3	0.2	0.1
34	3.3	3.1	2.8	2.6	2.3	1.9	1.7	1.4	1.2	1.0	0.9	0.7	0.5	0.3	0.2	0.1
35	3.3	3.2	2.8	2.6	2.3	2.0	1.7	1.4	1.2	1.0	0.9	0.7	0.5	0.3	0.2	0.1
36	3.4	3.2	2.8	2.6	2.4	2.0	1.8	1.4	1.2	1.0	0.9	0.7	0.5	0.4	0.2	0.1
37	3.4	3.3	2.9	2.7	2.4	2.0	1.8	1.4	1.2	1.0	0.9	0.7	0.5	0.4	0.2	0.1
38	3.5	3.3	2.9	2.7	2.4	2.0	1.8	1.5	1.2	1.0	0.9	0.7	0.5	0.4	0.2	0.1
39	3.5	3.3	2.9	2.7	2.5	2.0	1.8	1.5	1.2	1.0	0.9	0.7	0.5	0.4	0.2	0.1
40	3.6	3.4	3.0	2.8	2.5	2.1	1.9	1.5	1.2	1.1	0.9	0.7	0.5	0.4	0.2	0.1
41	3.6	3.4	3.0	2.8	2.5	2.1	1.9	1.5	1.3	1.1	1.0	0.8	0.5	0.4	0.2	0.1
42	3.7	3.5	3.1	2.9	2.6	2.1	1.9	1.5	1.3	1.1	1.0	0.8	0.5	0.4	0.2	0.1
43	3.7	3.6	3.1	2.9	2.6	2.2	2.0	1.6	1.3	1.1	1.0	0.8	0.5	0.4	0.2	0.1
44	3.8	3.6	3.2	2.9	2.7	2.2	2.0	1.6	1.3	1.1	1.0	0.8	0.5	0.4	0.2	0.1
45	3.9	3.7	3.2	3.0	2.7	2.2	2.0	1.6	1.4	1.2	1.0	0.8	0.5	0.4	0.2	0.1
46	3.9	3.7	3.3	3.1	2.7	2.3	2.1	1.6	1.4	1.2	1.0	0.8	0.5	0.4	0.2	0.1
47	4.0	3.8	3.4	3.1	2.8	2.3	2.1	1.7	1.4	1.2	1.1	0.8	0.6	0.4	0.2	0.1
48	4.1	3.9	3.4	3.2	2.9	2.4	2.1	1.7	1.4	1.2	1.1	0.9	0.6	0.4	0.2	0.1
49	4.2	4.0	3.5	3.2	2.9	2.4	2.2	1.7	1.5	1.2	1.1	0.9	0.6	0.4	0.2	0.1
50	4.2	4.0	3.6	3.3	3.0	2.5	2.2	1.8	1.5	1.3	1.1	0.9	0.6	0.4	0.2	0.1
51	4.3	4.1	3.6	3.4	3.0	2.5	2.3	1.8	1.5	1.3	1.2	0.9	0.6	0.5	0.2	0.1
52	4.4	4.2	3.7	3.4	3.1	2.6	2.3	1.9	1.6	1.3	1.2	0.9	0.6	0.5	0.2	0.1
53	4.5	4.3	3.8	3.5	3.2	2.6	2.4	1.9	1.6	1.4	1.2	1.0	0.6	0.5	0.2	0.1
54	4.6	4.4	3.9	3.6	3.2	2.7	2.4	1.9	1.6	1.4	1.2	1.0	0.6	0.5	0.2	0.1
55	4.7	4.5	4.0	3.7	3.3	2.8	2.5	2.0	1.7	1.4	1.2	1.0	0.7	0.5	0.2	0.1
56	4.9	4.6	4.1	3.8	3.4	2.8	2.6	2.0	1.7	1.5	1.3	1.0	0.7	0.5	0.3	0.1
57	5.0	4.8	4.2	3.9	3.5	2.9	2.6	2.1	1.8	1.5	1.3	1.1	0.7	0.5	0.3	0.1
58	5.1	4.9	4.3	4.0	3.6	3.0	2.7	2.2	1.8	1.5	1.4	1.1	0.7	0.5	0.3	0.1
59	5.3	5.0	4.4	4.1	3.7	3.1	2.8	2.2	1.9	1.6	1.4	1.1	0.7	0.6	0.3	0.1
60	5.4	5.2	4.6	4.2	3.8	3.2	2.9	2.3	1.9	1.6	1.4	1.1	0.8	0.6	0.3	0.1
61	5.6	5.4	4.7	4.4	3.9	3.3	3.0	2.4	2.0	1.7	1.5	1.2	0.8	0.6	0.3	0.1
62	5.8	5.5	4.9	4.5	4.1	3.4	3.0	2.4	2.0	1.7	1.5	1.2	0.8	0.6	0.3	0.2
63	6.0	5.7	5.0	4.7	4.2	3.5	3.2	2.5	2.1	1.8	1.6	1.3	0.8	0.6	0.3	0.2
64	6.2	5.9	5.2	4.8	4.3	3.6	3.3	2.6	2.2	1.9	1.6	1.3	0.9	0.7	0.3	0.2
65	6.4	6.1	5.4	5.0	4.5	3.8	3.4	2.7	2.3	1.9	1.7	1.4	0.9	0.7	0.3	0.2
66	6.7	6.4	5.6	5.2	4.7	3.9	3.5	2.8	2.3	2.0	1.8	1.4	0.9	0.7	0.4	0.2
67	6.9	6.6	5.8	5.4	4.9	4.1	3.7	2.9	2.4	2.1	1.8	1.5	1.0	0.7	0.4	0.2
68	7.2	6.9	6.1	5.6	5.1	4.2	3.8	3.1	2.5	2.2	1.9	1.5	1.0	0.8	0.4	0.2
69	7.6	7.2	6.4	5.9	5.3	4.4	4.0	3.2	2.7	2.3	2.0	1.6	1.1	0.8	0.4	0.2
70	7.9	7.6	6.7	6.2	5.6	4.6	4.2	3.4	2.8	2.4	2.1	1.7	1.1	0.8	0.4	0.2
71	8.3	7.9	7.0	6.5	5.9	4.9	4.4	3.5	2.9	2.5	2.2	1.8	1.2	0.9	0.4	0.2
72	8.8	8.4	7.4	6.8	6.2	5.1	4.6	3.7	3.1	2.6	2.3	1.9	1.2	0.9	0.5	0.2
73	9.3	8.8	7.8	7.3	6.5	5.4	4.9	3.9	3.3	2.8	2.4	2.0	1.3	1.0	0.5	0.2
74	9.8	9.4	8.3	7.7	6.9	5.8	5.2	4.2	3.5	3.0	2.6	2.1	1.4	1.0	0.5	0.3
75	10.4	10.0	8.8	8.1	7.3	6.1	5.5	4.4	3.7	3.2	2.8	2.2	1.5	1.1	0.6	0.3

Natural Trigonometric Functions

0°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	←179° ↓
0	0. 00000	29	∞	—	0. 00000	29	∞	—	1. 00000	0	1. 00000	0	60
1	. 00029	29	3437. 75	1718. 88	. 00029	29	3437. 75	1718. 88	. 00000	0	. 00000	0	59
2	. 00058	29	1718. 87	572. 95	. 00058	29	1718. 87	572. 95	. 00000	0	. 00000	0	58
3	. 00087	29	1145. 92	286. 483	. 00087	29	1145. 92	286. 484	. 00000	0	. 00000	0	57
4	. 00116	29	859. 437	171. 887	. 00116	29	859. 436	171. 887	. 00000	0	. 00000	0	56
5	0. 00145	30	687. 550	114. 592	0. 00145	30	687. 549	114. 592	1. 00000	0	1. 00000	0	55
6	. 00175	29	572. 958	81. 851	. 00175	29	572. 957	81. 851	. 00000	0	. 00000	0	54
7	. 00204	29	491. 107	61. 388	. 00204	29	491. 106	61. 388	. 00000	0	. 00000	0	53
8	. 00233	29	429. 719	47. 747	. 00233	29	429. 718	47. 747	. 00000	0	. 00000	0	52
9	. 00262	29	381. 972	38. 197	. 00262	29	381. 971	38. 197	. 00000	0	. 00000	0	51
10	0. 00291	29	343. 775	31. 252	0. 00291	29	343. 774	31. 253	1. 00000	1	1. 00000	1	50
11	. 00320	29	312. 523	26. 044	. 00320	29	312. 521	26. 043	. 00001	0	0. 99999	0	49
12	. 00349	29	286. 479	22. 036	. 00349	29	286. 478	22. 037	. 00001	0	. 99999	0	48
13	. 00378	29	264. 443	18. 889	. 00378	29	264. 441	18. 889	. 00001	0	. 99999	0	47
14	. 00407	29	245. 554	16. 370	. 00407	29	245. 552	16. 370	. 00001	0	. 99999	0	46
15	0. 00436	29	229. 184	14. 324	0. 00436	29	229. 182	14. 324	1. 00001	0	0. 99999	0	45
16	. 00465	30	214. 860	12. 639	. 00465	30	214. 858	12. 639	. 00001	0	. 99999	0	44
17	. 00495	29	202. 221	11. 234	. 00495	29	202. 219	11. 235	. 00001	0	. 99999	0	43
18	. 00524	29	190. 987	10. 052	. 00524	29	190. 984	10. 052	. 00001	1	. 99999	1	42
19	. 00553	29	180. 935	9. 047	. 00553	29	180. 932	9. 047	. 00002	0	. 99998	0	41
20	0. 00582	29	171. 888	8. 185	0. 00582	29	171. 885	8. 185	1. 00002	0	0. 99998	0	40
21	. 00611	29	163. 703	7. 441	. 00611	29	163. 700	7. 441	. 00002	0	. 99998	0	39
22	. 00640	29	156. 262	6. 794	. 00640	29	156. 259	6. 794	. 00002	0	. 99998	0	38
23	. 00669	29	149. 468	6. 227	. 00669	29	149. 465	6. 228	. 00002	0	. 99998	0	37
24	. 00698	29	143. 241	5. 730	. 00698	29	143. 237	5. 730	. 00002	1	. 99998	1	36
25	0. 00727	29	137. 511	5. 289	0. 00727	29	137. 507	5. 288	1. 00003	0	0. 99997	0	35
26	. 00756	29	132. 222	4. 897	. 00756	29	132. 219	4. 898	. 00003	0	. 99997	0	34
27	. 00785	29	127. 325	4. 547	. 00785	30	127. 321	4. 547	. 00003	0	. 99997	0	33
28	. 00814	30	122. 778	4. 234	. 00815	29	122. 774	4. 234	. 00003	1	. 99997	1	32
29	. 00844	29	118. 544	3. 951	. 00844	29	118. 540	3. 951	. 00004	0	. 99996	0	31
30	0. 00873	29	114. 593	3. 696	0. 00873	29	114. 589	3. 697	1. 00004	0	0. 99996	0	30
31	. 00902	29	110. 897	3. 466	. 00902	29	110. 892	3. 466	. 00004	0	. 99996	0	29
32	. 00931	29	107. 431	3. 255	. 00931	29	107. 426	3. 255	. 00004	1	. 99996	1	28
33	. 00960	29	104. 176	3. 064	. 00960	29	104. 171	3. 064	. 00005	0	. 99995	0	27
34	. 00989	29	101. 112	2. 8890	. 00989	29	101. 107	2. 8891	. 00005	0	. 99995	0	26
35	0. 01018	29	98. 2230	2. 7283	0. 01018	29	98. 2179	2. 7284	1. 00005	0	0. 99995	0	25
36	. 01047	29	95. 4947	2. 5808	. 01047	29	95. 4895	2. 5810	. 00005	0	. 99995	0	24
37	. 01076	29	92. 9139	2. 4450	. 01076	29	92. 9085	2. 4452	. 00006	1	. 99994	1	23
38	. 01105	29	90. 4689	2. 3197	. 01105	30	90. 4633	2. 3197	. 00006	0	. 99994	0	22
39	. 01134	30	88. 1492	2. 2036	. 01135	29	88. 1436	2. 2038	. 00006	1	. 99994	1	21
40	0. 01164	29	85. 9456	2. 0961	0. 01164	29	85. 9398	2. 0963	1. 00007	0	0. 99993	0	20
41	. 01193	29	83. 8495	1. 9963	. 01193	29	83. 8435	1. 9965	. 00007	0	. 99993	0	19
42	. 01222	29	81. 8532	1. 9035	. 01222	29	81. 8470	1. 9036	. 00007	1	. 99993	1	18
43	. 01251	29	79. 9497	1. 8170	. 01251	29	79. 9434	1. 8171	. 00008	0	. 99992	0	17
44	. 01280	29	78. 1327	1. 7361	. 01280	29	78. 1263	1. 7363	. 00008	1	. 99992	1	16
45	0. 01309	29	76. 3966	1. 6607	0. 01309	29	76. 3900	1. 6608	1. 00009	0	0. 99991	0	15
46	. 01338	29	74. 7359	1. 5901	. 01338	29	74. 7292	1. 5902	. 00009	0	. 99991	0	14
47	. 01367	29	73. 1458	1. 5237	. 01367	29	73. 1390	1. 5239	. 00009	1	. 99991	1	13
48	. 01396	29	71. 6221	1. 4616	. 01396	29	71. 6151	1. 4618	. 00010	0	. 99990	0	12
49	. 01425	29	70. 1605	1. 4031	. 01425	30	70. 1533	1. 4032	. 00010	1	. 99990	1	11
50	0. 01454	29	68. 7574	1. 3481	0. 01455	29	68. 7501	1. 3482	1. 00011	0	0. 99989	0	10
51	. 01483	30	67. 4093	1. 2963	. 01484	29	67. 4019	1. 2964	. 00011	0	. 99989	0	9
52	. 01513	29	66. 1130	1. 2473	. 01513	29	66. 1055	1. 2475	. 00011	1	. 99989	1	8
53	. 01542	29	64. 8657	1. 2011	. 01542	29	64. 8580	1. 2013	. 00012	0	. 99988	0	7
54	. 01571	29	63. 6616	1. 1574	. 01571	29	63. 6567	1. 1575	. 00012	1	. 99988	1	6
55	0. 01600	29	62. 5072	1. 1161	0. 01600	29	62. 4992	1. 1163	1. 00013	0	0. 99987	0	5
56	. 01629	29	61. 3911	1. 0770	. 01629	29	61. 3829	1. 0771	. 00013	1	. 99987	1	4
57	. 01658	29	60. 3141	1. 0398	. 01658	29	60. 3058	1. 0399	. 00014	0	. 99986	0	3
58	. 01687	29	59. 2743	1. 0045	. 01687	29	59. 2659	1. 0047	. 00014	1	. 99986	1	2
59	. 01716	29	58. 2698	0. 9711	. 01716	29	58. 2612	0. 9712	. 00015	0	. 99985	0	1
60	0. 01745		57. 2987		0. 01746	30	57. 2900		1. 00015		0. 99985		0
↑ 90°→	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ←89°

1°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	←178° ↓
0	0. 01745	29	57. 2987	9392	0. 01746	29	57. 2900	9394	1. 00015	1	0. 99985	1	60
1	. 01774	29	56. 3595	9090	. 01775	29	56. 3506	9091	. 00016	0	. 99984	0	59
2	. 01803	29	55. 4505	8800	. 01804	29	55. 4415	8802	. 00016	1	. 99984	1	58
3	. 01832	30	54. 5705	8526	. 01833	29	54. 5613	8527	. 00017	0	. 99983	0	57
4	. 01862	29	53. 7179	8263	. 01862	29	53. 7086	8265	. 00017	1	. 99983	1	56
5	0. 01891	29	52. 8916	8013	0. 01891	29	52. 8821	8014	1. 00018	0	0. 99982	0	55
6	. 01920	29	52. 0903	7774	. 01920	29	52. 0807	7775	. 00018	1	. 99982	1	54
7	. 01949	29	51. 3129	7545	. 01949	29	51. 3032	7547	. 00019	1	. 99981	1	53
8	. 01978	29	50. 5584	7326	. 01978	29	50. 5485	7328	. 00020	0	. 99980	0	52
9	. 02007	29	49. 8258	7117	. 02007	29	49. 8157	7118	. 00020	1	. 99980	1	51
10	0. 02036	29	49. 1141	6917	0. 02036	30	49. 1039	6918	1. 00021	0	0. 99979	0	50
11	. 02065	29	48. 4224	6724	. 02066	29	48. 4121	6726	. 00021	0	. 99979	1	49
12	. 02094	29	47. 7500	6540	. 02095	29	47. 7395	6542	. 00022	1	. 99978	1	48
13	. 02123	29	47. 0960	6364	. 02124	29	47. 0853	6364	. 00023	1	. 99977	0	47
14	. 02152	29	46. 4596	6193	. 02153	29	46. 4489	6195	. 00023	0	. 99977	1	46
15	0. 02181	30	45. 8403	6031	0. 02182	29	45. 8294	6033	1. 00024	1	0. 99976	0	45
16	. 02211	29	45. 2372	5874	. 02211	29	45. 2261	5875	. 00024	0	. 99976	1	44
17	. 02240	29	44. 6498	5723	. 02240	29	44. 6386	5725	. 00025	1	. 99975	1	43
18	. 02269	29	44. 0775	5579	. 02269	29	44. 0661	5580	. 00026	1	. 99974	0	42
19	. 02298	29	43. 5196	5439	. 02298	30	43. 5081	5440	. 00026	0	. 99974	1	41
20	0. 02327	29	42. 9757	5305	0. 02328	29	42. 9641	5306	1. 00027	1	0. 99973	1	40
21	. 02356	29	42. 4452	5175	. 02357	29	42. 4335	5177	. 00028	1	. 99972	0	39
22	. 02385	29	41. 9277	5050	. 02386	29	41. 9158	5052	. 00028	0	. 99972	1	38
23	. 02414	29	41. 4227	4931	. 02415	29	41. 4106	4932	. 00029	1	. 99971	1	37
24	. 02443	29	40. 9296	4814	. 02444	29	40. 9174	4816	. 00030	1	. 99970	1	36
25	0. 02472	29	40. 4482	4702	0. 02473	29	40. 4358	4703	1. 00031	0	0. 99969	0	35
26	. 02501	29	39. 9780	4595	. 02502	29	39. 9655	4596	. 00031	1	. 99969	1	34
27	. 02530	30	39. 5185	4489	. 02531	29	39. 5059	4491	. 00032	1	. 99968	1	33
28	. 02560	29	39. 0696	4389	. 02560	29	39. 0568	4391	. 00033	1	. 99967	1	32
29	. 02589	29	38. 6307	4291	. 02589	30	38. 6177	4292	. 00034	0	. 99966	0	31
30	0. 02618	29	38. 2016	4198	0. 02619	29	38. 1885	4199	1. 00034	1	0. 99966	1	30
31	. 02647	29	37. 7818	4105	. 02648	29	37. 7686	4107	. 00035	1	. 99965	1	29
32	. 02676	29	37. 3713	4018	. 02677	29	37. 3579	4019	. 00036	1	. 99964	1	28
33	. 02705	29	36. 9695	3932	. 02706	29	36. 9560	3933	. 00037	1	. 99963	0	27
34	. 02734	29	36. 5763	3849	. 02735	29	36. 5627	3851	. 00037	0	. 99963	1	26
35	0. 02763	29	36. 1914	3769	0. 02764	29	36. 1776	3770	1. 00038	1	0. 99962	1	25
36	. 02792	29	35. 8145	3691	. 02793	29	35. 8006	3693	. 00039	1	. 99961	1	24
37	. 02821	29	35. 4454	3616	. 02822	29	35. 4313	3618	. 00040	1	. 99960	1	23
38	. 02850	29	35. 0838	3543	. 02851	30	35. 0695	3544	. 00041	0	. 99959	0	22
39	. 02879	29	34. 7295	3472	. 02881	29	34. 7151	3473	. 00041	1	. 99959	1	21
40	0. 02908	30	34. 3823	3403	0. 02910	29	34. 3678	3405	1. 00042	1	0. 99958	1	20
41	. 02938	29	34. 0420	3337	. 02939	29	34. 0273	3338	. 00043	1	. 99957	1	19
42	. 02967	29	33. 7083	3271	. 02968	29	33. 6935	3273	. 00044	1	. 99956	1	18
43	. 02996	29	33. 3812	3209	. 02997	29	33. 3662	3210	. 00045	1	. 99955	1	17
44	. 03025	29	33. 0603	3148	. 03026	29	33. 0452	3149	. 00046	1	. 99954	1	16
45	0. 03054	29	32. 7455	3088	0. 03055	29	32. 7303	3090	1. 00047	1	0. 99953	1	15
46	. 03083	29	32. 4367	3030	. 03084	30	32. 4213	3032	. 00048	0	. 99952	0	14
47	. 03112	29	32. 1337	2975	. 03114	29	32. 1181	2976	. 00048	1	. 99952	1	13
48	. 03141	29	31. 8362	2920	. 03143	29	31. 8205	2921	. 00049	1	. 99951	1	12
49	. 03170	29	31. 5442	2866	. 03172	29	31. 5284	2868	. 00050	1	. 99950	1	11
50	0. 03199	29	31. 2576	2815	0. 03201	29	31. 2416	2817	1. 00051	1	0. 99949	1	10
51	. 03228	29	30. 9761	2765	. 03230	29	30. 9599	2766	. 00052	1	. 99948	1	9
52	. 03257	29	30. 6996	2716	. 03259	29	30. 6833	2717	. 00053	1	. 99947	1	8
53	. 03286	30	30. 4280	2668	. 03288	29	30. 4116	2670	. 00054	1	. 99946	1	7
54	. 03316	29	30. 1612	2622	. 03317	29	30. 1446	2623	. 00055	1	. 99945	1	6
55	0. 03345	29	29. 8990	2576	0. 03346	30	29. 8823	2578	1. 00056	1	0. 99944	1	5
56	. 03374	29	29. 6414	2533	. 03376	29	29. 6245	2534	. 00057	1	. 99943	1	4
57	. 03403	29	29. 3881	2489	. 03405	29	29. 3711	2491	. 00058	1	. 99942	1	3
58	. 03432	29	29. 1392	2448	. 03434	29	29. 1220	2449	. 00059	1	. 99941	1	2
59	. 03461	29	28. 8944	2407	. 03463	29	28. 8771	2408	. 00060	1	. 99940	1	1
60	0. 03490		28. 6537		0. 03492		28. 6363		1. 00061		0. 99939		0
↑ 91°→	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ←88°

2°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	←177° ↓
0	0. 03490	29	28. 6537	2367	0. 03492	29	28. 6363	2369	1. 00061	1	0. 99939	1	60
1	. 03519	29	4170	2328	. 03521	29	. 3994	2330	. 00062	1	. 99938	1	59
2	. 03548	29	28. 1842	2291	. 03550	29	28. 1664	2292	. 00063	1	. 99937	1	58
3	. 03577	29	27. 9551	2253	. 03579	30	27. 9372	2255	. 00064	1	. 99936	1	57
4	. 03606	29	. 7298	2218	. 03609	29	. 7117	2218	. 00065	1	. 99935	1	56
5	0. 03635	29	27. 5080	2182	0. 03638	29	27. 4899	2184	1. 00066	1	0. 99934	1	55
6	. 03664	29	. 2898	2148	. 03667	29	. 2715	2149	. 00067	1	. 99933	1	54
7	. 03693	30	27. 0750	2114	. 03696	29	27. 0566	2116	. 00068	1	. 99932	1	53
8	. 03723	29	26. 8636	2081	. 03725	29	26. 8450	2083	. 00069	1	. 99931	1	52
9	. 03752	29	. 6555	2050	. 03754	29	. 6367	2051	. 00070	2	. 99930	1	51
10	0. 03781	29	26. 4505	2018	0. 03783	29	26. 4316	2020	1. 00072	1	0. 99929	2	50
11	. 03810	29	. 2487	1988	. 03812	30	. 2296	1989	. 00073	1	. 99927	1	49
12	. 03839	29	26. 0499	1957	. 03842	29	26. 0307	1959	. 00074	1	. 99926	1	48
13	. 03868	29	25. 8542	1929	. 03871	29	25. 8348	1930	. 00075	1	. 99925	1	47
14	. 03897	29	. 6613	1900	. 03900	29	. 6418	1901	. 00076	1	. 99924	1	46
15	0. 03926	29	25. 4713	1872	0. 03929	29	25. 4517	1873	1. 00077	1	0. 99923	1	45
16	. 03955	29	. 2841	1844	. 03958	29	. 2644	1846	. 00078	1	. 99922	1	44
17	. 03984	29	25. 0997	1818	. 03987	29	25. 0798	1820	. 00079	2	. 99921	2	43
18	. 04013	29	24. 9179	1792	. 04016	30	24. 8978	1793	. 00081	1	. 99919	1	42
19	. 04042	29	. 7387	1766	. 04046	29	. 7185	1767	. 00082	1	. 99918	1	41
20	0. 04071	29	24. 5621	1741	0. 04075	29	24. 5418	1743	1. 00083	1	0. 99917	1	40
21	. 04100	29	. 3880	1716	. 04104	29	. 3675	1718	. 00084	1	. 99916	1	39
22	. 04129	30	. 2164	1693	. 04133	29	. 1957	1694	. 00085	2	. 99915	2	38
23	. 04159	29	24. 0471	1669	. 04162	29	24. 0263	1670	. 00087	1	. 99913	1	37
24	. 04188	29	23. 8802	1646	. 04191	29	23. 8593	1648	. 00088	1	. 99912	1	36
25	0. 04217	29	23. 7156	1623	0. 04220	30	23. 6945	1624	1. 00089	1	0. 99911	1	35
26	. 04246	29	. 5533	1601	. 04250	29	. 5321	1603	. 00090	1	. 99910	1	34
27	. 04275	29	. 3932	1580	. 04279	29	. 3718	1581	. 00091	2	. 99909	2	33
28	. 04304	29	. 2352	1558	. 04308	29	. 2137	1560	. 00093	1	. 99907	1	32
29	. 04333	29	23. 0794	1538	. 04337	29	23. 0577	1539	. 00094	1	. 99906	1	31
30	0. 04362	29	22. 9256	1517	0. 04366	29	22. 9038	1519	1. 00095	2	0. 99905	1	30
31	. 04391	29	. 7739	1498	. 04395	29	. 7519	1499	. 00097	1	. 99904	2	29
32	. 04420	29	. 6241	1477	. 04424	30	. 6020	1479	. 00098	1	. 99902	1	28
33	. 04449	29	. 4764	1459	. 04454	29	. 4541	1460	. 00099	1	. 99901	1	27
34	. 04478	29	. 3305	1440	. 04483	29	. 3081	1441	. 00100	2	. 99900	2	26
35	0. 04507	29	22. 1865	1421	0. 04512	29	22. 1640	1423	1. 00102	1	0. 99898	1	25
36	. 04536	29	22. 0444	1403	. 04541	29	22. 0217	1404	. 00103	1	. 99897	1	24
37	. 04565	29	21. 9041	1385	. 04570	29	21. 8813	1387	. 00104	2	. 99896	2	23
38	. 04594	29	. 7656	1368	. 04599	29	. 7426	1370	. 00106	1	. 99894	1	22
39	. 04623	30	. 6288	1351	. 04628	30	. 6056	1352	. 00107	1	. 99893	1	21
40	0. 04653	29	21. 4937	1334	0. 04658	29	21. 4704	1335	1. 00108	2	0. 99892	2	20
41	. 04682	29	. 3603	1318	. 04687	29	. 3369	1320	. 00110	1	. 99890	1	19
42	. 04711	29	. 2285	1301	. 04716	29	. 2049	1302	. 00111	2	. 99889	1	18
43	. 04740	29	21. 0984	1286	. 04745	29	21. 0747	1287	. 00113	1	. 99888	2	17
44	. 04769	29	20. 9698	1270	. 04774	29	20. 9460	1272	. 00114	1	. 99886	1	16
45	0. 04798	29	20. 8428	1254	0. 04803	30	20. 8188	1256	1. 00115	2	0. 99885	2	15
46	. 04827	29	. 7174	1240	. 04833	29	. 6932	1241	. 00117	1	. 99883	1	14
47	. 04856	29	. 5934	1225	. 04862	29	. 5691	1226	. 00118	2	. 99882	1	13
48	. 04885	29	. 4709	1210	. 04891	29	. 4465	1212	. 00120	1	. 99881	2	12
49	. 04914	29	. 3499	1196	. 04920	29	. 3253	1197	. 00121	1	. 99879	1	11
50	0. 04943	29	20. 2303	1182	0. 04949	29	20. 2056	1184	1. 00122	2	0. 99878	2	10
51	. 04972	29	20. 1121	1169	. 04978	29	20. 0872	1170	. 00124	1	. 99876	1	9
52	. 05001	29	19. 9952	1154	. 05007	30	19. 9702	1156	. 00125	2	. 99875	2	8
53	. 05030	29	. 8798	1142	. 05037	29	. 8546	1143	. 00127	1	. 99873	1	7
54	. 05059	29	. 7656	1128	. 05066	29	. 7403	1130	. 00128	2	. 99872	2	6
55	0. 05088	29	19. 6528	1116	0. 05095	29	19. 6273	1117	1. 00130	1	0. 99870	1	5
56	. 05117	29	. 5412	1103	. 05124	29	. 5156	1105	. 00131	2	. 99869	2	4
57	. 05146	29	. 4309	1091	. 05153	29	. 4051	1092	. 00133	1	. 99867	1	3
58	. 05175	30	. 3218	1078	. 05182	30	. 2959	1080	. 00134	2	. 99866	2	2
59	. 05205	29	. 2140	1067	. 05212	29	. 1879	1068	. 00136	2	. 99864	1	1
60	0. 05234		19. 1073		0. 05241		19. 0811		1. 00137	1	0. 99863		0
↑ 92°→	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	←87° ↑

3° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 176° ↓
0	0. 05234	29	19. 1073	1054	0. 05241	29	19. 0811	1056	1. 00137	2	0. 99863	2	60
1	. 05263	29	19. 0019	1044	. 05270	29	18. 9755	1044	. 00139	1	. 99861	1	59
2	. 05292	29	18. 8975	1031	. 05299	29	. 8711	1033	. 00140	2	. 99860	2	58
3	. 05321	29	. 7944	1021	. 05328	29	. 7678	1022	. 00142	1	. 99858	1	57
4	. 05350	29	. 6923	1009	. 05357	30	. 6656	1011	. 00143	2	. 99857	2	56
5	0. 05379	29	18. 5914	999	0. 05387	29	18. 5645	1000	1. 00145	2	0. 99855	1	55
6	. 05408	29	. 4915	988	. 05416	29	. 4645	990	. 00147	1	. 99854	2	54
7	. 05437	29	. 3927	977	. 05445	29	. 3655	978	. 00148	2	. 99852	1	53
8	. 05466	29	. 2950	967	. 05474	29	. 2677	969	. 00150	1	. 99851	2	52
9	. 05495	29	. 1983	957	. 05503	30	. 1708	958	. 00151	2	. 99849	2	51
10	0. 05524	29	18. 1026	947	0. 05533	29	18. 0750	948	1. 00153	2	0. 99847	1	50
11	. 05553	29	18. 0079	937	. 05562	29	17. 9802	939	. 00155	1	. 99846	2	49
12	. 05582	29	17. 9142	927	. 05591	29	. 8863	929	. 00156	2	. 99844	2	48
13	. 05611	29	. 8215	917	. 05620	29	. 7934	919	. 00158	1	. 99842	1	47
14	. 05640	29	. 7298	909	. 05649	29	. 7015	909	. 00159	2	. 99841	2	46
15	0. 05669	29	17. 6389	899	0. 05678	30	17. 6106	901	1. 00161	2	0. 99839	1	45
16	. 05698	29	. 5490	890	. 05708	29	. 5205	891	. 00163	1	. 99838	2	44
17	. 05727	29	. 4600	880	. 05737	29	. 4314	882	. 00164	2	. 99836	2	43
18	. 05756	29	. 3720	872	. 05766	29	. 3432	874	. 00166	2	. 99834	1	42
19	. 05785	29	. 2848	864	. 05795	29	. 2558	865	. 00168	1	. 99833	2	41
20	0. 05814	30	17. 1984	854	0. 05824	30	17. 1693	856	1. 00169	2	0. 99831	2	40
21	. 05844	29	. 1130	847	. 05854	29	17. 0837	847	. 00171	2	. 99829	2	39
22	. 05873	29	17. 0283	837	. 05883	29	16. 9990	840	. 00173	2	. 99827	1	38
23	. 05902	29	16. 9446	830	. 05912	29	. 9150	831	. 00175	2	. 99826	2	37
24	. 05931	29	. 8616	822	. 05941	29	. 8319	823	. 00176	1	. 99824	2	36
25	0. 05960	29	16. 7794	813	0. 05970	29	16. 7496	815	1. 00178	2	0. 99822	1	35
26	. 05989	29	. 6981	806	. 05999	30	. 6681	807	. 00180	2	. 99821	2	34
27	. 06018	29	. 6175	798	. 06029	29	. 5874	799	. 00182	2	. 99819	2	33
28	. 06047	29	. 5377	790	. 06058	29	. 5075	792	. 00183	1	. 99817	2	32
29	. 06076	29	. 4587	783	. 06087	29	. 4283	784	. 00185	2	. 99815	2	31
30	0. 06105	29	16. 3804	775	0. 06116	29	16. 3499	777	1. 00187	2	0. 99813	1	30
31	. 06134	29	. 3029	768	. 06145	30	. 2722	770	. 00189	1	. 99812	2	29
32	. 06163	29	. 2261	761	. 06175	29	. 1952	762	. 00190	2	. 99810	2	28
33	. 06192	29	. 1500	754	. 06204	29	. 1190	755	. 00192	2	. 99808	2	27
34	. 06221	29	16. 0746	747	. 06233	29	16. 0435	748	. 00194	2	. 99806	2	26
35	0. 06250	29	15. 9999	739	0. 06262	29	15. 9687	742	1. 00196	2	0. 99804	1	25
36	. 06279	29	. 9260	733	. 06291	30	. 8945	734	. 00198	2	. 99803	2	24
37	. 06308	29	. 8527	726	. 06321	29	. 8211	728	. 00200	1	. 99801	2	23
38	. 06337	29	. 7801	720	. 06350	29	. 7483	721	. 00201	2	. 99799	2	22
39	. 06366	29	. 7081	713	. 06379	29	. 6762	714	. 00203	2	. 99797	2	21
40	0. 06395	29	15. 6368	707	0. 06408	30	15. 6048	708	1. 00205	2	0. 99795	2	20
41	. 06424	29	. 5661	700	. 06438	29	. 5340	702	. 00207	2	. 99793	1	19
42	. 06453	29	. 4961	694	. 06467	29	. 4638	695	. 00209	2	. 99792	2	18
43	. 06482	29	. 4267	688	. 06496	29	. 3943	689	. 00211	2	. 99790	2	17
44	. 06511	29	. 3579	681	. 06525	29	. 3254	683	. 00213	2	. 99788	2	16
45	0. 06540	29	15. 2898	676	0. 06554	30	15. 2571	678	1. 00215	1	0. 99786	2	15
46	. 06569	29	. 2222	669	. 06584	29	. 1893	671	. 00216	2	. 99784	2	14
47	. 06598	29	. 1553	664	. 06613	29	. 1222	665	. 00218	2	. 99782	2	13
48	. 06627	29	. 0889	658	. 06642	29	15. 0557	659	. 00220	2	. 99780	2	12
49	. 06656	29	15. 0231	652	. 06671	29	14. 9898	654	. 00222	2	. 99778	2	11
50	0. 06685	29	14. 9579	647	0. 06700	30	14. 9244	648	1. 00224	2	0. 99776	2	10
51	. 06714	29	. 8932	641	. 06730	29	. 8596	642	. 00226	2	. 99774	2	9
52	. 06743	29	. 8291	635	. 06759	29	. 7954	637	. 00228	2	. 99772	2	8
53	. 06773	30	. 7656	630	. 06788	29	. 7317	632	. 00230	2	. 99770	2	7
54	. 06802	29	. 7026	625	. 06817	29	. 6685	626	. 00232	2	. 99768	2	6
55	0. 06831	29	14. 6401	619	0. 06847	30	14. 6059	621	1. 00234	2	0. 99766	2	5
56	. 06860	29	. 5782	614	. 06876	29	. 5438	615	. 00236	2	. 99764	2	4
57	. 06889	29	. 5168	609	. 06905	29	. 4823	611	. 00238	2	. 99762	2	3
58	. 06918	29	. 4559	604	. 06934	29	. 4212	605	. 00240	2	. 99760	2	2
59	. 06947	29	. 3955	599	. 06963	30	. 3607	600	. 00242	2	. 99758	2	1
60	0. 06976		14. 3356		0. 06993		14. 3007		1. 00244		0. 99756		0
↑ 93° →	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	← 86° ↑

4°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	←175° Diff. 1′	↓
′													′
0	0. 06976	29	14. 3356	594	0. 06993	29	14. 3007	596	1. 00244	2	0. 99756	2	60
1	. 07005	29	. 2762	589	. 07022	29	. 2411	590	. 00246	2	. 99754	2	59
2	. 07034	29	. 2173	584	. 07051	29	. 1821	586	. 00248	2	. 99752	2	58
3	. 07063	29	. 1589	579	. 07080	30	. 1235	580	. 00250	2	. 99750	2	57
4	. 07092	29	. 1010	575	. 07110	29	. 0655	576	. 00252	2	. 99748	2	56
5	0. 07121	29	14. 0435	570	0. 07139	29	14. 0079	572	1. 00254	3	0. 99746	2	55
6	. 07150	29	13. 9865	565	. 07168	29	13. 9507	567	. 00257	2	. 99744	2	54
7	. 07179	29	. 9300	561	. 07197	30	. 8940	562	. 00259	2	. 99742	2	53
8	. 07208	29	. 8739	556	. 07227	29	. 8378	557	. 00261	2	. 99740	2	52
9	. 07237	29	. 8183	552	. 07256	29	. 7821	554	. 00263	2	. 99738	2	51
10	0. 07266	29	13. 7631	547	0. 07285	29	13. 7267	548	1. 00265	2	0. 99736	2	50
11	. 07295	29	. 7084	543	. 07314	30	. 6719	545	. 00267	2	. 99734	3	49
12	. 07324	29	. 6541	539	. 07344	29	. 6174	540	. 00269	2	. 99731	2	48
13	. 07353	29	. 6002	534	. 07373	29	. 5634	536	. 00271	3	. 99729	2	47
14	. 07382	29	. 5468	531	. 07402	29	. 5098	532	. 00274	2	. 99727	2	46
15	0. 07411	29	13. 4937	526	0. 07431	30	13. 4566	527	1. 00276	2	0. 99725	2	45
16	. 07440	29	. 4411	522	. 07461	29	. 4039	524	. 00278	2	. 99723	2	44
17	. 07469	29	. 3889	518	. 07490	29	. 3515	519	. 00280	2	. 99721	2	43
18	. 07498	29	. 3371	514	. 07519	29	. 2996	516	. 00282	2	. 99719	3	42
19	. 07527	29	. 2857	510	. 07548	30	. 2480	511	. 00284	3	. 99716	2	41
20	0. 07556	29	13. 2347	506	0. 07578	29	13. 1969	508	1. 00287	2	0. 99714	2	40
21	. 07585	29	. 1841	502	. 07607	29	. 1461	503	. 00289	2	. 99712	2	39
22	. 07614	29	. 1339	499	. 07636	29	. 0958	500	. 00291	2	. 99710	2	38
23	. 07643	29	. 0840	494	. 07665	30	13. 0458	496	. 00293	3	. 99708	3	37
24	. 07672	29	13. 0346	491	. 07695	29	12. 9962	493	. 00296	2	. 99705	2	36
25	0. 07701	29	12. 9855	487	0. 07724	29	12. 9469	488	1. 00298	2	0. 99703	2	35
26	. 07730	29	. 9368	484	. 07753	29	. 8981	485	. 00300	2	. 99701	2	34
27	. 07759	29	. 8884	480	. 07782	30	. 8496	482	. 00302	3	. 99699	3	33
28	. 07788	29	. 8404	476	. 07812	29	. 8014	478	. 00305	2	. 99696	2	32
29	. 07817	29	. 7928	473	. 07841	29	. 7536	474	. 00307	2	. 99694	2	31
30	0. 07846	29	12. 7455	469	0. 07870	29	12. 7062	471	1. 00309	3	0. 99692	3	30
31	. 07875	29	. 6986	466	. 07899	30	. 6591	467	. 00312	2	. 99689	2	29
32	. 07904	29	. 6520	463	. 07929	29	. 6124	464	. 00314	2	. 99687	2	28
33	. 07933	29	. 6057	459	. 07958	29	. 5660	461	. 00316	2	. 99685	2	27
34	. 07962	29	. 5598	456	. 07987	30	. 5199	457	. 00318	3	. 99683	3	26
35	0. 07991	29	12. 5142	452	0. 08017	29	12. 4742	454	1. 00321	2	0. 99680	2	25
36	. 08020	29	. 4690	449	. 08046	29	. 4288	450	. 00323	3	. 99678	2	24
37	. 08049	29	. 4241	446	. 08075	29	. 3838	448	. 00326	2	. 99676	3	23
38	. 08078	29	. 3795	443	. 08104	30	. 3390	444	. 00328	2	. 99673	2	22
39	. 08107	29	. 3352	439	. 08134	29	. 2946	441	. 00330	3	. 99671	3	21
40	0. 08136	29	12. 2913	437	0. 08163	29	12. 2505	438	1. 00333	2	0. 99668	2	20
41	. 08165	29	. 2476	433	. 08192	29	. 2067	435	. 00335	2	. 99666	2	19
42	. 08194	29	. 2043	431	. 08221	30	. 1632	431	. 00337	3	. 99664	3	18
43	. 08223	29	. 1612	427	. 08251	29	. 1201	429	. 00340	2	. 99661	2	17
44	. 08252	29	. 1185	424	. 08280	29	. 0772	426	. 00342	3	. 99659	2	16
45	0. 08281	29	12. 0761	421	0. 08309	30	12. 0346	423	1. 00345	2	0. 99657	3	15
46	. 08310	29	12. 0340	419	. 08339	29	11. 9923	419	. 00347	3	. 99654	2	14
47	. 08339	29	11. 9921	415	. 08368	29	. 9504	417	. 00350	2	. 99652	3	13
48	. 08368	29	. 9506	413	. 08397	30	. 9087	414	. 00352	2	. 99649	2	12
49	. 08397	29	. 9093	409	. 08427	29	. 8673	411	. 00354	3	. 99647	3	11
50	0. 08426	29	11. 8684	407	0. 08456	29	11. 8262	409	1. 00357	2	0. 99644	2	10
51	. 08455	29	. 8277	404	. 08485	29	. 7853	405	. 00359	3	. 99642	3	9
52	. 08484	29	. 7873	402	. 08514	30	. 7448	403	. 00362	2	. 99639	2	8
53	. 08513	29	. 7471	398	. 08544	29	. 7045	400	. 00364	3	. 99637	2	7
54	. 08542	29	. 7073	396	. 08573	29	. 6645	397	. 00367	2	. 99635	3	6
55	0. 08571	29	11. 6677	393	0. 08602	30	11. 6248	395	1. 00369	3	0. 99632	2	5
56	. 08600	29	. 6284	391	. 08632	29	. 5853	392	. 00372	2	. 99630	3	4
57	. 08629	29	. 5893	388	. 08661	29	. 5461	389	. 00374	3	. 99627	2	3
58	. 08658	29	. 5505	385	. 08690	30	. 5072	387	. 00377	2	. 99625	3	2
59	. 08687	29	. 5120	383	. 08720	29	. 4685	384	. 00379	3	. 99622	3	1
60	0. 08716		11. 4737		0. 08749		11. 4301		1. 00382		0. 99619		0
↑ 94°→	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′ ←85°	↑

5°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	←174° ↓
0	0.08716	29	11.4737	380	0.08749	29	11.4301	382	1.00382	3	0.99619	2	60
1	.08745	29	.4357	378	.08778	29	.3919	379	.00385	2	.99617	3	59
2	.08774	29	.3979	375	.08807	30	.3540	377	.00387	3	.99614	2	58
3	.08803	28	.3604	373	.08837	29	.3163	374	.00390	2	.99612	3	57
4	.08831	29	.3231	370	.08866	29	.2789	372	.00392	3	.99609	2	56
5	0.08860	29	11.2861	368	0.08895	30	11.2417	369	1.00395	2	0.99607	3	55
6	.08889	29	.2493	365	.08925	29	.2048	367	.00397	3	.99604	2	54
7	.08918	29	.2128	363	.08954	29	.1681	365	.00400	3	.99602	3	53
8	.08947	29	.1765	361	.08983	30	.1316	362	.00403	2	.99599	3	52
9	.08976	29	.1404	359	.09013	29	.0954	360	.00405	3	.99596	2	51
10	0.09005	29	11.1045	356	0.09042	29	11.0594	357	1.00408	3	0.99594	3	50
11	.09034	29	.0689	353	.09071	30	11.0237	355	.00411	2	.99591	3	49
12	.09063	29	11.0336	352	.09101	29	10.9882	353	.00413	3	.99588	2	48
13	.09092	29	10.9984	349	.09130	29	.9529	351	.00416	3	.99586	3	47
14	.09121	29	.9635	347	.09159	30	.9178	349	.00419	2	.99583	3	46
15	0.09150	29	10.9288	345	0.09189	29	10.8829	346	1.00421	3	0.99580	2	45
16	.09179	29	.8943	343	.09218	29	.8483	344	.00424	3	.99578	3	44
17	.09208	29	.8600	340	.09247	30	.8139	342	.00427	2	.99575	3	43
18	.09237	29	.8260	339	.09277	29	.7797	340	.00429	3	.99572	3	42
19	.09266	29	.7921	336	.09306	29	.7457	338	.00432	3	.99570	2	41
20	0.09295	29	10.7585	334	0.09335	30	10.7119	336	1.00435	3	0.99567	3	40
21	.09324	29	.7251	332	.09365	29	.6783	333	.00438	2	.99564	3	39
22	.09353	29	.6919	330	.09394	29	.6450	332	.00440	3	.99562	3	38
23	.09382	29	.6589	328	.09423	30	.6118	329	.00443	3	.99559	3	37
24	.09411	29	.6261	326	.09453	29	.5789	327	.00446	3	.99556	3	36
25	0.09440	29	10.5935	324	0.09482	29	10.5462	326	1.00449	2	0.99553	2	35
26	.09469	29	.5611	322	.09511	30	.5136	323	.00451	3	.99551	3	34
27	.09498	29	.5289	320	.09541	29	.4813	322	.00454	3	.99548	3	33
28	.09527	29	.4969	319	.09570	30	.4491	319	.00457	3	.99545	3	32
29	.09556	29	.4650	316	.09600	29	.4172	318	.00460	3	.99542	2	31
30	0.09585	29	10.4334	314	0.09629	29	10.3854	316	1.00463	2	0.99540	3	30
31	.09614	28	.4020	312	.09658	30	.3538	314	.00465	3	.99537	3	29
32	.09642	29	.3708	311	.09688	29	.3224	311	.00468	3	.99534	3	28
33	.09671	29	.3397	308	.09717	29	.2913	311	.00471	3	.99531	3	27
34	.09700	29	.3089	307	.09746	30	.2602	308	.00474	3	.99528	2	26
35	0.09729	29	10.2782	305	0.09776	29	10.2294	306	1.00477	3	0.99526	3	25
36	.09758	29	.2477	303	.09805	29	.1988	305	.00480	2	.99523	3	24
37	.09787	29	.2174	301	.09834	30	.1683	302	.00482	3	.99520	3	23
38	.09816	29	.1873	300	.09864	29	.1381	301	.00485	3	.99517	3	22
39	.09845	29	.1573	298	.09893	30	.1080	300	.00488	3	.99514	3	21
40	0.09874	29	10.1275	296	0.09923	29	10.0780	297	1.00491	3	0.99511	3	20
41	.09903	29	.0979	294	.09952	29	.0483	296	.00494	3	.99508	2	19
42	.09932	29	.0685	293	.09981	30	10.0187	2939	.00497	3	.99506	3	18
43	.09961	29	.0392	291	.10011	29	9.98931	2924	.00500	3	.99503	3	17
44	.09990	29	.0101	2887	.10040	29	.96007	2906	.00503	3	.99500	3	16
45	0.10019	29	9.98123	2875	0.10069	30	9.93101	2890	1.00506	3	0.99497	3	15
46	.10048	29	.95248	2859	.10099	29	.90211	2873	.00509	3	.99494	3	14
47	.10077	29	.92389	2842	.10128	30	.87338	2856	.00512	3	.99491	3	13
48	.10106	29	.89547	2825	.10158	29	.84482	2841	.00515	3	.99488	3	12
49	.10135	29	.86722	2810	.10187	29	.81641	2824	.00518	3	.99485	3	11
50	0.10164	28	9.83912	2793	0.10216	30	9.78817	2808	1.00521	3	0.99482	3	10
51	.10192	29	.81119	2778	.10246	29	.76009	2792	.00524	3	.99479	3	9
52	.10221	29	.78341	2762	.10275	30	.73217	2776	.00527	3	.99476	3	8
53	.10250	29	.75579	2746	.10305	29	.70441	2761	.00530	3	.99473	3	7
54	.10279	29	.72833	2730	.10334	29	.67680	2745	.00533	3	.99470	3	6
55	0.10308	29	9.70103	2716	0.10363	30	9.64935	2730	1.00536	3	0.99467	3	5
56	.10337	29	.67387	2700	.10393	29	.62205	2715	.00539	3	.99464	3	4
57	.10366	29	.64687	2685	.10422	29	.59490	2699	.00542	3	.99461	3	3
58	.10395	29	.62002	2670	.10452	30	.56791	2685	.00545	3	.99458	3	2
59	.10424	29	.59332	2655	.10481	29	.54106	2670	.00548	3	.99455	3	1
60	0.10453		9.56677		0.10510	29	9.51436		1.00551		0.99452		0
↑ 95°→	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ←84°

6°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	←173° Diff. 1′ ↓
0	0. 10453	29	9. 56677	2640	0. 10510	30	9. 51436	2655	1. 00551	3	0. 99452	3 60
1	. 10482	29	. 54037	2626	. 10540	29	. 48781	2640	. 00554	3	. 99449	3 59
2	. 10511	29	. 51411	2611	. 10569	30	. 46141	2626	. 00557	3	. 99446	3 58
3	. 10540	29	. 48800	2597	. 10599	29	. 43515	2611	. 00560	3	. 99443	3 57
4	. 10569	28	. 46203	2583	. 10628	29	. 40904	2597	. 00563	3	. 99440	3 56
5	0. 10597	29	9. 43620	2568	0. 10657	30	9. 38307	2583	1. 00566	3	0. 99437	3 55
6	. 10626	29	. 41052	2555	. 10687	29	. 35724	2569	. 00569	4	. 99434	3 54
7	. 10655	29	. 38497	2540	. 10716	30	. 33155	2556	. 00573	3	. 99431	3 53
8	. 10684	29	. 35957	2527	. 10746	29	. 30599	2541	. 00576	3	. 99428	4 52
9	. 10713	29	. 33430	2513	. 10775	30	. 28058	2528	. 00579	3	. 99424	3 51
10	0. 10742	29	9. 30917	2500	0. 10805	29	9. 25530	2514	1. 00582	3	0. 99421	3 50
11	. 10771	29	. 28417	2486	. 10834	29	. 23016	2500	. 00585	3	. 99418	3 49
12	. 10800	29	. 25931	2472	. 10863	30	. 20516	2488	. 00588	4	. 99415	3 48
13	. 10829	29	. 23459	2460	. 10893	29	. 18028	2474	. 00592	3	. 99412	3 47
14	. 10858	29	. 20999	2446	. 10922	30	. 15554	2461	. 00595	3	. 99409	3 46
15	0. 10887	29	9. 18553	2433	0. 10952	29	9. 13093	2447	1. 00598	3	0. 99406	4 45
16	. 10916	29	. 16120	2421	. 10981	30	. 10646	2435	. 00601	3	. 99402	3 44
17	. 10945	28	. 13699	2407	. 11011	29	. 08211	2422	. 00604	4	. 99399	3 43
18	. 10973	29	. 11292	2395	. 11040	30	. 05789	2410	. 00608	3	. 99396	3 42
19	. 11002	29	. 08897	2382	. 11070	29	. 03379	2396	. 00611	3	. 99393	3 41
20	0. 11031	29	9. 06515	2369	0. 11099	29	9. 00983	2385	1. 00614	3	0. 99390	4 40
21	. 11060	29	. 04146	2358	. 11128	30	8. 98598	2371	. 00617	4	. 99386	3 39
22	. 11089	29	9. 01788	2344	. 11158	29	. 96227	2360	. 00621	3	. 99383	3 38
23	. 11118	29	8. 99444	2333	. 11187	30	. 93867	2347	. 00624	3	. 99380	3 37
24	. 11147	29	. 97111	2320	. 11217	29	. 91520	2335	. 00627	3	. 99377	3 36
25	0. 11176	29	8. 94791	2309	0. 11246	30	8. 89185	2323	1. 00630	4	0. 99374	4 35
26	. 11205	29	. 92482	2296	. 11276	29	. 86862	2311	. 00634	3	. 99370	3 34
27	. 11234	29	. 90186	2285	. 11305	30	. 84551	2299	. 00637	3	. 99367	3 33
28	. 11263	28	. 87901	2273	. 11335	29	. 82252	2288	. 00640	4	. 99364	4 32
29	. 11291	29	. 85628	2261	. 11364	30	. 79964	2275	. 00644	3	. 99360	3 31
30	0. 11320	29	8. 83367	2249	0. 11394	29	8. 77689	2264	1. 00647	3	0. 99357	3 30
31	. 11349	29	. 81118	2238	. 11423	29	. 75425	2253	. 00650	4	. 99354	3 29
32	. 11378	29	. 78880	2227	. 11452	30	. 73172	2241	. 00654	3	. 99351	4 28
33	. 11407	29	. 76653	2215	. 11482	29	. 70931	2230	. 00657	3	. 99347	3 27
34	. 11436	29	. 74438	2204	. 11511	30	. 68701	2219	. 00660	4	. 99344	3 26
35	0. 11465	29	8. 72234	2193	0. 11541	29	8. 66482	2207	1. 00664	3	0. 99341	4 25
36	. 11494	29	. 70041	2182	. 11570	30	. 64275	2197	. 00667	4	. 99337	3 24
37	. 11523	29	. 67859	2171	. 11600	29	. 62078	2185	. 00671	3	. 99334	3 23
38	. 11552	28	. 65688	2160	. 11629	30	. 59893	2175	. 00674	3	. 99331	4 22
39	. 11580	29	. 63528	2149	. 11659	29	. 57718	2163	. 00677	4	. 99327	3 21
40	0. 11609	29	8. 61379	2138	0. 11688	30	8. 55555	2153	1. 00681	3	0. 99324	4 20
41	. 11638	29	. 59241	2128	. 11718	29	. 53402	2143	. 00684	4	. 99320	3 19
42	. 11667	29	. 57113	2117	. 11747	30	. 51259	2131	. 00688	3	. 99317	3 18
43	. 11696	29	. 54996	2107	. 11777	29	. 49128	2121	. 00691	4	. 99314	4 17
44	. 11725	29	. 52889	2096	. 11806	30	. 47007	2111	. 00695	3	. 99310	3 16
45	0. 11754	29	8. 50793	2086	0. 11836	29	8. 44896	2101	1. 00698	3	0. 99307	4 15
46	. 11783	29	. 48707	2075	. 11865	30	. 42795	2090	. 00701	4	. 99303	3 14
47	. 11812	28	. 46632	2066	. 11895	29	. 40705	2080	. 00705	3	. 99300	3 13
48	. 11840	29	. 44566	2055	. 11924	30	. 38625	2070	. 00708	4	. 99297	4 12
49	. 11869	29	. 42511	2045	. 11954	29	. 36555	2059	. 00712	3	. 99293	3 11
50	0. 11898	29	8. 40466	2035	0. 11983	30	8. 34496	2050	1. 00715	4	0. 99290	4 10
51	. 11927	29	. 38431	2026	. 12013	29	. 32446	2040	. 00719	3	. 99286	3 9
52	. 11956	29	. 36405	2015	. 12042	30	. 30406	2030	. 00722	4	. 99283	4 8
53	. 11985	29	. 34390	2006	. 12072	29	. 28376	2021	. 00726	4	. 99279	3 7
54	. 12014	29	. 32384	1996	. 12101	30	. 26355	2010	. 00730	3	. 99276	4 6
55	0. 12043	28	8. 30388	1986	0. 12131	29	8. 24345	2001	1. 00733	4	0. 99272	3 5
56	. 12071	29	. 28402	1977	. 12160	30	. 22344	1992	. 00737	3	. 99269	4 4
57	. 12100	29	. 26425	1968	. 12190	29	. 20352	1982	. 00740	4	. 99265	3 3
58	. 12129	29	. 24457	1957	. 12219	30	. 18370	1972	. 00744	3	. 99262	4 2
59	. 12158	29	. 22500	1949	. 12249	29	. 16398	1963	. 00747	4	. 99258	3 1
60	0. 12187		8. 20551		0. 12278		8. 14435		1. 00751		0. 99255	3 0
↑ 96°→	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′ ↑ ←83°

7°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	←172° Diff. 1′	↓
0	0. 12187	29	8. 20551	1939	0. 12278	30	8. 14435	1954	1. 00751	4	0. 99255	4	60
1	. 12216	29	. 18612	1931	. 12308	30	. 12481	1945	. 00755	3	. 99251	3	59
2	. 12245	29	. 16681	1921	. 12338	29	. 10536	1936	. 00758	4	. 99248	4	58
3	. 12274	28	. 14760	1911	. 12367	30	. 08600	1926	. 00762	3	. 99244	4	57
4	. 12302	29	. 12849	1903	. 12397	29	. 06674	1918	. 00765	4	. 99240	3	56
5	0. 12331	29	8. 10946	1894	0. 12426	30	8. 04756	1908	1. 00769	4	0. 99237	4	55
6	. 12360	29	. 09052	1885	. 12456	29	. 02848	1900	. 00773	3	. 99233	3	54
7	. 12389	29	. 07167	1876	. 12485	30	8. 00948	1890	. 00776	4	. 99230	4	53
8	. 12418	29	. 05291	1868	. 12515	29	7. 99058	1882	. 00780	4	. 99226	4	52
9	. 12447	29	. 03423	1858	. 12544	30	. 97176	1874	. 00784	3	. 99222	3	51
10	0. 12476	28	8. 01565	1851	0. 12574	29	7. 95302	1864	1. 00787	4	0. 99219	4	50
11	. 12504	29	7. 99714	1841	. 12603	30	. 93438	1856	. 00791	4	. 99215	4	49
12	. 12533	29	. 97873	1833	. 12633	29	. 91582	1848	. 00795	4	. 99211	3	48
13	. 12562	29	. 96040	1824	. 12662	30	. 89734	1839	. 00799	3	. 99208	4	47
14	. 12591	29	. 94216	1817	. 12692	30	. 87895	1831	. 00802	4	. 99204	4	46
15	0. 12620	29	7. 92399	1807	0. 12722	29	7. 86064	1822	1. 00806	4	0. 99200	3	45
16	. 12649	29	. 90592	1800	. 12751	30	. 84242	1814	. 00810	3	. 99197	4	44
17	. 12678	28	. 88792	1791	. 12781	29	. 82428	1806	. 00813	4	. 99193	4	43
18	. 12706	29	. 87001	1783	. 12810	30	. 80622	1797	. 00817	4	. 99189	3	42
19	. 12735	29	. 85218	1775	. 12840	29	. 78825	1790	. 00821	4	. 99186	4	41
20	0. 12764	29	7. 83443	1766	0. 12869	30	7. 77035	1781	1. 00825	3	0. 99182	4	40
21	. 12793	29	. 81677	1759	. 12899	30	. 75254	1774	. 00828	4	. 99178	3	39
22	. 12822	29	. 79918	1751	. 12929	29	. 73480	1765	. 00832	4	. 99175	4	38
23	. 12851	29	. 78167	1743	. 12958	30	. 71715	1758	. 00836	4	. 99171	4	37
24	. 12880	28	. 76424	1735	. 12988	29	. 69957	1749	. 00840	4	. 99167	4	36
25	0. 12908	29	7. 74689	1727	0. 13017	30	7. 68208	1742	1. 00844	4	0. 99163	3	35
26	. 12937	29	. 72962	1720	. 13047	29	. 66466	1734	. 00848	3	. 99160	4	34
27	. 12966	29	. 71242	1712	. 13076	30	. 64732	1727	. 00851	4	. 99156	4	33
28	. 12995	29	. 69530	1704	. 13106	30	. 63005	1718	. 00855	4	. 99152	4	32
29	. 13024	29	. 67826	1696	. 13136	29	. 61287	1712	. 00859	4	. 99148	4	31
30	0. 13053	28	7. 66130	1689	0. 13165	30	7. 59575	1703	1. 00863	4	0. 99144	3	30
31	. 13081	29	. 64441	1682	. 13195	29	. 57872	1696	. 00867	4	. 99141	4	29
32	. 13110	29	. 62759	1674	. 13224	30	. 56176	1689	. 00871	4	. 99137	4	28
33	. 13139	29	. 61085	1667	. 13254	30	. 54487	1681	. 00875	3	. 99133	4	27
34	. 13168	29	. 59418	1659	. 13284	29	. 52806	1674	. 00878	4	. 99129	4	26
35	0. 13197	29	7. 57759	1652	0. 13313	30	7. 51132	1667	1. 00882	4	0. 99125	3	25
36	. 13226	28	. 56107	1645	. 13343	29	. 49465	1659	. 00886	4	. 99122	4	24
37	. 13254	29	. 54462	1637	. 13372	30	. 47806	1652	. 00890	4	. 99118	4	23
38	. 13283	29	. 52825	1631	. 13402	30	. 46154	1645	. 00894	4	. 99114	4	22
39	. 13312	29	. 51194	1623	. 13432	29	. 44509	1638	. 00898	4	. 99110	4	21
40	0. 13341	29	7. 49571	1616	0. 13461	30	7. 42871	1631	1. 00902	4	0. 99106	4	20
41	. 13370	29	. 47955	1609	. 13491	30	. 41240	1624	. 00906	4	. 99102	4	19
42	. 13399	28	. 46346	1603	. 13521	29	. 39616	1617	. 00910	4	. 99098	4	18
43	. 13427	29	. 44743	1595	. 13550	30	. 37999	1610	. 00914	4	. 99094	3	17
44	. 13456	29	. 43148	1588	. 13580	29	. 36389	1603	. 00918	4	. 99091	4	16
45	0. 13485	29	7. 41560	1582	0. 13609	30	7. 34786	1596	1. 00922	4	0. 99087	4	15
46	. 13514	29	. 39978	1575	. 13639	30	. 33190	1590	. 00926	4	. 99083	4	14
47	. 13543	29	. 38403	1568	. 13669	29	. 31600	1582	. 00930	4	. 99079	4	13
48	. 13572	29	. 36835	1561	. 13698	30	. 30018	1576	. 00934	4	. 99075	4	12
49	. 13600	28	. 35274	1555	. 13728	30	. 28442	1569	. 00938	4	. 99071	4	11
50	0. 13629	29	7. 33719	1548	0. 13758	29	7. 26873	1563	1. 00942	4	0. 99067	4	10
51	. 13658	29	. 32171	1541	. 13787	30	. 25310	1556	. 00946	4	. 99063	4	9
52	. 13687	29	. 30630	1535	. 13817	29	. 23754	1550	. 00950	4	. 99059	4	8
53	. 13716	29	. 29095	1529	. 13846	30	. 22204	1543	. 00954	4	. 99055	4	7
54	. 13744	28	. 27566	1522	. 13876	30	. 20661	1536	. 00958	4	. 99051	4	6
55	0. 13773	29	7. 26044	1515	0. 13906	29	7. 19125	1531	1. 00962	4	0. 99047	4	5
56	. 13802	29	. 24529	1510	. 13935	30	. 17594	1523	. 00966	4	. 99043	4	4
57	. 13831	29	. 23019	1502	. 13965	30	. 16071	1518	. 00970	5	. 99039	4	3
58	. 13860	29	. 21517	1497	. 13995	29	. 14553	1511	. 00975	4	. 99035	4	2
59	. 13889	29	. 20020	1490	. 14024	30	. 13042	1505	. 00979	4	. 99031	4	1
60	0. 13917	28	7. 18530		0. 14054		7. 11537		1. 00983		0. 99027		0
↑ 97°→	cos	Diff. 1′	sec	Diff. 1′	cot.	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′ ←82°	↑

8°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	←171° Diff. 1′	↓
0	0. 13917	29	7. 18530	1484	0. 14054	30	7. 11537	1499	1. 00983	4	0. 99027	4	60
1	. 13946	29	. 17046	1478	. 14084	29	. 10038	1492	. 00987	4	. 99023	4	59
2	. 13975	29	. 15568	1472	. 14113	30	. 08546	1487	. 00991	4	. 99019	4	58
3	. 14004	29	. 14096	1466	. 14143	30	. 07059	1480	. 00995	4	. 99015	4	57
4	. 14033	28	. 12630	1459	. 14173	29	. 05579	1474	. 00999	5	. 99011	5	56
5	0. 14061	29	7. 11171	1454	0. 14202	30	7. 04105	1468	1. 01004	4	0. 99006	4	55
6	. 14090	29	. 09717	1448	. 14232	30	. 02637	1463	. 01008	4	. 99002	4	54
7	. 14119	29	. 08269	1441	. 14262	29	7. 01174	1456	. 01012	4	. 98998	4	53
8	. 14148	29	. 06828	1436	. 14291	30	6. 99718	1450	. 01016	4	. 98994	4	52
9	. 14177	28	. 05392	1430	. 14321	30	. 98268	1445	. 01020	4	. 98990	4	51
10	0. 14205	29	7. 03962	1424	0. 14351	30	6. 96823	1438	1. 01024	5	0. 98986	4	50
11	. 14234	29	. 02538	1418	. 14381	29	. 95385	1433	. 01029	4	. 98982	4	49
12	. 14263	29	7. 01120	1412	. 14410	30	. 93952	1427	. 01033	4	. 98978	4	48
13	. 14292	28	6. 99708	1407	. 14440	30	. 92525	1421	. 01037	4	. 98973	5	47
14	. 14320	29	. 98301	1401	. 14470	29	. 91104	1416	. 01041	5	. 98969	4	46
15	0. 14349	29	6. 96900	1395	0. 14499	30	6. 89688	1410	1. 01046	4	0. 98965	4	45
16	. 14378	29	. 95505	1390	. 14529	30	. 88278	1404	. 01050	4	. 98961	4	44
17	. 14407	29	. 94115	1384	. 14559	29	. 86874	1399	. 01054	5	. 98957	4	43
18	. 14436	28	. 92731	1379	. 14588	30	. 85475	1393	. 01059	4	. 98953	5	42
19	. 14464	29	. 91352	1373	. 14618	30	. 84082	1388	. 01063	4	. 98948	4	41
20	0. 14493	29	6. 89979	1367	0. 14648	30	6. 82694	1382	1. 01067	4	0. 98944	4	40
21	. 14522	29	. 88612	1362	. 14678	29	. 81312	1376	. 01071	5	. 98940	4	39
22	. 14551	29	. 87250	1357	. 14707	30	. 79936	1372	. 01076	4	. 98936	5	38
23	. 14580	28	. 85893	1351	. 14737	30	. 78564	1365	. 01080	4	. 98931	4	37
24	. 14608	29	. 84542	1346	. 14767	29	. 77199	1361	. 01084	5	. 98927	4	36
25	0. 14637	29	6. 83196	1340	0. 14796	30	6. 75838	1355	1. 01089	4	0. 98923	4	35
26	. 14666	29	. 81856	1335	. 14826	30	. 74483	1350	. 01093	4	. 98919	5	34
27	. 14695	28	. 80521	1330	. 14856	30	. 73133	1344	. 01097	5	. 98914	4	33
28	. 14723	29	. 79191	1325	. 14886	29	. 71789	1339	. 01102	4	. 98910	4	32
29	. 14752	29	. 77866	1319	. 14915	30	. 70450	1334	. 01106	5	. 98906	4	31
30	0. 14781	29	6. 76547	1314	0. 14945	30	6. 69116	1329	1. 01111	4	0. 98902	5	30
31	. 14810	28	. 75233	1309	. 14975	30	. 67787	1324	. 01115	4	. 98897	4	29
32	. 14838	29	. 73924	1304	. 15005	29	. 66463	1319	. 01119	5	. 98893	4	28
33	. 14867	29	. 72620	1299	. 15034	30	. 65144	1313	. 01124	4	. 98889	5	27
34	. 14896	29	. 71321	1294	. 15064	30	. 63831	1308	. 01128	5	. 98884	4	26
35	0. 14925	29	6. 70027	1289	0. 15094	30	6. 62523	1304	1. 01133	4	0. 98880	4	25
36	. 14954	28	. 68738	1284	. 15124	29	. 61219	1298	. 01137	5	. 98876	5	24
37	. 14982	29	. 67454	1278	. 15153	30	. 59921	1294	. 01142	4	. 98871	4	23
38	. 15011	29	. 66176	1274	. 15183	30	. 58627	1288	. 01146	5	. 98867	4	22
39	. 15040	29	. 64902	1269	. 15213	30	. 57339	1284	. 01151	4	. 98863	5	21
40	0. 15069	28	6. 63633	1264	0. 15243	29	6. 56055	1278	1. 01155	5	0. 98858	4	20
41	. 15097	29	. 62369	1259	. 15272	30	. 54777	1274	. 01160	4	. 98854	5	19
42	. 15126	29	. 61110	1255	. 15302	30	. 53503	1269	. 01164	5	. 98849	4	18
43	. 15155	29	. 59855	1249	. 15332	30	. 52234	1264	. 01169	4	. 98845	4	17
44	. 15184	28	. 58606	1245	. 15362	29	. 50970	1260	. 01173	5	. 98841	5	16
45	0. 15212	29	6. 57361	1240	0. 15391	30	6. 49710	1254	1. 01178	4	0. 98836	4	15
46	. 15241	29	. 56121	1235	. 15421	30	. 48456	1250	. 01182	5	. 98832	5	14
47	. 15270	29	. 54886	1231	. 15451	30	. 47206	1245	. 01187	4	. 98827	4	13
48	. 15299	28	. 53655	1226	. 15481	30	. 45961	1241	. 01191	5	. 98823	5	12
49	. 15327	29	. 52429	1221	. 15511	29	. 44720	1236	. 01196	4	. 98818	4	11
50	0. 15356	29	6. 51208	1217	0. 15540	30	6. 43484	1231	1. 01200	5	0. 98814	5	10
51	. 15385	29	. 49991	1212	. 15570	30	. 42253	1227	. 01205	4	. 98809	4	9
52	. 15414	28	. 48779	1207	. 15600	30	. 41026	1222	. 01209	5	. 98805	5	8
53	. 15442	29	. 47572	1203	. 15630	30	. 39804	1217	. 01214	5	. 98800	4	7
54	. 15471	29	. 46369	1198	. 15660	29	. 38587	1213	. 01219	4	. 98796	5	6
55	0. 15500	29	6. 45171	1194	0. 15689	30	6. 37374	1209	1. 01223	5	0. 98791	4	5
56	. 15529	28	. 43977	1190	. 15719	30	. 36165	1204	. 01228	5	. 98787	5	4
57	. 15557	29	. 42787	1185	. 15749	30	. 34961	1200	. 01233	4	. 98782	4	3
58	. 15586	29	. 41602	1180	. 15779	30	. 33761	1195	. 01237	5	. 98778	5	2
59	. 15615	29	. 40422	1177	. 15809	29	. 32566	1191	. 01242	5	. 98773	4	1
60	0. 15643	28	6. 39245		0. 15838		6. 31375		1. 01247		0. 98769		0
↑ 98°→	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′ ←81°	↑

9°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	←170° ↓
′													′
0	0. 15643	29	6. 39245	1172	0. 15838	30	6. 31375	1186	1. 01247	4	0. 98769	5	60
1	. 15672	29	. 38073	1167	. 15868	30	. 30189	1182	. 01251	5	. 98764	4	59
2	. 15701	29	. 36906	1163	. 15898	30	. 29007	1178	. 01256	5	. 98760	5	58
3	. 15730	28	. 35743	1159	. 15928	30	. 27829	1174	. 01261	4	. 98755	4	57
4	. 15758	29	. 34584	1155	. 15958	30	. 26655	1169	. 01265	5	. 98751	5	56
5	0. 15787	29	6. 33429	1150	0. 15988	29	6. 25486	1165	1. 01270	5	0. 98746	5	55
6	. 15816	29	. 32279	1146	. 16017	30	. 24321	1161	. 01275	4	. 98741	4	54
7	. 15845	28	. 31133	1142	. 16047	30	. 23160	1157	. 01279	5	. 98737	5	53
8	. 15873	29	. 29991	1138	. 16077	30	. 22003	1152	. 01284	5	. 98732	4	52
9	. 15902	29	. 28853	1134	. 16107	30	. 20851	1148	. 01289	5	. 98728	5	51
10	0. 15931	28	6. 27719	1129	0. 16137	30	6. 19703	1144	1. 01294	4	0. 98723	5	50
11	. 15959	29	. 26590	1126	. 16167	29	. 18559	1140	. 01298	5	. 98718	4	49
12	. 15988	29	. 25464	1121	. 16196	30	. 17419	1136	. 01303	5	. 98714	5	48
13	. 16017	29	. 24343	1117	. 16226	30	. 16283	1132	. 01308	5	. 98709	5	47
14	. 16046	28	. 23226	1113	. 16256	30	. 15151	1128	. 01313	4	. 98704	4	46
15	0. 16074	29	6. 22113	1109	0. 16286	30	6. 14023	1124	1. 01317	5	0. 98700	5	45
16	. 16103	29	. 21004	1106	. 16316	30	. 12899	1120	. 01322	5	. 98695	5	44
17	. 16132	28	. 19898	1101	. 16346	30	. 11779	1115	. 01327	5	. 98690	4	43
18	. 16160	29	. 18797	1097	. 16376	29	. 10664	1112	. 01332	5	. 98686	5	42
19	. 16189	29	. 17700	1093	. 16405	30	. 09552	1108	. 01337	5	. 98681	5	41
20	0. 16218	28	6. 16607	1090	0. 16435	30	6. 08444	1104	1. 01342	4	0. 98676	5	40
21	. 16246	29	. 15517	1085	. 16465	30	. 07340	1100	. 01346	5	. 98671	4	39
22	. 16275	29	. 14432	1082	. 16495	30	. 06240	1097	. 01351	5	. 98667	5	38
23	. 16304	29	. 13350	1077	. 16525	30	. 05143	1092	. 01356	5	. 98662	5	37
24	. 16333	28	. 12273	1074	. 16555	30	. 04051	1089	. 01361	5	. 98657	5	36
25	0. 16361	29	6. 11199	1070	0. 16585	30	6. 02962	1084	1. 01366	5	0. 98652	4	35
26	. 16390	29	. 10129	1067	. 16615	30	. 01878	1081	. 01371	5	. 98648	5	34
27	. 16419	28	. 09062	1062	. 16645	29	6. 00797	1077	. 01376	5	. 98643	5	33
28	. 16447	29	. 08000	1059	. 16674	30	5. 99720	1074	. 01381	5	. 98638	5	32
29	. 16476	29	. 06941	1055	. 16704	30	. 98646	1070	. 01386	5	. 98633	4	31
30	0. 16505	28	6. 05886	1052	0. 16734	30	5. 97576	1066	1. 01391	4	0. 98629	5	30
31	. 16533	29	. 04834	1047	. 16764	30	. 96510	1062	. 01395	5	. 98624	5	29
32	. 16562	29	. 03787	1044	. 16794	30	. 95448	1058	. 01400	5	. 98619	5	28
33	. 16591	29	. 02743	1041	. 16824	30	. 94390	1055	. 01405	5	. 98614	5	27
34	. 16620	28	. 01702	1036	. 16854	30	. 93335	1052	. 01410	5	. 98609	5	26
35	0. 16648	29	6. 00666	1033	0. 16884	30	5. 92283	1047	1. 01415	5	0. 98604	4	25
36	. 16677	29	5. 99633	1030	. 16914	30	. 91236	1045	. 01420	5	. 98600	5	24
37	. 16706	28	. 98603	1026	. 16944	30	. 90191	1049	. 01425	5	. 98595	5	23
38	. 16734	29	. 97577	1022	. 16974	30	. 89151	1037	. 01430	5	. 98590	5	22
39	. 16763	29	. 96555	1019	. 17004	29	. 88114	1034	. 01435	5	. 98585	5	21
40	0. 16792	28	5. 95536	1015	0. 17033	30	5. 87080	1029	1. 01440	5	0. 98580	5	20
41	. 16820	29	. 94521	1012	. 17063	30	. 86051	1027	. 01445	5	. 98575	5	19
42	. 16849	29	. 93509	1008	. 17093	30	. 85024	1023	. 01450	5	. 98570	5	18
43	. 16878	28	. 92501	1005	. 17123	30	. 84001	1019	. 01455	5	. 98565	4	17
44	. 16906	29	. 91496	1001	. 17153	30	. 82982	1016	. 01460	6	. 98561	5	16
45	0. 16935	29	5. 90495	998	0. 17183	30	5. 81966	1013	1. 01466	5	0. 98556	5	15
46	. 16964	28	. 89497	995	. 17213	30	. 80953	1009	. 01471	5	. 98551	5	14
47	. 16992	29	. 88502	991	. 17243	30	. 79944	1006	. 01476	5	. 98546	5	13
48	. 17021	29	. 87511	987	. 17273	30	. 78938	1002	. 01481	5	. 98541	5	12
49	. 17050	28	. 86524	985	. 17303	30	. 77936	999	. 01486	5	. 98536	5	11
50	0. 17078	29	5. 85539	981	0. 17333	30	5. 76937	996	1. 01491	5	0. 98531	5	10
51	. 17107	29	. 84558	977	. 17363	30	. 75941	992	. 01496	5	. 98526	5	9
52	. 17136	28	. 83581	975	. 17393	30	. 74949	989	. 01501	5	. 98521	5	8
53	. 17164	29	. 82606	971	. 17423	30	. 73960	986	. 01506	6	. 98516	5	7
54	. 17193	29	. 81635	968	. 17453	30	. 72974	982	. 01512	5	. 98511	5	6
55	0. 17222	28	5. 80667	964	0. 17483	30	5. 71992	979	1. 01517	5	0. 98506	5	5
56	. 17250	29	. 79703	961	. 17513	30	. 71013	976	. 01522	5	. 98501	5	4
57	. 17279	29	. 78742	959	. 17543	30	. 70037	973	. 01527	5	. 98496	5	3
58	. 17308	28	. 77783	954	. 17573	30	. 69064	970	. 01532	5	. 98491	5	2
59	. 17336	29	. 76829	952	. 17603	30	. 68094	966	. 01537	6	. 98486	5	1
60	0. 17365		5. 75877		0. 17633		5. 67128		1. 01543		0. 98481		0
↑ 99°→	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ←80°

10°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	←169° ↓
0	0. 17365	28	5. 75877	948	0. 17633	30	5. 67128	963	1. 01543	5	0. 98481	5	60
1	. 17393	29	. 74929	946	. 17663	30	. 66165	960	. 01548	5	. 98476	5	59
2	. 17422	29	. 73983	942	. 17693	30	. 65205	957	. 01553	5	. 98471	5	58
3	. 17451	28	. 73041	939	. 17723	30	. 64248	953	. 01558	6	. 98466	5	57
4	. 17479	29	. 72102	936	. 17753	30	. 63295	951	. 01564	5	. 98461	6	56
5	0. 17508	29	5. 71166	932	0. 17783	30	5. 62344	947	1. 01569	5	0. 98455	5	55
6	. 17537	28	. 70234	930	. 17813	30	. 61397	945	. 01574	5	. 98450	5	54
7	. 17565	29	. 69304	927	. 17843	30	. 60452	941	. 01579	6	. 98445	5	53
8	. 17594	29	. 68377	923	. 17873	30	. 59511	938	. 01585	5	. 98440	5	52
9	. 17623	28	. 67454	921	. 17903	30	. 58573	935	. 01590	5	. 98435	5	51
10	0. 17651	29	5. 66533	917	0. 17933	30	5. 57638	932	1. 01595	6	0. 98430	5	50
11	. 17680	28	. 65616	915	. 17963	30	. 56706	929	. 01601	5	. 98425	5	49
12	. 17708	29	. 64701	911	. 17993	30	. 55777	926	. 01606	5	. 98420	6	48
13	. 17737	29	. 63790	909	. 18023	30	. 54851	924	. 01611	5	. 98414	5	47
14	. 17766	28	. 62881	905	. 18053	30	. 53927	920	. 01616	6	. 98409	5	46
15	0. 17794	29	5. 61976	903	0. 18083	30	5. 53007	917	1. 01622	5	0. 98404	5	45
16	. 17823	29	. 61073	899	. 18113	30	. 52090	914	. 01627	6	. 98399	5	44
17	. 17852	28	. 60174	897	. 18143	30	. 51176	912	. 01633	5	. 98394	5	43
18	. 17880	29	. 59277	894	. 18173	30	. 50264	908	. 01638	5	. 98389	6	42
19	. 17909	28	. 58383	890	. 18203	30	. 49356	905	. 01643	6	. 98383	5	41
20	0. 17937	29	5. 57493	888	0. 18233	30	5. 48451	903	1. 01649	5	0. 98378	5	40
21	. 17966	29	. 56605	885	. 18263	30	. 47548	900	. 01654	5	. 98373	5	39
22	. 17995	28	. 55720	883	. 18293	30	. 46648	897	. 01659	6	. 98368	6	38
23	. 18023	29	. 54837	879	. 18323	30	. 45751	894	. 01665	5	. 98362	5	37
24	. 18052	29	. 53958	877	. 18353	31	. 44857	891	. 01670	6	. 98357	5	36
25	0. 18081	28	5. 53081	873	0. 18384	30	5. 43966	888	1. 01676	5	0. 98352	5	35
26	. 18109	29	. 52208	871	. 18414	30	. 43078	886	. 01681	6	. 98347	6	34
27	. 18138	28	. 51337	869	. 18444	30	. 42192	883	. 01687	5	. 98341	5	33
28	. 18166	29	. 50468	865	. 18474	30	. 41309	880	. 01692	6	. 98336	5	32
29	. 18195	29	. 49603	863	. 18504	30	. 40429	877	. 01698	5	. 98331	6	31
30	0. 18224	28	5. 48740	859	0. 18534	30	5. 39552	875	1. 01703	6	0. 98325	5	30
31	. 18252	29	. 47881	858	. 18564	30	. 38677	872	. 01709	5	. 98320	5	29
32	. 18281	28	. 47023	854	. 18594	30	. 37805	869	. 01714	6	. 98315	5	28
33	. 18300	29	. 46169	852	. 18624	30	. 36936	866	. 01720	5	. 98310	6	27
34	. 18338	29	. 45317	849	. 18654	30	. 36070	864	. 01725	6	. 98304	5	26
35	0. 18367	28	5. 44468	846	0. 18684	30	5. 35206	861	1. 01731	5	0. 98299	5	25
36	. 18395	29	. 43622	844	. 18714	31	. 34345	858	. 01736	6	. 98294	6	24
37	. 18424	28	. 42778	841	. 18745	30	. 33487	856	. 01742	5	. 98288	5	23
38	. 18452	29	. 41937	838	. 18775	30	. 32631	853	. 01747	6	. 98283	6	22
39	. 18481	28	. 41099	836	. 18805	30	. 31778	850	. 01753	5	. 98277	5	21
40	0. 18509	29	5. 40263	838	0. 18835	30	5. 30928	848	1. 01758	6	0. 98272	5	20
41	. 18538	29	. 39430	830	. 18865	30	. 30080	845	. 01764	5	. 98267	6	19
42	. 18567	28	. 38600	828	. 18895	30	. 29235	842	. 01769	6	. 98261	5	18
43	. 18595	29	. 37772	825	. 18925	30	. 28393	840	. 01775	6	. 98256	6	17
44	. 18624	28	. 36947	823	. 18955	31	. 27553	838	. 01781	5	. 98250	5	16
45	0. 18652	29	5. 36124	820	0. 18986	30	5. 26715	835	1. 01786	6	0. 98245	5	15
46	. 18681	29	. 35304	818	. 19016	30	. 25880	832	. 01792	6	. 98240	6	14
47	. 18710	29	. 34486	815	. 19046	30	. 25048	830	. 01798	5	. 98234	5	13
48	. 18738	28	. 33671	812	. 19076	30	. 24218	827	. 01803	6	. 98229	6	12
49	. 18767	28	. 32859	810	. 19106	30	. 23391	825	. 01809	6	. 98223	5	11
50	0. 18795	29	5. 32049	808	0. 19136	30	5. 22566	822	1. 01815	5	0. 98218	6	10
51	. 18824	28	. 31241	805	. 19166	31	. 21744	819	. 01820	6	. 98212	5	9
52	. 18852	29	. 30436	802	. 19197	30	. 20925	818	. 01826	6	. 98207	6	8
53	. 18881	29	. 29634	801	. 19227	30	. 20107	814	. 01832	5	. 98201	5	7
54	. 18910	28	. 28833	797	. 19257	30	. 19293	813	. 01837	6	. 98196	6	6
55	0. 18938	29	5. 28036	795	0. 19287	30	5. 18480	809	1. 01843	6	0. 98190	5	5
56	. 18967	28	. 27241	793	. 19317	30	. 17671	808	. 01849	5	. 98185	6	4
57	. 18995	29	. 26448	790	. 19347	31	. 16863	805	. 01854	6	. 98179	5	3
58	. 19024	29	. 25658	788	. 19378	30	. 16058	802	. 01860	6	. 98174	6	2
59	. 19052	28	. 24870	786	. 19408	30	. 15256	801	. 01866	6	. 98168	6	1
60	0. 19081	29	5. 24084		0. 19438		5. 14455		1. 01872		0. 98163	5	0
↑ 100°→	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ←79°

11° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 168° ↓
0	0. 19081	28	5. 24084	783	0. 19438	30	5. 14455	797	1. 01872	5	0. 98163	6	60
1	. 19109	29	. 23301	780	. 19468	30	. 13658	796	. 01877	6	. 98157	5	59
2	. 19138	29	. 22521	779	. 19498	31	. 12862	793	. 01883	6	. 98152	6	58
3	. 19167	28	. 21742	776	. 19529	30	. 12069	790	. 01889	6	. 98146	6	57
4	. 19195	29	. 20966	773	. 19559	30	. 11279	789	. 01895	6	. 98140	5	56
5	0. 19224	28	5. 20193	772	0. 19589	30	5. 10490	786	1. 01901	5	0. 98135	6	55
6	. 19252	29	. 19421	769	. 19619	30	. 09704	783	. 01906	6	. 98129	5	54
7	. 19281	28	. 18652	766	. 19649	31	. 08921	782	. 01912	6	. 98124	6	53
8	. 19309	29	. 17886	765	. 19680	30	. 08139	779	. 01918	6	. 98118	6	52
9	. 19338	28	. 17121	762	. 19710	30	. 07360	776	. 01924	6	. 98112	5	51
10	0. 19366	29	5. 16359	760	0. 19740	30	5. 06584	775	1. 01930	6	0. 98107	6	50
11	. 19395	28	. 15599	757	. 19770	31	. 05809	772	. 01936	5	. 98101	5	49
12	. 19423	29	. 14842	755	. 19801	30	. 05037	770	. 01941	6	. 98096	6	48
13	. 19452	29	. 14087	753	. 19831	30	. 04267	768	. 01947	6	. 98090	6	47
14	. 19481	28	. 13334	751	. 19861	30	. 03499	765	. 01953	6	. 98084	5	46
15	0. 19509	29	5. 12583	748	0. 19891	30	5. 02734	763	1. 01959	6	0. 98079	6	45
16	. 19538	28	. 11835	747	. 19921	31	. 01971	761	. 01965	6	. 98073	6	44
17	. 19566	29	. 11088	744	. 19952	30	. 01210	759	. 01971	6	. 98067	6	43
18	. 19595	28	. 10344	742	. 19982	30	5. 00451	756	. 01977	6	. 98061	5	42
19	. 19623	29	. 09602	739	. 20012	30	4. 99695	755	. 01983	6	. 98056	6	41
20	0. 19652	28	5. 08863	738	0. 20042	31	4. 98940	752	1. 01989	6	0. 98050	6	40
21	. 19680	29	. 08125	735	. 20073	30	. 98188	750	. 01995	6	. 98044	5	39
22	. 19709	28	. 07390	733	. 20103	30	. 97438	748	. 02001	6	. 98039	6	38
23	. 19737	29	. 06657	731	. 20133	31	. 96690	745	. 02007	6	. 98033	6	37
24	. 19766	28	. 05926	729	. 20164	30	. 95945	744	. 02013	6	. 98027	6	36
25	0. 19794	29	5. 05197	726	0. 20194	30	4. 95201	741	1. 02019	6	0. 98021	5	35
26	. 19823	28	. 04471	725	. 20224	30	. 94460	739	. 02025	6	. 98016	6	34
27	. 19851	29	. 03746	722	. 20254	31	. 93721	737	. 02031	6	. 98010	6	33
28	. 19880	29	. 03024	721	. 20285	30	. 92984	735	. 02037	6	. 98004	6	32
29	. 19908	28	. 02303	718	. 20315	30	. 92249	733	. 02043	6	. 97998	6	31
30	0. 19937	28	5. 01585	716	0. 20345	31	4. 91516	731	1. 02049	6	0. 97992	5	30
31	. 19965	29	. 00869	714	. 20376	30	. 90785	729	. 02055	6	. 97987	6	29
32	. 19994	28	5. 00155	712	. 20406	30	. 90056	726	. 02061	6	. 97981	6	28
33	. 20022	29	4. 99443	710	. 20436	30	. 89330	725	. 02067	6	. 97975	6	27
34	. 20051	28	. 98733	708	. 20466	31	. 88605	723	. 02073	6	. 97969	6	26
35	0. 20079	29	4. 98025	705	0. 20497	30	4. 87882	720	1. 02079	6	0. 97963	5	25
36	. 20108	28	. 97320	704	. 20527	30	. 87162	718	. 02085	6	. 97958	6	24
37	. 20136	29	. 96616	702	. 20557	31	. 86444	717	. 02091	6	. 97952	6	23
38	. 20165	28	. 95914	699	. 20588	30	. 85727	714	. 02097	6	. 97946	6	22
39	. 20193	29	. 95215	698	. 20618	30	. 85013	713	. 02103	7	. 97940	6	21
40	0. 20222	28	4. 94517	696	0. 20648	31	4. 84300	710	1. 02110	6	0. 97934	6	20
41	. 20250	29	. 93821	693	. 20679	30	. 83590	708	. 02116	6	. 97928	6	19
42	. 20279	28	. 93128	692	. 20709	30	. 82882	707	. 02122	6	. 97922	6	18
43	. 20307	29	. 92436	690	. 20739	31	. 82175	704	. 02128	6	. 97916	6	17
44	. 20336	28	. 91746	688	. 20770	30	. 81471	702	. 02134	6	. 97910	5	16
45	0. 20364	29	4. 91058	685	0. 20800	30	4. 80769	701	1. 02140	6	0. 97905	6	15
46	. 20393	28	. 90373	684	. 20830	31	. 80068	698	. 02146	7	. 97899	6	14
47	. 20421	29	. 89689	682	. 20861	30	. 79370	697	. 02153	6	. 97893	6	13
48	. 20450	28	. 89007	680	. 20891	30	. 78673	695	. 02159	6	. 97887	6	12
49	. 20478	29	. 88327	678	. 20921	31	. 77978	692	. 02165	6	. 97881	6	11
50	0. 20507	28	4. 87649	676	0. 20952	30	4. 77286	691	1. 02171	7	0. 97875	6	10
51	. 20535	28	. 86973	674	. 20982	31	. 76595	689	. 02178	6	. 97869	6	9
52	. 20563	29	. 86299	672	. 21013	30	. 75906	687	. 02184	6	. 97863	6	8
53	. 20592	28	. 85627	671	. 21043	30	. 75219	685	. 02190	6	. 97857	6	7
54	. 20620	29	. 84956	668	. 21073	31	. 74534	683	. 02196	7	. 97851	6	6
55	0. 20649	28	4. 84288	667	0. 21104	30	4. 73851	681	1. 02203	6	0. 97845	6	5
56	. 20677	29	. 83621	665	. 21134	30	. 73170	680	. 02209	6	. 97839	6	4
57	. 20706	28	. 82956	662	. 21164	31	. 72490	677	. 02215	6	. 97833	6	3
58	. 20734	29	. 82294	661	. 21195	30	. 71813	676	. 02221	7	. 97827	6	2
59	. 20763	28	. 81633	660	. 21225	31	. 71137	674	. 02228	6	. 97821	6	1
60	0. 20791		4. 80973		0. 21256		4. 70463		1. 02234		0. 97815		0
↑ 101° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ← 78°

12°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	←167° ↓
0	0. 26791	29	4. 80973	657	0. 21256	30	4. 70463	672	1. 02234	6	0. 97815	6	60
1	. 20820	28	. 80316	655	. 21286	30	. 69791	679	. 02240	7	. 97809	6	59
2	. 20848	29	. 79661	654	. 21316	31	. 69121	669	. 02247	6	. 97803	6	58
3	. 20877	28	. 79007	652	. 21347	30	. 68452	666	. 02253	6	. 97797	6	57
4	. 20905	28	. 78355	650	. 21377	31	. 67786	665	. 02259	7	. 97791	7	56
5	0. 20933	29	4. 77705	648	0. 21408	30	4. 67121	663	1. 02266	6	0. 97784	6	55
6	. 20962	28	. 77057	646	. 21438	31	. 66458	661	. 02272	7	. 97778	6	54
7	. 20990	29	. 76411	645	. 21469	30	. 65797	659	. 02279	6	. 97772	6	53
8	. 21019	28	. 75766	643	. 21499	30	. 65138	658	. 02285	6	. 97766	6	52
9	. 21047	29	. 75123	641	. 21529	31	. 64480	655	. 02291	7	. 97760	6	51
10	0. 21076	28	4. 74482	639	0. 21560	30	4. 63825	654	1. 02298	6	0. 97754	6	50
11	. 21104	28	. 73843	638	. 21590	31	. 63171	653	. 02304	7	. 97748	6	49
12	. 21132	29	. 73205	636	. 21621	30	. 62518	650	. 02311	6	. 97742	7	48
13	. 21161	28	. 72569	634	. 21651	31	. 61868	649	. 02317	6	. 97735	6	47
14	. 21189	29	. 71935	632	. 21682	30	. 61219	647	. 02323	7	. 97729	6	46
15	0. 21218	28	4. 71303	630	0. 21712	31	4. 60572	645	1. 02330	6	0. 97723	6	45
16	. 21246	29	. 70673	629	. 21743	30	. 59927	644	. 02336	7	. 97717	6	44
17	. 21275	28	. 70044	627	. 21773	31	. 59283	642	. 02343	6	. 97711	6	43
18	. 21303	28	. 69417	626	. 21804	30	. 58641	640	. 02349	7	. 97705	7	42
19	. 21331	29	. 68701	624	. 21834	30	. 58001	638	. 02356	6	. 97698	6	41
20	0. 21360	28	4. 68167	622	0. 21864	31	4. 57363	637	1. 02362	7	0. 97692	6	40
21	. 21388	29	. 67545	620	. 21895	30	. 56726	635	. 02369	6	. 97686	6	39
22	. 21417	28	. 66925	618	. 21925	31	. 56091	633	. 02375	7	. 97680	7	38
23	. 21445	29	. 66307	617	. 21956	30	. 55458	632	. 02382	6	. 97673	6	37
24	. 21474	28	. 65690	616	. 21986	31	. 54826	630	. 02388	7	. 97667	6	36
25	0. 21502	28	4. 65074	613	0. 22017	30	4. 54196	628	1. 02395	7	0. 97661	6	35
26	. 21530	29	. 64461	612	. 22047	31	. 53568	627	. 02402	6	. 97655	7	34
27	. 21559	28	. 63849	611	. 22078	30	. 52941	625	. 02408	7	. 97648	6	33
28	. 21587	29	. 63238	608	. 22108	31	. 52316	623	. 02415	6	. 97642	6	32
29	. 21616	28	. 62630	607	. 22139	30	. 51693	622	. 02421	7	. 97636	6	31
30	0. 21644	28	4. 62023	606	0. 22169	31	4. 51071	620	1. 02428	7	0. 97630	7	30
31	. 21672	29	. 61417	604	. 22200	31	. 50451	619	. 02435	6	. 97623	6	29
32	. 21701	28	. 60813	602	. 22231	30	. 49832	617	. 02441	7	. 97617	6	28
33	. 21729	29	. 60211	600	. 22261	31	. 49215	615	. 02448	6	. 97611	7	27
34	. 21758	28	. 59611	599	. 22292	30	. 48600	614	. 02454	7	. 97604	6	26
35	0. 21786	28	4. 59012	598	0. 22322	31	4. 47986	612	1. 02461	7	0. 97598	6	25
36	. 21814	29	. 58414	595	. 22353	30	. 47374	610	. 02468	6	. 97592	7	24
37	. 21843	28	. 57819	595	. 22383	31	. 46764	609	. 02474	7	. 97585	6	23
38	. 21871	28	. 57224	592	. 22414	30	. 46155	607	. 02481	7	. 97579	6	22
39	. 21899	29	. 56632	591	. 22444	31	. 45548	606	. 02488	6	. 97573	7	21
40	0. 21928	28	4. 56041	590	0. 22475	30	4. 44942	604	1. 02494	7	0. 97566	6	20
41	. 21956	29	. 55451	588	. 22505	31	. 44338	603	. 02501	7	. 97560	7	19
42	. 21985	28	. 54863	586	. 22536	31	. 43735	601	. 02508	7	. 97553	6	18
43	. 22013	28	. 54277	585	. 22567	30	. 43134	600	. 02515	6	. 97547	6	17
44	. 22041	29	. 53692	583	. 22597	31	. 42534	598	. 02521	7	. 97541	7	16
45	0. 22070	28	4. 53109	582	0. 22628	30	4. 41936	596	1. 02528	7	0. 97534	6	15
46	. 22098	28	. 52527	580	. 22658	31	. 41340	595	. 02535	7	. 97528	7	14
47	. 22126	29	. 51947	579	. 22689	30	. 40745	593	. 02542	6	. 97521	6	13
48	. 22155	28	. 51368	577	. 22719	31	. 40152	592	. 02548	7	. 97515	7	12
49	. 22183	29	. 50791	575	. 22750	31	. 39560	591	. 02555	7	. 97508	6	11
50	0. 22212	28	4. 50216	574	0. 22781	30	4. 38969	588	1. 02562	7	0. 97502	6	10
51	. 22240	28	. 49642	573	. 22811	31	. 38381	588	. 02569	7	. 97496	7	9
52	. 22268	29	. 49069	571	. 22842	30	. 37793	586	. 02576	8	. 97489	6	8
53	. 22297	28	. 48498	570	. 22872	31	. 37207	584	. 02582	7	. 97483	7	7
54	. 22325	28	. 47928	568	. 22903	31	. 36623	583	. 02589	7	. 97476	6	6
55	0. 22353	29	4. 47360	567	0. 22934	30	4. 36040	581	1. 02596	7	0. 97470	7	5
56	. 22382	28	. 46793	565	. 22964	31	. 35459	580	. 02603	7	. 97463	6	4
57	. 22410	28	. 46228	564	. 22995	31	. 34879	579	. 02610	7	. 97457	7	3
58	. 22438	29	. 45664	562	. 23026	30	. 34300	577	. 02617	7	. 97450	6	2
59	. 22467	28	. 45102	561	. 23056	31	. 33723	575	. 02624	6	. 97444	7	1
60	0. 22495		4. 44541		0. 23087		4. 33148		1. 02630		0. 97437		0
↑ 102°→	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ←77°

13° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 166° ↓
′													′
0	0. 22495	28	4. 44541	559	0. 23087	30	4. 33148	575	1. 02630	7	0. 97437	7	60
1	. 22523	29	. 43982	558	. 23117	31	. 32573	572	. 02637	7	. 97430	6	59
2	. 22552	28	. 43424	557	. 23148	31	. 32001	571	. 02644	7	. 97424	7	58
3	. 22580	28	. 42867	555	. 23179	30	. 31430	570	. 02651	7	. 97417	6	57
4	. 22608	29	. 42312	553	. 23209	31	. 30860	569	. 02658	7	. 97411	7	56
5	0. 22637	28	4. 41759	553	0. 23240	31	4. 30291	567	1. 02665	7	0. 97404	6	55
6	. 22665	28	. 41206	550	. 23271	30	. 29724	565	. 02672	7	. 97398	7	54
7	. 22693	29	. 40656	550	. 23301	31	. 29159	564	. 02679	7	. 97391	7	53
8	. 22722	28	. 40106	548	. 23332	31	. 28595	563	. 02686	7	. 97384	6	52
9	. 22750	28	. 39558	546	. 23363	30	. 28032	561	. 02693	7	. 97378	7	51
10	0. 22778	29	4. 39012	546	0. 23393	31	4. 27471	560	1. 02700	7	0. 97371	6	50
11	. 22807	28	. 38466	543	. 23424	31	. 26911	559	. 02707	7	. 97365	7	49
12	. 22835	28	. 37923	543	. 23455	30	. 26352	557	. 02714	7	. 97358	7	48
13	. 22863	29	. 37380	541	. 23485	31	. 25795	556	. 02721	7	. 97351	6	47
14	. 22892	28	. 36839	540	. 23516	31	. 25239	554	. 02728	7	. 97345	7	46
15	0. 22920	28	4. 36299	538	0. 23547	31	4. 24685	553	1. 02735	7	0. 97338	7	45
16	. 22948	29	. 35761	537	. 23578	30	. 24132	552	. 02742	7	. 97331	6	44
17	. 22977	28	. 35224	535	. 23608	31	. 23580	550	. 02749	7	. 97325	7	43
18	. 23005	28	. 34689	535	. 23639	31	. 23030	549	. 02756	7	. 97318	7	42
19	. 23033	29	. 34154	532	. 23670	30	. 22481	548	. 02763	7	. 97311	7	41
20	0. 23062	28	4. 33622	532	0. 23700	31	4. 21933	546	1. 02770	7	0. 97304	6	40
21	. 23090	28	. 33090	530	. 23731	31	. 21387	545	. 02777	7	. 97298	7	39
22	. 23118	28	. 32560	529	. 23762	31	. 20842	544	. 02784	7	. 97291	7	38
23	. 23146	29	. 32031	528	. 23793	30	. 20298	542	. 02791	8	. 97284	6	37
24	. 23175	28	. 31503	526	. 23823	31	. 19756	541	. 02799	7	. 97278	7	36
25	0. 23203	28	4. 30977	525	0. 23854	31	4. 19215	540	1. 02806	7	0. 97271	7	35
26	. 23231	29	. 30452	523	. 23885	31	. 18675	538	. 02813	7	. 97264	7	34
27	. 23260	28	. 29929	523	. 23916	30	. 18137	537	. 02820	7	. 97257	6	33
28	. 23288	28	. 29406	521	. 23946	31	. 17600	536	. 02827	7	. 97251	7	32
29	. 23316	29	. 28885	519	. 23977	31	. 17064	534	. 02834	8	. 97244	7	31
30	0. 23345	28	4. 28366	519	0. 24008	31	4. 16530	533	1. 02842	7	0. 97237	7	30
31	. 23373	28	. 27847	517	. 24039	30	. 15997	532	. 02849	7	. 97230	7	29
32	. 23401	28	. 27330	516	. 24069	31	. 15465	531	. 02856	7	. 97223	6	28
33	. 23429	29	. 26814	514	. 24100	31	. 14934	529	. 02863	7	. 97217	7	27
34	. 23458	28	. 26300	513	. 24131	31	. 14405	528	. 02870	8	. 97210	7	26
35	0. 23486	28	4. 25787	512	0. 24162	31	4. 13877	527	1. 02878	7	0. 97203	7	25
36	. 23514	28	. 25275	511	. 24193	30	. 13350	525	. 02885	7	. 97196	7	24
37	. 23542	29	. 24764	509	. 24223	31	. 12825	524	. 02892	7	. 97189	7	23
38	. 23571	28	. 24255	509	. 24254	31	. 12301	523	. 02899	8	. 97182	6	22
39	. 23599	28	. 23746	507	. 24285	31	. 11778	522	. 02907	7	. 97176	7	21
40	0. 23627	29	4. 23239	505	0. 24316	31	4. 11256	520	1. 02914	7	0. 97169	7	20
41	. 23656	28	. 22734	505	. 24347	30	. 10736	520	. 02921	7	. 97162	7	19
42	. 23684	28	. 22229	503	. 24377	31	. 10216	517	. 02928	8	. 97155	7	18
43	. 23712	28	. 21726	502	. 24408	31	. 09699	517	. 02936	7	. 97148	7	17
44	. 23740	29	. 21224	501	. 24439	31	. 09182	516	. 02943	7	. 97141	7	16
45	0. 23769	28	4. 20723	499	0. 24470	31	4. 08666	514	1. 02950	8	0. 97134	7	15
46	. 23797	28	. 20224	499	. 24501	31	. 08152	513	. 02958	7	. 97127	7	14
47	. 23825	28	. 19725	497	. 24532	30	. 07639	512	. 02965	7	. 97120	7	13
48	. 23853	29	. 19228	495	. 24562	31	. 07127	511	. 02972	8	. 97113	7	12
49	. 23882	28	. 18733	495	. 24593	31	. 06616	509	. 02980	7	. 97106	6	11
50	0. 23910	28	4. 18238	494	0. 24624	31	4. 06107	508	1. 02987	7	0. 97100	7	10
51	. 23938	28	. 17744	492	. 24655	31	. 05599	507	. 02994	8	. 97093	7	9
52	. 23966	29	. 17252	491	. 24686	31	. 05092	506	. 03002	7	. 97086	7	8
53	. 23995	28	. 16761	490	. 24717	30	. 04586	505	. 03009	8	. 97079	7	7
54	. 24023	28	. 16271	489	. 24747	31	. 04081	503	. 03017	7	. 97072	7	6
55	0. 24051	28	4. 15782	487	0. 24778	31	4. 03578	502	1. 03024	8	0. 97065	7	5
56	. 24079	28	. 15295	486	. 24809	31	. 03076	502	. 03032	7	. 97058	7	4
57	. 24108	29	. 14809	486	. 24840	31	. 02574	500	. 03039	7	. 97051	7	3
58	. 24136	28	. 14323	484	. 24871	31	. 02074	498	. 03046	8	. 97044	7	2
59	. 24164	28	. 13839	482	. 24902	31	. 01576	498	. 03054	7	. 97037	7	1
60	0. 24192		4. 13357		0. 24933		4. 01078		1. 03061		0. 97030		0
↑ 103° →	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ← 76°

14°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	←165° ↓
0	0. 24192	28	4. 13357	482	0. 24933	31	4. 01078	496	1. 03061	8	0. 97030	7	60
1	. 24220	29	. 12875	481	. 24964	31	. 00582	496	. 03069	7	. 97023	8	59
2	. 24249	28	. 12394	479	. 24995	31	4. 00086	494	. 03076	8	. 97015	7	58
3	. 24277	28	. 11915	478	. 25026	30	3. 99592	493	. 03084	7	. 97008	7	57
4	. 24305	28	. 11437	477	. 25056	31	. 99099	492	. 03091	8	. 97001	7	56
5	0. 24333	29	4. 10960	476	0. 25087	31	3. 98607	490	1. 03099	7	0. 96994	7	55
6	. 24362	28	. 10484	475	. 25118	31	. 98117	490	. 03106	8	. 96987	7	54
7	. 24390	28	. 10009	474	. 25149	31	. 97627	488	. 03114	7	. 96980	7	53
8	. 24418	28	. 09535	472	. 25180	31	. 97139	488	. 03121	8	. 96973	7	52
9	. 24446	28	. 09063	472	. 25211	31	. 96651	486	. 03129	8	. 96966	7	51
10	0. 24474	29	4. 08591	470	0. 25242	31	3. 96165	485	1. 03137	7	0. 96959	7	50
11	. 24503	28	. 08121	469	. 25273	31	. 95680	484	. 03144	8	. 96952	7	49
12	. 24531	28	. 07652	468	. 25304	31	. 95196	483	. 03152	7	. 96945	8	48
13	. 24559	28	. 07184	467	. 25335	31	. 94713	481	. 03159	8	. 96937	7	47
14	. 24587	28	. 06717	466	. 25366	31	. 94232	481	. 03167	8	. 96930	7	46
15	0. 24615	29	4. 06251	465	0. 25397	31	3. 93751	480	1. 03175	7	0. 96923	7	45
16	. 24644	28	. 05786	464	. 25428	31	. 93271	478	. 03182	8	. 96916	7	44
17	. 24672	28	. 05322	462	. 25459	31	. 92793	477	. 03190	7	. 96909	7	43
18	. 24700	28	. 04860	462	. 25490	31	. 92316	477	. 03197	8	. 96902	8	42
19	. 24728	28	. 04398	460	. 25521	31	. 91839	475	. 03205	8	. 96894	7	41
20	0. 24756	28	4. 03938	459	0. 25552	31	3. 91364	474	1. 03213	7	0. 96887	7	40
21	. 24784	29	. 03479	459	. 25583	31	. 90890	473	. 03220	8	. 96880	7	39
22	. 24813	28	. 03020	457	. 25614	31	. 90417	472	. 03228	8	. 96873	7	38
23	. 24841	28	. 02563	456	. 25645	31	. 89945	471	. 03236	8	. 96866	8	37
24	. 24869	28	. 02107	455	. 25676	31	. 89474	470	. 03244	7	. 96858	7	36
25	0. 24897	28	4. 01652	454	0. 25707	31	3. 89004	468	1. 03251	8	0. 96851	7	35
26	. 24925	29	. 01198	453	. 25738	31	. 88536	468	. 03259	8	. 96844	7	34
27	. 24954	28	. 00745	452	. 25769	31	. 88068	467	. 03267	8	. 96837	8	33
28	. 24982	28	4. 00293	450	. 25800	31	. 87601	465	. 03275	7	. 96829	7	32
29	. 25010	28	3. 99843	450	. 25831	31	. 87136	465	. 03282	8	. 96822	7	31
30	0. 25038	28	3. 99393	449	0. 25862	31	3. 86671	463	1. 03290	8	0. 96815	8	30
31	. 25066	28	. 98944	447	. 25893	31	. 86208	463	. 03298	8	. 96807	7	29
32	. 25094	28	. 98497	447	. 25924	31	. 85745	461	. 03306	8	. 96800	7	28
33	. 25122	29	. 98050	446	. 25955	31	. 85284	460	. 03313	7	. 96793	7	27
34	. 25151	28	. 97604	444	. 25986	31	. 84824	460	. 03321	8	. 96786	8	26
35	0. 25179	28	3. 97160	444	0. 26017	31	3. 84364	458	1. 03329	8	0. 96778	7	25
36	. 25207	28	. 96716	442	. 26048	31	. 83906	457	. 03337	8	. 96771	7	24
37	. 25235	28	. 96274	442	. 26079	31	. 83449	457	. 03345	8	. 96764	8	23
38	. 25263	28	. 95832	440	. 26110	31	. 82992	455	. 03353	7	. 96756	7	22
39	. 25291	29	. 95392	440	. 26141	31	. 82537	454	. 03360	8	. 96749	7	21
40	0. 25320	28	3. 94952	438	0. 26172	31	3. 82083	453	1. 03368	8	0. 96742	8	20
41	. 25348	28	. 94514	438	. 26203	32	. 81630	453	. 03376	8	. 96734	7	19
42	. 25376	28	. 94076	436	. 26235	31	. 81177	451	. 03384	8	. 96727	8	18
43	. 25404	28	. 93640	436	. 26266	31	. 80726	450	. 03392	8	. 96719	7	17
44	. 25432	28	. 93204	434	. 26297	31	. 80276	449	. 03400	8	. 96712	7	16
45	0. 25460	28	3. 92770	433	0. 26328	31	3. 79827	449	1. 03408	8	0. 96705	8	15
46	. 25488	28	. 92337	433	. 26359	31	. 79378	447	. 03416	8	. 96697	7	14
47	. 25516	29	. 91904	431	. 26390	31	. 78931	446	. 03424	8	. 96690	8	13
48	. 25545	28	. 91473	431	. 26421	31	. 78485	445	. 03432	7	. 96682	7	12
49	. 25573	28	. 91042	429	. 26452	31	. 78040	445	. 03439	8	. 96675	8	11
50	0. 25601	28	3. 90613	429	0. 26483	32	3. 77595	443	1. 03447	8	0. 96667	7	10
51	. 25629	28	. 90184	428	. 26515	31	. 77152	443	. 03455	8	. 96660	7	9
52	. 25657	28	. 89756	426	. 26546	31	. 76709	441	. 03463	8	. 96653	8	8
53	. 25685	28	. 89330	426	. 26577	31	. 76268	440	. 03471	8	. 96645	7	7
54	. 25713	28	. 88904	425	. 26608	31	. 75828	440	. 03479	8	. 96638	8	6
55	0. 25741	28	3. 88479	423	0. 26639	31	3. 75388	438	1. 03487	8	0. 96630	7	5
56	. 25769	29	. 88056	423	. 26670	31	. 74950	438	. 03495	8	. 96623	8	4
57	. 25798	28	. 87633	422	. 26701	32	. 74512	437	. 03503	8	. 96615	7	3
58	. 25826	28	. 87211	421	. 26733	31	. 74075	435	. 03511	9	. 96608	8	2
59	. 25854	28	. 86790	420	. 26764	31	. 73640	435	. 03520	8	. 96600	7	1
60	0. 25882		3. 86370		0. 26795		3. 73205		1. 03528		0. 96593		0
↑ 104°→ cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	←75° ↑

15° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 164° ↓
0	0. 25882	28	3. 86370	419	0. 26795	31	3. 73205	434	1. 03528	8	0. 96593	8	60
1	. 25910	28	. 85951	418	. 26826	31	. 72771	433	. 03536	8	. 96585	7	59
2	. 25938	28	. 85533	417	. 26857	31	. 72338	431	. 03544	8	. 96578	8	58
3	. 25966	28	. 85116	416	. 26888	32	. 71907	431	. 03552	8	. 96570	8	57
4	. 25994	28	. 84700	415	. 26920	31	. 71476	430	. 03560	8	. 96562	7	56
5	0. 26022	28	3. 84285	414	0. 26951	31	3. 71046	430	1. 03568	8	0. 96555	8	55
6	. 26050	29	. 83871	414	. 26982	31	. 70616	428	. 03576	8	. 96547	7	54
7	. 26079	28	. 83457	412	. 27013	31	. 70188	427	. 03584	8	. 96540	8	53
8	. 26107	28	. 83045	412	. 27044	32	. 69761	426	. 03592	9	. 96532	8	52
9	. 26135	28	. 82633	410	. 27076	31	. 69335	426	. 03601	8	. 96524	7	51
10	0. 26163	28	3. 82223	410	0. 27107	31	3. 68909	424	1. 03609	8	0. 96517	8	50
11	. 26191	28	. 81813	409	. 27138	31	. 68485	424	. 03617	8	. 96509	7	49
12	. 26219	28	. 81404	408	. 27169	32	. 68061	423	. 03625	8	. 96502	8	48
13	. 26247	28	. 80996	407	. 27201	31	. 67638	421	. 03633	9	. 96494	8	47
14	. 26275	28	. 80589	406	. 27232	31	. 67217	421	. 03642	8	. 96486	7	46
15	0. 26303	28	3. 80183	405	0. 27263	31	3. 66796	420	1. 03650	8	0. 96479	8	45
16	. 26331	28	. 79778	404	. 27294	32	. 66376	419	. 03658	8	. 96471	8	44
17	. 26359	28	. 79374	404	. 27326	31	. 65957	419	. 03666	8	. 96463	7	43
18	. 26387	28	. 78970	402	. 27357	31	. 65538	417	. 03674	9	. 96456	8	42
19	. 26415	28	. 78568	402	. 27388	31	. 65121	416	. 03683	8	. 96448	8	41
20	0. 26443	28	3. 78166	401	0. 27419	32	3. 64705	416	1. 03691	8	0. 96440	7	40
21	. 26471	29	. 77765	400	. 27451	31	. 64289	415	. 03699	9	. 96433	8	39
22	. 26500	28	. 77365	399	. 27482	31	. 63874	413	. 03708	8	. 96425	8	38
23	. 26528	28	. 76966	398	. 27513	32	. 63461	413	. 03716	8	. 96417	7	37
24	. 26556	28	. 76568	397	. 27545	31	. 63048	412	. 03724	8	. 96410	8	36
25	0. 26584	28	3. 76171	396	0. 27576	31	3. 62636	412	1. 03732	9	0. 96402	8	35
26	. 26612	28	. 75775	396	. 27607	31	. 62224	410	. 03741	8	. 96394	8	34
27	. 26640	28	. 75379	395	. 27638	32	. 61814	409	. 03749	8	. 96386	7	33
28	. 26668	28	. 74984	393	. 27670	31	. 61405	409	. 03757	9	. 96379	8	32
29	. 26696	28	. 74591	393	. 27701	31	. 60996	408	. 03766	8	. 96371	8	31
30	0. 26724	28	3. 74198	392	0. 27732	32	3. 60588	407	1. 03774	9	0. 96363	8	30
31	. 26752	28	. 73806	392	. 27764	31	. 60181	406	. 03783	8	. 96355	8	29
32	. 26780	28	. 73414	390	. 27795	31	. 59775	405	. 03791	8	. 96347	7	28
33	. 26808	28	. 73024	389	. 27826	32	. 59370	404	. 03799	9	. 96340	8	27
34	. 26836	28	. 72635	389	. 27858	31	. 58966	404	. 03808	8	. 96332	8	26
35	0. 26864	28	3. 72246	388	0. 27889	32	3. 58562	402	1. 03816	9	0. 96324	8	25
36	. 26892	28	. 71858	387	. 27921	31	. 58160	402	. 03825	8	. 96316	8	24
37	. 26920	28	. 71471	386	. 27952	31	. 57758	401	. 03833	9	. 96308	7	23
38	. 26948	28	. 71085	385	. 27983	32	. 57357	400	. 03842	8	. 96301	8	22
39	. 26976	28	. 70700	385	. 28015	31	. 56957	400	. 03850	8	. 96293	8	21
40	0. 27004	28	3. 70315	384	0. 28046	31	3. 56557	398	1. 03858	9	0. 96285	8	20
41	. 27032	28	. 69931	382	. 28077	32	. 56159	398	. 03867	8	. 96277	8	19
42	. 27060	28	. 69549	382	. 28109	31	. 55761	397	. 03875	9	. 96269	8	18
43	. 27088	28	. 69167	382	. 28140	32	. 55364	396	. 03884	8	. 96261	8	17
44	. 27116	28	. 68785	380	. 28172	31	. 54968	395	. 03892	9	. 96253	7	16
45	0. 27144	28	3. 68405	380	0. 28203	31	3. 54573	394	1. 03901	8	0. 96246	8	15
46	. 27172	28	. 68025	378	. 28234	32	. 54179	394	. 03909	9	. 96238	8	14
47	. 27200	28	. 67647	378	. 28266	31	. 53785	392	. 03918	9	. 96230	8	13
48	. 27228	28	. 67269	377	. 28297	32	. 53393	392	. 03927	8	. 96222	8	12
49	. 27256	28	. 66892	377	. 28329	31	. 53001	392	. 03935	9	. 96214	8	11
50	0. 27284	28	3. 66515	375	0. 28360	31	3. 52609	390	1. 03944	8	0. 96206	8	10
51	. 27312	28	. 66140	375	. 28391	32	. 52219	390	. 03952	9	. 96198	8	9
52	. 27340	28	. 65765	374	. 28423	31	. 51829	388	. 03961	8	. 96190	8	8
53	. 27368	28	. 65391	373	. 28454	32	. 51441	388	. 03969	9	. 96182	8	7
54	. 27396	28	. 65018	373	. 28486	31	. 51053	387	. 03978	9	. 96174	8	6
55	0. 27424	28	3. 64645	371	0. 28517	32	3. 50666	387	1. 03987	8	0. 96166	8	5
56	. 27452	28	. 64274	371	. 28549	31	. 50279	385	. 03995	9	. 96158	8	4
57	. 27480	28	. 63903	370	. 28580	32	. 49894	385	. 04004	9	. 96150	8	3
58	. 27508	28	. 63533	369	. 28612	31	. 49509	384	. 04013	8	. 96142	8	2
59	. 27536	28	. 63164	368	. 28643	32	. 49125	384	. 04021	9	. 96134	8	1
60	0. 27564		3. 62796		0. 28675		3. 48741		1. 04030		0. 96126		0
↑ 105° →	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ 74° ←

16° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 163° ↓
0	0. 27564	28	3. 62796	368	0. 28675	31	3. 48741	382	1. 04030	9	0. 96126	8	60
1	. 27592	28	. 62428	367	. 28706	32	. 48359	382	. 04039	8	. 96118	8	59
2	. 27620	28	. 62061	366	. 28738	31	. 47977	381	. 04047	9	. 96110	8	58
3	. 27648	28	. 61695	365	. 28769	32	. 47596	380	. 04056	9	. 96102	8	57
4	. 27676	28	. 61330	365	. 28801	31	. 47216	379	. 04065	8	. 96094	8	56
5	0. 27704	27	3. 60965	364	0. 28832	32	3. 46837	379	1. 04073	9	0. 96086	8	55
6	. 27731	28	. 60601	363	. 28864	31	. 46458	378	. 04082	9	. 96078	8	54
7	. 27759	28	. 60238	362	. 28895	32	. 46080	377	. 04091	9	. 96070	8	53
8	. 27787	28	. 59876	362	. 28927	31	. 45703	376	. 04100	8	. 96062	8	52
9	. 27815	28	. 59514	360	. 28958	32	. 45327	376	. 04108	9	. 96054	8	51
10	0. 27843	28	3. 59154	360	0. 28990	31	3. 44951	375	1. 04117	9	0. 96046	9	50
11	. 27871	28	. 58794	360	. 29021	32	. 44576	374	. 04126	9	. 96037	8	49
12	. 27899	28	. 58434	358	. 29053	31	. 44202	373	. 04135	9	. 96029	8	48
13	. 27927	28	. 58076	358	. 29084	32	. 43829	373	. 04144	8	. 96021	8	47
14	. 27955	28	. 57718	357	. 29116	31	. 43456	372	. 04152	9	. 96013	8	46
15	0. 27983	28	3. 57361	356	0. 29147	32	3. 43084	371	1. 04161	9	0. 96005	8	45
16	. 28011	28	. 57005	356	. 29179	31	. 42713	370	. 04170	9	. 95997	8	44
17	. 28039	28	. 56649	355	. 29210	32	. 42343	370	. 04179	9	. 95989	8	43
18	. 28067	28	. 56294	354	. 29242	32	. 41973	369	. 04188	9	. 95981	9	42
19	. 28095	28	. 55940	353	. 29274	31	. 41604	368	. 04197	9	. 95972	8	41
20	0. 28123	27	3. 55587	353	0. 29305	32	3. 41236	367	1. 04206	8	0. 95964	8	40
21	. 28150	28	. 55234	351	. 29337	31	. 40869	367	. 04214	9	. 95956	8	39
22	. 28178	28	. 54883	352	. 29368	32	. 40502	366	. 04223	9	. 95948	8	38
23	. 28206	28	. 54531	350	. 29400	32	. 40136	365	. 04232	9	. 95940	9	37
24	. 28234	28	. 54181	350	. 29432	31	. 39771	365	. 04241	9	. 95931	8	36
25	0. 28262	28	3. 53831	349	0. 29463	32	3. 39406	364	1. 04250	9	0. 95923	8	35
26	. 28290	28	. 53482	348	. 29495	31	. 39042	363	. 04259	9	. 95915	8	34
27	. 28318	28	. 53134	347	. 29526	32	. 38679	362	. 04268	9	. 95907	9	33
28	. 28346	28	. 52787	347	. 29558	32	. 38317	362	. 04277	9	. 95898	8	32
29	. 28374	28	. 52440	346	. 29590	31	. 37955	361	. 04286	9	. 95890	8	31
30	0. 28402	27	3. 52094	346	0. 29621	32	3. 37594	360	1. 04295	9	0. 95882	8	30
31	. 28429	28	. 51748	344	. 29653	32	. 37234	359	. 04304	9	. 95874	9	29
32	. 28457	28	. 51404	344	. 29685	31	. 36875	359	. 04313	9	. 95865	8	28
33	. 28485	28	. 51060	344	. 29716	32	. 36516	358	. 04322	9	. 95857	8	27
34	. 28513	28	. 50716	342	. 29748	32	. 36158	358	. 04331	9	. 95849	8	26
35	0. 28541	28	3. 50374	342	0. 29780	31	3. 35800	357	1. 04340	9	0. 95841	9	25
36	. 28569	28	. 50032	341	. 29811	32	. 35443	356	. 04349	9	. 95832	8	24
37	. 28597	28	. 49691	341	. 29843	32	. 35087	355	. 04358	9	. 95824	8	23
38	. 28625	27	. 49350	340	. 29875	31	. 34732	355	. 04367	9	. 95816	9	22
39	. 28652	28	. 49010	339	. 29906	32	. 34377	354	. 04376	9	. 95807	8	21
40	0. 28680	28	3. 48671	338	0. 29938	32	3. 34023	353	1. 04385	9	0. 95799	8	20
41	. 28708	28	. 48333	338	. 29970	31	. 33670	353	. 04394	9	. 95791	9	19
42	. 28736	28	. 47995	337	. 30001	32	. 33317	352	. 04403	10	. 95782	8	18
43	. 28764	28	. 47658	337	. 30033	32	. 32965	351	. 04413	9	. 95774	8	17
44	. 28792	28	. 47321	335	. 30065	32	. 32614	350	. 04422	9	. 95766	9	16
45	0. 28820	27	3. 46986	335	0. 30097	31	3. 32264	350	1. 04431	9	0. 95757	8	15
46	. 28847	28	. 46651	335	. 30128	32	. 31914	349	. 04440	9	. 95749	9	14
47	. 28875	28	. 46316	333	. 30160	32	. 31565	349	. 04449	9	. 95740	8	13
48	. 28903	28	. 45983	333	. 30192	32	. 31216	348	. 04458	10	. 95732	8	12
49	. 28931	28	. 45650	333	. 30224	31	. 30868	347	. 04468	9	. 95724	9	11
50	0. 28959	28	3. 45317	331	0. 30255	32	3. 30521	347	1. 04477	9	0. 95715	8	10
51	. 28987	28	. 44986	331	. 30287	32	. 30174	345	. 04486	9	. 95707	9	9
52	. 29015	27	. 44655	331	. 30319	32	. 29829	346	. 04495	9	. 95698	8	8
53	. 29042	28	. 44324	329	. 30351	31	. 29483	344	. 04504	10	. 95690	9	7
54	. 29070	28	. 43995	329	. 30382	32	. 29139	344	. 04514	9	. 95681	8	6
55	0. 29098	28	3. 43666	329	0. 30414	32	3. 28795	343	1. 04523	9	0. 95673	9	5
56	. 29126	28	. 43337	327	. 30446	32	. 28452	343	. 04532	9	. 95664	8	4
57	. 29154	28	. 43010	327	. 30478	31	. 28109	342	. 04541	10	. 95656	9	3
58	. 29182	27	. 42683	327	. 30509	32	. 27767	341	. 04551	9	. 95647	8	2
59	. 29209	28	. 42356	326	. 30541	32	. 27426	341	. 04560	9	. 95639	9	1
60	0. 29237		3. 42030		0. 30573		3. 27085		1. 04569		0. 95630		0
↑ 106° →	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	← 73° ↑

217 125

17° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 162° ↓
0	0. 29237	28	3. 42030	325	0. 30573	32	3. 27085	340	1. 04569	9	0. 95630	8	60
1	. 29265	28	. 41705	324	. 30605	32	. 26745	339	. 04578	10	. 95622	9	59
2	. 29293	28	. 41381	324	. 30637	32	. 26406	339	. 04588	9	. 95613	8	58
3	. 29321	27	. 41057	323	. 30669	31	. 26067	338	. 04597	9	. 95605	9	57
4	. 29348	28	. 40734	323	. 30700	32	. 25729	337	. 04606	10	. 95596	8	56
5	0. 29376	28	3. 40411	322	0. 30732	32	3. 25392	337	1. 04616	9	0. 95588	9	55
6	. 29404	28	. 40089	321	. 30764	32	. 25055	336	. 04625	10	. 95579	8	54
7	. 29432	28	. 39768	320	. 30796	32	. 24719	336	. 04635	9	. 95571	9	53
8	. 29460	27	. 39448	320	. 30828	32	. 24383	334	. 04644	9	. 95562	8	52
9	. 29487	28	. 39128	320	. 30860	31	. 24049	335	. 04653	10	. 95554	9	51
10	0. 29515	28	3. 38808	319	0. 30891	32	3. 23714	333	1. 04663	9	0. 95545	9	50
11	. 29543	28	. 38489	318	. 30923	32	. 23381	333	. 04672	10	. 95536	8	49
12	. 29571	28	. 38171	317	. 30955	32	. 23048	333	. 04682	9	. 95528	9	48
13	. 29599	27	. 37854	317	. 30987	32	. 22715	331	. 04691	9	. 95519	8	47
14	. 29626	28	. 37537	316	. 31019	32	. 22384	331	. 04700	10	. 95511	9	46
15	0. 29654	28	3. 37221	316	0. 31051	32	3. 22053	331	1. 04710	9	0. 95502	9	45
16	. 29682	28	. 36905	315	. 31083	32	. 21722	330	. 04719	10	. 95493	8	44
17	. 29710	27	. 36590	314	. 31115	32	. 21392	329	. 04729	9	. 95485	9	43
18	. 29737	28	. 36276	314	. 31147	31	. 21063	329	. 04738	10	. 95476	9	42
19	. 29765	28	. 35962	313	. 31178	32	. 20734	328	. 04748	9	. 95467	8	41
20	0. 29793	28	3. 35649	313	0. 31210	32	3. 20406	327	1. 04757	10	0. 95459	9	40
21	. 29821	28	. 35336	311	. 31242	32	. 20079	327	. 04767	9	. 95450	9	39
22	. 29849	27	. 35025	312	. 31274	32	. 19752	326	. 04776	10	. 95441	8	38
23	. 29876	28	. 34713	310	. 31306	32	. 19426	326	. 04786	9	. 95433	9	37
24	. 29904	28	. 34403	311	. 31338	32	. 19100	325	. 04795	10	. 95424	9	36
25	0. 29932	28	3. 34092	309	0. 31370	32	3. 18775	324	1. 04805	10	0. 95415	8	35
26	. 29960	27	. 33783	309	. 31402	32	. 18451	324	. 04815	9	. 95407	9	34
27	. 29987	28	. 33474	308	. 31434	32	. 18127	323	. 04824	10	. 95398	9	33
28	. 30015	28	. 33166	308	. 31466	32	. 17804	323	. 04834	9	. 95389	9	32
29	. 30043	28	. 32858	307	. 31498	32	. 17481	322	. 04843	10	. 95380	8	31
30	0. 30071	27	3. 32551	307	0. 31530	32	3. 17159	321	1. 04853	10	0. 95372	9	30
31	. 30098	28	. 32244	305	. 31562	32	. 16838	321	. 04863	9	. 95363	9	29
32	. 30126	28	. 31939	306	. 31594	32	. 16517	320	. 04872	10	. 95354	9	28
33	. 30154	28	. 31633	305	. 31626	32	. 16197	320	. 04882	9	. 95345	8	27
34	. 30182	27	. 31328	304	. 31658	32	. 15877	319	. 04891	10	. 95337	9	26
35	0. 30209	28	3. 31024	303	0. 31690	32	3. 15558	318	1. 04901	10	0. 95328	9	25
36	. 30237	28	. 30721	303	. 31722	32	. 15240	318	. 04911	9	. 95319	9	24
37	. 30265	27	. 30418	303	. 31754	32	. 14922	317	. 04920	10	. 95310	9	23
38	. 30292	28	. 30115	301	. 31786	32	. 14605	317	. 04930	10	. 95301	8	22
39	. 30320	28	. 29814	302	. 31818	32	. 14288	316	. 04940	10	. 95293	9	21
40	0. 30348	28	3. 29512	300	0. 31850	32	3. 13972	316	1. 04950	9	0. 95284	9	20
41	. 30376	27	. 29212	300	. 31882	32	. 13656	315	. 04959	10	. 95275	9	19
42	. 30403	28	. 28912	300	. 31914	32	. 13341	314	. 04969	10	. 95266	9	18
43	. 30431	28	. 28612	299	. 31946	32	. 13027	314	. 04979	10	. 95257	9	17
44	. 30459	27	. 28313	298	. 31978	32	. 12713	313	. 04989	9	. 95248	8	16
45	0. 30486	28	3. 28015	298	0. 32010	32	3. 12400	313	1. 04998	10	0. 95240	9	15
46	. 30514	28	. 27717	297	. 32042	32	. 12087	312	. 05008	10	. 95231	9	14
47	. 30542	28	. 27420	297	. 32074	32	. 11775	311	. 05018	10	. 95222	9	13
48	. 30570	27	. 27123	296	. 32106	33	. 11464	311	. 05028	10	. 95213	9	12
49	. 30597	28	. 26827	296	. 32139	32	. 11153	311	. 05038	9	. 95204	9	11
50	0. 30625	28	3. 26531	294	0. 32171	32	3. 10842	310	1. 05047	10	0. 95195	9	10
51	. 30653	27	. 26237	295	. 32203	32	. 10532	309	. 05057	10	. 95186	9	9
52	. 30680	28	. 25942	294	. 32235	32	. 10223	309	. 05067	10	. 95177	9	8
53	. 30708	28	. 25648	293	. 32267	32	. 09914	308	. 05077	10	. 95168	9	7
54	. 30736	27	. 25355	293	. 32299	32	. 09606	308	. 05087	10	. 95159	9	6
55	0. 30763	28	3. 25062	292	0. 32331	32	3. 09298	307	1. 05097	10	0. 95150	8	5
56	. 30791	28	. 24770	292	. 32363	33	. 08991	306	. 05107	9	. 95142	9	4
57	. 30819	27	. 24478	291	. 32396	32	. 08685	306	. 05116	10	. 95133	9	3
58	. 30846	28	. 24187	290	. 32428	32	. 08379	306	. 05126	10	. 95124	9	2
59	. 30874	28	. 23897	290	. 32460	32	. 08073	305	. 05136	10	. 95115	9	1
60	0. 30902		3. 23607		0. 32492		3. 07768		1. 05146		0. 95106		0
↑ 107° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ← 72°

18° ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	′ ↓
0	0. 30902	27	3. 23607	290	0. 32492	32	3. 07768	304	1. 05146	10	0. 95106	9	60
1	. 30929	28	. 23317	289	. 32524	32	. 07464	304	. 05156	10	. 95097	9	59
2	. 30957	28	. 23028	288	. 32556	32	. 07160	303	. 05166	10	. 95088	9	58
3	. 30985	27	. 22740	288	. 32588	33	. 06857	303	. 05176	10	. 95079	9	57
4	. 31012	28	. 22452	287	. 32621	32	. 06554	302	. 05186	10	. 95070	9	56
5	0. 31040	28	3. 22165	287	0. 32653	32	3. 06252	302	1. 05196	10	0. 95061	9	55
6	. 31068	27	. 21878	286	. 32685	32	. 05950	301	. 05206	10	. 95052	9	54
7	. 31095	28	. 21592	286	. 32717	32	. 05649	300	. 05216	10	. 95043	10	53
8	. 31123	28	. 21306	285	. 32749	33	. 05349	300	. 05226	10	. 95033	9	52
9	. 31151	27	. 21021	284	. 32782	32	. 05049	300	. 05236	10	. 95024	9	51
10	0. 31178	28	3. 20737	284	0. 32814	32	3. 04749	299	1. 05246	10	0. 95015	9	50
11	. 31206	27	. 20453	284	. 32846	32	. 04450	298	. 05256	10	. 95006	9	49
12	. 31233	28	. 20169	283	. 32878	33	. 04152	298	. 05266	10	. 94997	9	48
13	. 31261	28	. 19886	282	. 32911	32	. 03854	298	. 05276	10	. 94988	9	47
14	. 31289	27	. 19604	282	. 32943	32	. 03556	296	. 05286	11	. 94979	9	46
15	0. 31316	28	3. 19322	282	0. 32975	32	3. 03260	297	1. 05297	10	0. 94970	9	45
16	. 31344	28	. 19040	281	. 33007	33	. 02963	296	. 05307	10	. 94961	9	44
17	. 31372	27	. 18759	280	. 33040	32	. 02667	295	. 05317	10	. 94952	9	43
18	. 31399	28	. 18479	280	. 33072	32	. 02372	295	. 05327	10	. 94943	10	42
19	. 31427	27	. 18199	279	. 33104	32	. 02077	294	. 05337	10	. 94933	9	41
20	0. 31454	28	3. 17920	279	0. 33136	33	3. 01783	294	1. 05347	10	0. 94924	9	40
21	. 31482	28	. 17641	278	. 33169	32	. 01489	293	. 05357	10	. 94915	9	39
22	. 31510	27	. 17363	278	. 33201	32	. 01196	293	. 05367	11	. 94906	9	38
23	. 31537	28	. 17085	277	. 33233	33	. 00903	292	. 05378	10	. 94897	9	37
24	. 31565	28	. 16808	277	. 33266	32	. 00611	292	. 05388	10	. 94888	10	36
25	0. 31593	27	3. 16531	276	0. 33298	32	3. 00319	291	1. 05398	10	0. 94878	9	35
26	. 31620	28	. 16255	276	. 33330	33	3. 00028	290	. 05408	10	. 94869	9	34
27	. 31648	27	. 15979	275	. 33363	32	2. 99738	291	. 05418	11	. 94860	9	33
28	. 31675	28	. 15704	275	. 33395	32	. 99447	289	. 05429	10	. 94851	9	32
29	. 31703	27	. 15429	274	. 33427	33	. 99158	290	. 05439	10	. 94842	10	31
30	0. 31730	28	3. 15155	274	0. 33460	32	2. 98868	288	1. 05449	10	0. 94832	9	30
31	. 31758	28	. 14881	273	. 33492	32	. 98580	288	. 05459	11	. 94823	9	29
32	. 31786	27	. 14608	273	. 33524	33	. 98292	288	. 05470	10	. 94814	9	28
33	. 31813	28	. 14335	272	. 33557	32	. 98004	287	. 05480	10	. 94805	10	27
34	. 31841	27	. 14063	272	. 33589	32	. 97717	287	. 05490	11	. 94795	9	26
35	0. 31868	28	3. 13791	271	0. 33621	33	2. 97430	286	1. 05501	10	0. 94786	9	25
36	. 31896	27	. 13520	271	. 33654	32	. 97144	286	. 05511	10	. 94777	9	24
37	. 31923	28	. 13249	270	. 33686	32	. 96858	285	. 05521	11	. 94768	10	23
38	. 31951	28	. 12979	270	. 33718	33	. 96573	285	. 05532	10	. 94758	9	22
39	. 31979	27	. 12709	269	. 33751	32	. 96288	284	. 05542	10	. 94749	9	21
40	0. 32006	28	3. 12440	269	0. 33783	33	2. 96004	283	1. 05552	11	0. 94740	10	20
41	. 32034	27	. 12171	268	. 33816	32	. 95721	284	. 05563	10	. 94730	9	19
42	. 32061	28	. 11903	268	. 33848	33	. 95437	282	. 05573	11	. 94721	9	18
43	. 32089	27	. 11635	268	. 33881	32	. 95155	283	. 05584	10	. 94712	10	17
44	. 32116	28	. 11367	266	. 33913	32	. 94872	281	. 05594	10	. 94702	9	16
45	0. 32144	27	3. 11101	267	0. 33945	33	2. 94591	282	1. 05604	11	0. 94693	9	15
46	. 32171	28	. 10834	266	. 33978	32	. 94309	281	. 05615	10	. 94684	10	14
47	. 32199	28	. 10568	265	. 34010	33	. 94028	280	. 05625	11	. 94674	9	13
48	. 32227	27	. 10303	265	. 34043	32	. 93748	280	. 05636	11	. 94665	9	12
49	. 32254	28	. 10038	264	. 34075	33	. 93468	279	. 05646	10	. 94656	10	11
50	0. 32282	27	3. 09774	264	0. 34108	32	2. 93189	279	1. 05657	11	0. 94646	9	10
51	. 32309	28	. 09510	264	. 34140	33	. 92910	278	. 05667	10	. 94637	10	9
52	. 32337	27	. 09246	263	. 34173	32	. 92632	278	. 05678	11	. 94627	9	8
53	. 32364	28	. 08983	262	. 34205	33	. 92354	278	. 05688	10	. 94618	9	7
54	. 32392	27	. 08721	262	. 34238	32	. 92076	277	. 05699	11	. 94609	10	6
55	0. 32419	28	3. 08459	262	0. 34270	33	2. 91799	276	1. 05709	10	0. 94599	9	5
56	. 32447	27	. 08197	261	. 34303	32	. 91523	277	. 05720	11	. 94590	10	4
57	. 32474	28	. 07936	261	. 34335	33	. 91246	275	. 05730	10	. 94580	9	3
58	. 32502	27	. 07675	260	. 34368	32	. 90971	275	. 05741	11	. 94571	10	2
59	. 32529	28	. 07415	260	. 34400	33	. 90696	275	. 05751	11	. 94561	9	1
60	0. 32557		3. 07155		0. 34433		2. 90421		1. 05762		0. 94552		0
108° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	← 71°

← 161°

219 427

21° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 158° ↓
0	0. 35837	27	2. 79043	211	0. 38386	34	2. 60509	226	1. 07114	12	0. 93358	10	60
1	. 35864	27	. 78832	211	. 38420	33	. 60283	226	. 07126	12	. 93348	11	59
2	. 35891	27	. 78621	211	. 38453	34	. 60057	226	. 07138	12	. 93337	10	58
3	. 35918	27	. 78410	210	. 38487	33	. 59831	225	. 07150	12	. 93327	11	57
4	. 35945	28	. 78200	210	. 38520	33	. 59606	225	. 07162	12	. 93316	10	56
5	0. 35973	27	2. 77990	210	0. 38553	34	2. 59381	225	1. 07174	12	0. 93306	11	55
6	. 36000	27	. 77780	209	. 38587	33	. 59156	224	. 07186	13	. 93295	10	54
7	. 36027	27	. 77571	209	. 38620	34	. 58932	224	. 07199	12	. 93285	11	53
8	. 36054	27	. 77362	208	. 38654	33	. 58708	224	. 07211	12	. 93274	10	52
9	. 36081	27	. 77154	209	. 38687	34	. 58484	223	. 07223	12	. 93264	11	51
10	0. 36108	27	2. 76945	208	0. 38721	33	2. 58261	223	1. 07235	12	0. 93253	10	50
11	. 36135	27	. 76737	207	. 38754	33	. 58038	223	. 07247	12	. 93243	11	49
12	. 36162	27	. 76530	207	. 38787	34	. 57815	222	. 07259	12	. 93232	10	48
13	. 36190	28	. 76323	207	. 38821	33	. 57593	222	. 07271	12	. 93222	11	47
14	. 36217	27	. 76116	207	. 38854	34	. 57371	221	. 07283	12	. 93211	10	46
15	0. 36244	27	2. 75909	206	0. 38888	33	2. 57150	222	1. 07295	12	0. 93201	11	45
16	. 36271	27	. 75703	206	. 38921	34	. 56928	221	. 07307	13	. 93190	10	44
17	. 36298	27	. 75497	205	. 38955	33	. 56707	220	. 07320	12	. 93180	11	43
18	. 36325	27	. 75292	206	. 38988	34	. 56487	221	. 07332	12	. 93169	10	42
19	. 36352	27	. 75086	205	. 39022	33	. 56266	220	. 07344	12	. 93159	11	41
20	0. 36379	27	2. 74881	204	0. 39055	34	2. 56046	219	1. 07356	12	0. 93148	11	40
21	. 36406	28	. 74677	204	. 39089	33	. 55827	219	. 07368	12	. 93137	10	39
22	. 36434	27	. 74473	204	. 39122	34	. 55608	219	. 07380	12	. 93127	11	38
23	. 36461	27	. 74269	204	. 39156	34	. 55389	219	. 07393	13	. 93116	10	37
24	. 36488	27	. 74065	203	. 39190	33	. 55170	218	. 07405	12	. 93106	11	36
25	0. 36515	27	2. 73862	203	0. 39223	34	2. 54952	218	1. 07417	12	0. 93095	11	35
26	. 36542	27	. 73659	203	. 39257	33	. 54734	218	. 07429	13	. 93084	10	34
27	. 36569	27	. 73456	202	. 39290	34	. 54516	217	. 07442	12	. 93074	11	33
28	. 36596	27	. 73254	202	. 39324	33	. 54299	217	. 07454	12	. 93063	11	32
29	. 36623	27	. 73052	202	. 39357	34	. 54082	217	. 07466	13	. 93052	10	31
30	0. 36650	27	2. 72850	201	0. 39391	34	2. 53865	217	1. 07479	12	0. 93042	11	30
31	. 36677	27	. 72649	201	. 39425	33	. 53648	216	. 07491	12	. 93031	11	29
32	. 36704	27	. 72448	201	. 39458	34	. 53432	215	. 07503	13	. 93020	10	28
33	. 36731	27	. 72247	200	. 39492	34	. 53217	216	. 07516	12	. 93010	11	27
34	. 36758	27	. 72047	200	. 39526	33	. 53001	215	. 07528	12	. 92999	11	26
35	0. 36785	27	2. 71847	200	0. 39559	34	2. 52786	215	1. 07540	13	0. 92988	10	25
36	. 36812	27	. 71647	199	. 39593	33	. 52571	214	. 07553	12	. 92978	11	24
37	. 36839	28	. 71448	199	. 39626	34	. 52357	215	. 07565	13	. 92967	11	23
38	. 36867	27	. 71249	199	. 39660	34	. 52142	213	. 07578	12	. 92956	11	22
39	. 36894	27	. 71050	199	. 39694	33	. 51929	214	. 07590	12	. 92945	10	21
40	0. 36921	27	2. 70851	198	0. 39727	34	2. 51715	213	1. 07602	13	0. 92935	11	20
41	. 36948	27	. 70653	198	. 39761	34	. 51502	213	. 07615	12	. 92924	11	19
42	. 36975	27	. 70455	197	. 39795	34	. 51289	213	. 07627	13	. 92913	11	18
43	. 37002	27	. 70258	197	. 39829	33	. 51076	212	. 07640	12	. 92902	10	17
44	. 37029	27	. 70061	197	. 39862	34	. 50864	212	. 07652	13	. 92892	11	16
45	0. 37056	27	2. 69864	197	0. 39896	34	2. 50652	212	1. 07665	12	0. 92881	11	15
46	. 37083	27	. 69667	196	. 39930	33	. 50440	211	. 07677	13	. 92870	11	14
47	. 37110	27	. 69471	196	. 39963	34	. 50229	211	. 07690	12	. 92859	10	13
48	. 37137	27	. 69275	196	. 39997	34	. 50018	211	. 07702	13	. 92849	11	12
49	. 37164	27	. 69079	195	. 40031	34	. 49807	210	. 07715	12	. 92838	11	11
50	0. 37191	27	2. 68884	195	0. 40065	33	2. 49597	211	1. 07727	13	0. 92827	11	10
51	. 37218	27	. 68689	195	. 40098	34	. 49386	209	. 07740	12	. 92816	11	9
52	. 37245	27	. 68494	195	. 40132	34	. 49177	210	. 07752	13	. 92805	11	8
53	. 37272	27	. 68299	194	. 40166	34	. 48967	209	. 07765	13	. 92794	11	7
54	. 37299	27	. 68105	194	. [illegible]	34	. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6
55	0. 37326	27	2. 67911	193	0. 40234	33	2. 48549	209	1. 07790	13	0. 92773	11	5
56	. 37353	27	. 67718	193	. 40267	34	. 48340	208	. 07803	13	. 92762	11	4
57	. 37380	27	. 67525	193	. 40301	34	. 48132	208	. 07816	12	. 92751	11	3
58	. 37407	27	. 67332	193	. 40335	34	. 47924	208	. 07828	13	. 92740	11	2
59	. 37434	27	. 67139	192	. 40369	34	. 47716	207	. 07841	12	. 92729	11	1
60	0. 37461	27	2. 66947	192	0. 40403	34	2. 47509	207	1. 07853	12	0. 92718	11	0
↑ 111° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ← 68°

22°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	←157° ↓
0	0. 37461	27	2. 66947	192	0. 40403	33	2. 47509	207	1. 07853	13	0. 92718	11	60
1	. 37488	27	. 66755	192	. 40436	34	. 47302	207	. 07866	13	. 92707	10	59
2	. 37515	27	. 66563	192	. 40470	34	. 47095	207	. 07879	13	. 92697	11	58
3	. 37542	27	. 66371	191	. 40504	34	. 46888	206	. 07892	12	. 92686	11	57
4	. 37569	26	. 66180	191	. 40538	34	. 46682	206	. 07904	13	. 92675	11	56
5	0. 37595	27	2. 65989	190	0. 40572	34	2. 46476	206	1. 07917	13	0. 92664	11	55
6	. 37622	27	. 65799	190	. 40606	34	. 46270	205	. 07930	13	. 92653	11	54
7	. 37649	27	. 65609	190	. 40640	34	. 46065	205	. 07943	12	. 92642	11	53
8	. 37676	27	. 65419	190	. 40674	33	. 45860	205	. 07955	13	. 92631	11	52
9	. 37703	27	. 65229	189	. 40707	34	. 45655	204	. 07968	13	. 92620	11	51
10	0. 37730	27	2. 65040	189	0. 40741	34	2. 45451	205	1. 07981	13	0. 92609	11	50
11	. 37757	27	. 64851	189	. 40775	34	. 45246	203	. 07994	12	. 92598	11	49
12	. 37784	27	. 64662	189	. 40809	34	. 45043	204	. 08006	13	. 92587	11	48
13	. 37811	27	. 64473	188	. 40843	34	. 44839	203	. 08019	13	. 92576	11	47
14	. 37838	27	. 64285	188	. 40877	34	. 44636	203	. 08032	13	. 92565	11	46
15	0. 37865	27	2. 64097	188	0. 40911	34	2. 44433	203	1. 08045	13	0. 92554	11	45
16	. 37892	27	. 63909	187	. 40945	34	. 44230	203	. 08058	13	. 92543	11	44
17	. 37919	27	. 63722	187	. 40979	34	. 44027	202	. 08071	13	. 92532	11	43
18	. 37946	27	. 63535	187	. 41013	34	. 43825	202	. 08084	13	. 92521	11	42
19	. 37973	26	. 63348	186	. 41047	34	. 43623	201	. 08097	12	. 92510	11	41
20	0. 37999	27	2. 63162	186	0. 41081	34	2. 43422	202	1. 08109	13	0. 92499	11	40
21	. 38026	27	. 62976	186	. 41115	34	. 43220	201	. 08122	13	. 92488	11	39
22	. 38053	27	. 62790	186	. 41149	34	. 43019	200	. 08135	13	. 92477	11	38
23	. 38080	27	. 62604	185	. 41183	34	. 42819	201	. 08148	13	. 92466	11	37
24	. 38107	27	. 62419	185	. 41217	34	. 42618	200	. 08161	13	. 92455	11	36
25	0. 38134	27	2. 62234	185	0. 41251	34	2. 42418	200	1. 08174	13	0. 92444	12	35
26	. 38161	27	. 62049	185	. 41285	34	. 42218	199	. 08187	13	. 92432	11	34
27	. 38188	27	. 61864	184	. 41319	34	. 42019	200	. 08200	13	. 92421	11	33
28	. 38215	26	. 61680	184	. 41353	34	. 41819	199	. 08213	13	. 92410	11	32
29	. 38241	27	. 61496	183	. 41387	34	. 41620	199	. 08226	13	. 92399	11	31
30	0. 38268	27	2. 61313	184	0. 41421	34	2. 41421	198	1. 08239	13	0. 92388	11	30
31	. 38295	27	. 61129	183	. 41455	35	. 41223	198	. 08252	13	. 92377	11	29
32	. 38322	27	. 60946	183	. 41490	34	. 41025	198	. 08265	13	. 92366	11	28
33	. 38349	27	. 60763	182	. 41524	34	. 40827	198	. 08278	13	. 92355	12	27
34	. 38376	27	. 60581	182	. 41558	34	. 40629	197	. 08291	14	. 92343	11	26
35	0. 38403	27	2. 60399	182	0. 41592	34	2. 40432	197	1. 08305	13	0. 92332	11	25
36	. 38430	26	. 60217	182	. 41626	34	. 40235	197	. 08318	13	. 92321	11	24
37	. 38456	27	. 60035	182	. 41660	34	. 40038	197	. 08331	13	. 92310	11	23
38	. 38483	27	. 59853	181	. 41694	34	. 39841	196	. 08344	13	. 92299	12	22
39	. 38510	27	. 59672	181	. 41728	35	. 39645	196	. 08357	13	. 92287	11	21
40	0. 38537	27	2. 59491	180	0. 41763	34	2. 39449	196	1. 08370	13	0. 92276	11	20
41	. 38564	27	. 59311	181	. 41797	34	. 39253	195	. 08383	14	. 92265	11	19
42	. 38591	26	. 59130	180	. 41831	34	. 39058	195	. 08397	13	. 92254	11	18
43	. 38617	27	. 58950	179	. 41865	34	. 38863	195	. 08410	13	. 92243	12	17
44	. 38644	27	. 58771	180	. 41899	34	. 38668	195	. 08423	13	. 92231	11	16
45	0. 38671	27	2. 58591	179	0. 41933	35	2. 38473	194	1. 08436	13	0. 92220	11	15
46	. 38698	27	. 58412	179	. 41968	34	. 38279	195	. 08449	14	. 92209	11	14
47	. 38725	27	. 58233	179	. 42002	34	. 38084	193	. 08463	13	. 92198	12	13
48	. 38752	26	. 58054	178	. 42036	34	. 37891	194	. 08476	13	. 92186	11	12
49	. 38778	27	. 57876	178	. 42070	35	. 37697	193	. 08489	14	. 92175	11	11
50	0. 38805	27	2. 57698	178	0. 42105	34	2. 37504	193	1. 08503	13	0. 92164	12	10
51	. 38832	27	. 57520	178	. 42139	34	. 37311	193	. 08516	13	. 92152	11	9
52	. 38859	27	. 57342	177	. 42173	34	. 37118	193	. 08529	13	. 92141	11	8
53	. 38886	26	. 57165	177	. 42207	35	. 36925	192	. 08542	14	. 92130	11	7
54	. 38912	27	. 56988	177	. 42242	34	. 36733	192	. 08556	13	. 92119	12	6
55	0. 38939	27	2. 56811	177	0. 42276	34	2. 36541	192	1. 08569	13	0. 92107	11	5
56	. 38966	27	. 56634	176	. 42310	35	. 36349	191	. 08582	14	. 92096	11	4
57	. 38993	27	. 56458	176	. 42345	34	. 36158	191	. 08596	13	. 92085	12	3
58	. 39020	26	. 56282	176	. 42379	34	. 35967	191	. 08609	14	. 92073	11	2
59	. 39046	27	. 56106	176	. 42413	34	. 35776	191	. 08623	13	. 92062	12	1
60	0. 39073		2. 55930		0. 42447		2. 35585		1. 08636		0. 92050		0
↑ 112°→	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	←67° ↑

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23° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 156° ↓
0	0. 39073	27	2. 55930	175	0. 42447	35	2. 35585	190	1. 08636	13	0. 92050	11	60
1	. 39100	27	. 55755	175	. 42482	34	. 35395	190	. 08649	14	. 92039	11	59
2	. 39127	26	. 55580	175	. 42516	35	. 35205	190	. 08663	13	. 92028	12	58
3	. 39153	27	. 55405	174	. 42551	34	. 35015	190	. 08676	14	. 92016	11	57
4	. 39180	27	. 55231	174	. 42585	34	. 34825	189	. 08690	13	. 92005	11	56
5	0. 39207	27	2. 55057	174	0. 42619	35	2. 34636	189	1. 08703	14	0. 91994	12	55
6	. 39234	26	. 54883	174	. 42654	34	. 34447	189	. 08717	13	. 91982	11	54
7	. 39260	27	. 54709	173	. 42689	34	. 34258	189	. 08730	14	. 91971	12	53
8	. 39287	27	. 54536	173	. 42722	35	. 34069	188	. 08744	13	. 91959	11	52
9	. 39314	27	. 54363	173	. 42757	34	. 33881	188	. 08757	14	. 91948	12	51
10	0. 39341	26	2. 54190	173	0. 42791	35	2. 33693	188	1. 08771	13	0. 91936	11	50
11	. 39367	27	. 54017	172	. 42826	34	. 33505	188	. 08784	14	. 91925	11	49
12	. 39394	27	. 53845	173	. 42860	34	. 33317	187	. 08798	13	. 91914	12	48
13	. 39421	27	. 53672	172	. 42894	35	. 33130	187	. 08811	14	. 91902	11	47
14	. 39448	26	. 53500	171	. 42929	34	. 32943	187	. 08825	14	. 91891	12	46
15	0. 39474	27	2. 53329	172	0. 42963	35	2. 32756	186	1. 08839	13	0. 91879	11	45
16	. 39501	27	. 53157	171	. 42998	34	. 32570	187	. 08852	14	. 91868	12	44
17	. 39528	27	. 52986	171	. 43032	35	. 32383	186	. 08866	14	. 91856	11	43
18	. 39555	27	. 52815	170	. 43067	34	. 32197	185	. 08880	13	. 91845	12	42
19	. 39581	26	. 52645	171	. 43101	35	. 32012	186	. 08893	14	. 91833	11	41
20	0. 39608	27	2. 52474	170	0. 43136	34	2. 31826	185	1. 08907	13	0. 91822	12	40
21	. 39635	26	. 52304	170	. 43170	35	. 31641	185	. 08920	14	. 91810	11	39
22	. 39661	27	. 52134	169	. 43205	34	. 31456	185	. 08934	14	. 91799	12	38
23	. 39688	27	. 51965	170	. 43239	35	. 31271	185	. 08948	14	. 91787	12	37
24	. 39715	26	. 51795	169	. 43274	34	. 31086	184	. 08962	13	. 91775	11	36
25	0. 39741	27	2. 51626	169	0. 43308	35	2. 30902	184	1. 08975	14	0. 91764	12	35
26	. 39768	27	. 51457	168	. 43343	35	. 30718	184	. 08989	14	. 91752	11	34
27	. 39795	27	. 51289	169	. 43378	34	. 30534	183	. 09003	14	. 91741	12	33
28	. 39822	26	. 51120	168	. 43412	35	. 30351	184	. 09017	13	. 91729	11	32
29	. 39848	27	. 50952	168	. 43447	34	. 30167	183	. 09030	14	. 91718	12	31
30	0. 39875	27	2. 50784	167	0. 43481	35	2. 29984	183	1. 09044	14	0. 91706	12	30
31	. 39902	26	. 50617	168	. 43516	34	. 29801	182	. 09058	14	. 91694	11	29
32	. 39928	27	. 50449	167	. 43550	35	. 29619	182	. 09072	14	. 91683	12	28
33	. 39955	27	. 50282	167	. 43585	35	. 29437	183	. 09086	13	. 91671	11	27
34	. 39982	26	. 50115	167	. 43620	34	. 29254	181	. 09099	14	. 91660	12	26
35	0. 40008	27	2. 49948	166	0. 43654	35	2. 29073	182	1. 09113	14	0. 91648	12	25
36	. 40035	27	. 49782	166	. 43689	35	. 28891	181	. 09127	14	. 91636	11	24
37	. 40062	26	. 49616	166	. 43724	34	. 28710	182	. 09141	14	. 91625	12	23
38	. 40088	27	. 49450	166	. 43758	35	. 28528	180	. 09155	14	. 91613	12	22
39	. 40115	26	. 49284	165	. 43793	35	. 28348	181	. 09169	14	. 91601	11	21
40	0. 40141	27	2. 49119	165	0. 43828	34	2. 28167	180	1. 09183	14	0. 91590	12	20
41	. 40168	27	. 48954	165	. 43862	35	. 27987	181	. 09197	14	. 91578	12	19
42	. 40195	26	. 48789	165	. 43897	35	. 27806	180	. 09211	13	. 91566	11	18
43	. 40221	27	. 48624	165	. 43932	34	. 27626	179	. 09224	14	. 91555	12	17
44	. 40248	27	. 48459	164	. 43966	35	. 27447	180	. 09238	14	. 91543	12	16
45	0. 40275	26	2. 48295	164	0. 44001	35	2. 27267	179	1. 09252	14	0. 91531	12	15
46	. 40301	27	. 48131	164	. 44036	35	. 27088	179	. 09266	14	. 91519	11	14
47	. 40328	27	. 47967	163	. 44071	34	. 26909	179	. 09280	14	. 91508	12	13
48	. 40355	26	. 47804	164	. 44105	35	. 26730	178	. 09294	14	. 91496	12	12
49	. 40381	27	. 47640	163	. 44140	35	. 26552	178	. 09308	15	. 91484	12	11
50	0. 40408	26	2. 47477	163	0. 44175	35	2. 26374	178	1. 09323	14	0. 91472	11	10
51	. 40434	27	. 47314	162	. 44210	34	. 26196	178	. 09337	14	. 91461	12	9
52	. 40461	27	. 47152	163	. 44244	35	. 26018	178	. 09351	14	. 91449	12	8
53	. 40488	26	. 46989	162	. 44279	35	. 25840	177	. 09365	14	. 91437	12	7
54	. 40514	27	. 46827	162	. 44314	35	. 25663	177	. 09379	14	. 91425	11	6
55	0. 40541	26	2. 46665	161	0. 44349	35	2. 25486	177	1. 09393	14	0. 91414	12	5
56	. 40567	27	. 46504	162	. 44384	34	. 25309	177	. 09407	14	. 91402	12	4
57	. 40594	27	. 46342	161	. 44418	35	. 25132	176	. 09421	14	. 91390	12	3
58	. 40621	26	. 46181	161	. 44453	35	. 24956	176	. 09435	14	. 91378	12	2
59	. 40647	27	. 46020	161	. 44488	35	. 24780	176	. 09449	15	. 91366	11	1
60	0. 40674		2. 45859		0. 44523		2. 24604		1. 09464		0. 91355		0
↑ 113° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ← 66°

24° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′ ← 155° ↓	
0	0. 40674	26	2. 45859	160	0. 44523	35	2. 24604	176	1. 09464	14	0. 91355	12	60
1	. 40700	27	. 45699	160	. 44558	35	. 24428	176	. 09478	14	. 91343	12	59
2	. 40727	26	. 45539	161	. 44593	34	. 24252	175	. 09492	14	. 91331	12	58
3	. 40753	27	. 45378	159	. 44627	35	. 24077	175	. 09506	14	. 91319	12	57
4	. 40780	26	. 45219	160	. 44662	35	. 23902	175	. 09520	15	. 91307	12	56
5	0. 40806	27	2. 45059	159	0. 44697	35	2. 23727	174	1. 09535	14	0. 91295	12	55
6	. 40833	27	. 44900	159	. 44732	35	. 23553	175	. 09549	14	. 91283	11	54
7	. 40860	26	. 44741	159	. 44767	35	. 23378	174	. 09563	14	. 91272	12	53
8	. 40886	27	. 44582	159	. 44802	35	. 23204	174	. 09577	15	. 91260	12	52
9	. 40913	26	. 44423	159	. 44837	35	. 23030	173	. 09592	14	. 91248	12	51
10	0. 40939	27	2. 44264	158	0. 44872	35	2. 22857	174	1. 09606	14	0. 91236	12	50
11	. 40966	26	. 44106	158	. 44907	35	. 22683	173	. 09620	15	. 91224	12	49
12	. 40992	27	. 43948	158	. 44942	35	. 22510	173	. 09635	14	. 91212	12	48
13	. 41019	26	. 43790	157	. 44977	35	. 22337	173	. 09649	14	. 91200	12	47
14	. 41045	27	. 43633	157	. 45012	35	. 22164	172	. 09663	15	. 91188	12	46
15	0. 41072	26	2. 43476	158	0. 45047	35	2. 21992	173	1. 09678	14	0. 91176	12	45
16	. 41098	27	. 43318	156	. 45082	35	. 21819	172	. 09692	15	. 91164	12	44
17	. 41125	26	. 43162	157	. 45117	35	. 21647	172	. 09707	14	. 91152	12	43
18	. 41151	27	. 43005	157	. 45152	35	. 21475	171	. 09721	14	. 91140	12	42
19	. 41178	26	. 42848	156	. 45187	35	. 21304	172	. 09735	15	. 91128	12	41
20	0. 41204	27	2. 42692	156	0. 45222	35	2. 21132	171	1. 09750	14	0. 91116	12	40
21	. 41231	26	. 42536	156	. 45257	35	. 20961	171	. 09764	15	. 91104	12	39
22	. 41257	27	. 42380	155	. 45292	35	. 20790	171	. 09779	14	. 91092	12	38
23	. 41284	26	. 42225	155	. 45327	35	. 20619	170	. 09793	15	. 91080	12	37
24	. 41310	27	. 42070	156	. 45362	35	. 20449	171	. 09808	14	. 91068	12	36
25	0. 41337	26	2. 41914	154	0. 45397	35	2. 20278	170	1. 09822	15	0. 91056	12	35
26	. 41363	27	. 41760	155	. 45432	35	. 20108	170	. 09837	14	. 91044	12	34
27	. 41390	26	. 41605	155	. 45467	35	. 19938	169	. 09851	15	. 91032	12	33
28	. 41416	27	. 41450	154	. 45502	36	. 19769	170	. 09866	14	. 91020	12	32
29	. 41443	26	. 41296	154	. 45538	35	. 19599	169	. 09880	15	. 91008	12	31
30	0. 41469	27	2. 41142	154	0. 45573	35	2. 19430	169	1. 09895	14	0. 90996	12	30
31	. 41496	26	. 40988	153	. 45608	35	. 19261	169	. 09909	15	. 90984	12	29
32	. 41522	27	. 40835	154	. 45643	35	. 19092	169	. 09924	15	. 90972	12	28
33	. 41549	26	. 40681	153	. 45678	35	. 18923	168	. 09939	14	. 90960	12	27
34	. 41575	27	. 40528	153	. 45713	35	. 18755	168	. 09953	15	. 90948	12	26
35	0. 41602	26	2. 40375	153	0. 45748	36	2. 18587	168	1. 09968	14	0. 90936	12	25
36	. 41628	27	. 40222	152	. 45784	35	. 18419	168	. 09982	15	. 90924	13	24
37	. 41655	26	. 40070	152	. 45819	35	. 18251	167	. 09997	15	. 90911	12	23
38	. 41681	26	. 39918	152	. 45854	35	. 18084	168	. 10012	14	. 90899	12	22
39	. 41707	27	. 39766	152	. 45889	35	. 17916	167	. 10026	15	. 90887	12	21
40	0. 41734	26	2. 39614	152	0. 45924	36	2. 17749	167	1. 10041	15	0. 90875	12	20
41	. 41760	27	. 39462	151	. 45960	35	. 17582	166	. 10056	15	. 90863	12	19
42	. 41787	26	. 39311	152	. 45995	35	. 17416	167	. 10071	14	. 90851	12	18
43	. 41813	27	. 39159	151	. 46030	35	. 17249	166	. 10085	15	. 90839	13	17
44	. 41840	26	. 39008	151	. 46065	36	. 17083	166	. 10100	15	. 90826	12	16
45	0. 41866	26	2. 38857	150	0. 46101	35	2. 16917	166	1. 10115	15	0. 90814	12	15
46	. 41892	27	. 38707	151	. 46136	35	. 16751	166	. 10130	14	. 90802	12	14
47	. 41919	26	. 38556	150	. 46171	35	. 16585	165	. 10144	15	. 90790	12	13
48	. 41945	27	. 38406	150	. 46206	36	. 16420	165	. 10159	15	. 90778	12	12
49	. 41972	26	. 38256	150	. 46242	35	. 16255	165	. 10174	15	. 90766	13	11
50	0. 41998	26	2. 38106	149	0. 46277	35	2. 16090	165	1. 10189	15	0. 90753	12	10
51	. 42024	27	. 37957	149	. 46312	36	. 15925	165	. 10204	14	. 90741	12	9
52	. 42051	26	. 37808	150	. 46348	35	. 15760	164	. 10218	15	. 90729	12	8
53	. 42077	27	. 37658	149	. 46383	35	. 15596	164	. 10233	15	. 90717	13	7
54	. 42104	26	. 37509	148	. 46418	36	. 15432	164	. 10248	15	. 90704	12	6
55	0. 42130	26	2. 37361	149	0. 46454	35	2. 15268	164	1. 10263	15	0. 90692	12	5
56	. 42156	27	. 37212	148	. 46489	36	. 15104	164	. 10278	15	. 90680	12	4
57	. 42183	26	. 37064	148	. 46525	35	. 14940	163	. 10293	15	. 90668	13	3
58	. 42209	26	. 36916	148	. 46560	35	. 14777	163	. 10308	15	. 90655	12	2
59	. 42235	27	. 36768	148	. 46595	36	. 14614	163	. 10323	15	. 90643	12	1
60	0. 42262		2. 36620		0. 46631		2. 14451		1. 10338		0. 90631		0
↑ 114° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′ ← 65° ↑	

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25°→ ↓ ′	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	←154° ↓ ′
0	0. 42262	26	2. 36620	147	0. 46631	35	2. 14451	163	1. 10338	15	0. 90631	13	60
1	. 42288	27	. 36473	148	. 46666	36	. 14288	163	. 10353	15	. 90618	12	59
2	. 42315	26	. 36325	147	. 46702	35	. 14125	162	. 10368	15	. 90606	12	58
3	. 42341	26	. 36178	147	. 46737	35	. 13963	162	. 10383	15	. 90594	12	57
4	. 42367	27	. 36031	146	. 46772	36	. 13801	162	. 10398	15	. 90582	13	56
5	0. 42394	26	2. 35885	147	0. 46808	35	2. 13639	162	1. 10413	15	0. 90569	12	55
6	. 42420	26	. 35738	146	. 46843	36	. 13477	161	. 10428	15	. 90557	12	54
7	. 42446	27	. 35592	146	. 46879	35	. 13316	162	. 10443	15	. 90545	13	53
8	. 42473	26	. 35446	146	. 46914	36	. 13154	161	. 10458	15	. 90532	12	52
9	. 42499	26	. 35300	146	. 46950	35	. 12993	161	. 10473	15	. 90520	13	51
10	0. 42525	27	2. 35154	145	0. 46985	36	2. 12832	161	1. 10488	15	0. 90507	12	50
11	. 42552	26	. 35009	146	. 47021	35	. 12671	160	. 10503	15	. 90495	12	49
12	. 42578	26	. 34863	145	. 47056	36	. 12511	161	. 10518	15	. 90483	13	48
13	. 42604	27	. 34718	145	. 47092	36	. 12350	160	. 10533	15	. 90470	12	47
14	. 42631	26	. 34573	144	. 47128	35	. 12190	160	. 10549	16	. 90458	12	46
15	0. 42657	26	2. 34429	145	0. 47163	36	2. 12030	159	1. 10564	15	0. 90446	13	45
16	. 42683	26	. 34284	144	. 47199	35	. 11871	160	. 10579	15	. 90433	12	44
17	. 42709	27	. 34140	144	. 47234	36	. 11711	159	. 10594	15	. 90421	13	43
18	. 42736	26	. 33996	144	. 47270	35	. 11552	160	. 10609	16	. 90408	12	42
19	. 42762	26	. 33852	144	. 47305	36	. 11392	159	. 10625	15	. 90396	13	41
20	0. 42788	27	2. 33708	143	0. 47341	36	2. 11233	158	1. 10640	15	0. 90383	12	40
21	. 42815	26	. 33565	143	. 47377	35	. 11075	159	. 10655	15	. 90371	13	39
22	. 42841	26	. 33422	144	. 47412	36	. 10916	158	. 10670	15	. 90358	12	38
23	. 42867	27	. 33278	143	. 47448	35	. 10758	158	. 10686	16	. 90346	12	37
24	. 42894	26	. 33135	142	. 47483	36	. 10600	158	. 10701	15	. 90334	13	36
25	0. 42920	26	2. 32993	143	0. 47519	36	2. 10442	158	1. 10716	15	0. 90321	12	35
26	. 42946	26	. 32850	142	. 47555	35	. 10284	158	. 10731	16	. 90309	13	34
27	. 42972	27	. 32708	142	. 47590	36	. 10126	157	. 10747	15	. 90296	12	33
28	. 42999	26	. 32566	142	. 47626	36	. 09969	158	. 10762	15	. 90284	12	32
29	. 43025	26	. 32424	142	. 47662	36	. 09811	157	. 10777	16	. 90271	13	31
30	0. 43051	26	2. 32282	142	0. 47698	35	2. 09654	156	1. 10793	15	0. 90259	12	30
31	. 43077	27	. 32140	141	. 47733	36	. 09498	157	. 10808	16	. 90246	13	29
32	. 43104	26	. 31999	141	. 47769	36	. 09341	157	. 10824	15	. 90233	12	28
33	. 43130	26	. 31858	141	. 47805	35	. 09184	157	. 10839	15	. 90221	13	27
34	. 43156	26	. 31717	141	. 47840	36	. 09028	156	. 10854	16	. 90208	12	26
35	0. 43182	27	2. 31576	140	0. 47876	36	2. 08872	156	1. 10870	15	0. 90196	13	25
36	. 43209	26	. 31436	141	. 47912	36	. 08716	156	. 10885	16	. 90183	12	24
37	. 43235	26	. 31295	140	. 47948	36	. 08560	155	. 10901	15	. 90171	13	23
38	. 43261	26	. 31155	140	. 47984	35	. 08405	155	. 10916	16	. 90158	12	22
39	. 43287	26	. 31015	140	. 48019	36	. 08250	156	. 10932	15	. 90146	13	21
40	0. 43313	27	2. 30875	140	0. 48055	36	2. 08094	155	1. 10947	16	0. 90133	13	20
41	. 43340	26	. 30735	139	. 48091	36	. 07939	154	. 10963	15	. 90120	12	19
42	. 43366	26	. 30596	139	. 48127	36	. 07785	155	. 10978	16	. 90108	13	18
43	. 43392	26	. 30457	139	. 48163	35	. 07630	154	. 10994	15	. 90095	13	17
44	. 43418	27	. 30318	139	. 48198	36	. 07476	155	. 11009	16	. 90082	12	16
45	0. 43445	26	2. 30179	139	0. 48234	36	2. 07321	154	1. 11025	16	0. 90070	13	15
46	. 43471	26	. 30040	139	. 48270	36	. 07167	153	. 11041	15	. 90057	12	14
47	. 43497	26	. 29901	138	. 48306	36	. 07014	154	. 11056	16	. 90045	13	13
48	. 43523	26	. 29763	138	. 48342	36	. 06860	154	. 11072	16	. 90032	13	12
49	. 43549	26	. 29625	138	. 48378	36	. 06706	153	. 11087	15	. 90019	12	11
50	0. 43575	27	2. 29487	138	0. 48414	36	2. 06553	153	1. 11103	16	0. 90007	13	10
51	. 43602	26	. 29349	138	. 48450	36	. 06400	153	. 11119	16	. 89994	13	9
52	. 43628	26	. 29211	138	. 48486	35	. 06247	153	. 11134	16	. 89981	13	8
53	. 43654	26	. 29074	137	. 48521	36	. 06094	152	. 11150	16	. 89968	12	7
54	. 43680	26	. 28937	137	. 48557	36	. 05942	152	. 11166	15	. 89956	13	6
55	0. 43706	27	2. 28800	137	0. 48593	36	2. 05790	153	1. 11181	16	0. 89943	13	5
56	. 43733	26	. 28663	137	. 48629	36	. 05637	152	. 11197	16	. 89930	12	4
57	. 43759	26	. 28526	136	. 48665	36	. 05485	152	. 11213	16	. 89918	13	3
58	. 43785	26	. 28390	137	. 48701	36	. 05333	151	. 11229	16	. 89905	13	2
59	. 43811	26	. 28253	136	. 48737	36	. 05182	152	. 11244	15	. 89892	13	1
60	0. 43837		2. 28117		0. 48773		2. 05030		1. 11260	16	0. 89879		0
↑ 115°→ cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ←64°

26°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	←153° ↓
0	0. 43837	26	2. 28117	136	0. 48773	36	2. 05030	151	1. 11260	16	0. 89879	12	60
1	. 43863	26	. 27981	136	. 48809	36	. 04879	151	. 11276	16	. 89867	13	59
2	. 43889	27	. 27845	135	. 48845	36	. 04728	151	. 11292	16	. 89854	13	58
3	. 43916	26	. 27710	136	. 48881	36	. 04577	151	. 11308	15	. 89841	13	57
4	. 43942	26	. 27574	135	. 48917	36	. 04426	150	. 11323	16	. 89828	12	56
5	0. 43968	26	2. 27439	135	0. 48953	36	2. 04276	151	1. 11339	16	0. 89816	13	55
6	. 43994	26	. 27304	135	. 48989	37	. 04125	150	. 11355	16	. 89803	13	54
7	. 44020	26	. 27169	134	. 49026	36	. 03975	150	. 11371	16	. 89790	13	53
8	. 44046	26	. 27035	135	. 49062	36	. 03825	150	. 11387	16	. 89777	13	52
9	. 44072	26	. 26900	134	. 49098	36	. 03675	149	. 11403	16	. 89764	12	51
10	0. 44098	26	2. 26766	134	0. 49134	36	2. 03526	150	1. 11419	16	0. 89752	13	50
11	. 44124	27	. 26632	134	. 49170	36	. 03376	149	. 11435	16	. 89739	13	49
12	. 44151	26	. 26498	134	. 49206	36	. 03227	149	. 11451	16	. 89726	13	48
13	. 44177	26	. 26364	134	. 49242	36	. 03078	149	. 11467	16	. 89713	13	47
14	. 44203	26	. 26230	133	. 49278	37	. 02929	149	. 11483	16	. 89700	13	46
15	0. 44229	26	2. 26097	134	0. 49315	36	2. 02780	149	1. 11499	16	0. 89687	13	45
16	. 44255	26	. 25963	133	. 49351	36	. 02631	148	. 11515	16	. 89674	12	44
17	. 44281	26	. 25830	133	. 49387	36	. 02483	148	. 11531	16	. 89662	13	43
18	. 44307	26	. 25697	132	. 49423	36	. 02335	148	. 11547	16	. 89649	13	42
19	. 44333	26	. 25565	133	. 49459	36	. 02187	148	. 11563	16	. 89636	13	41
20	0. 44359	26	2. 25432	132	0. 49495	37	2. 02039	148	1. 11579	16	0. 89623	13	40
21	. 44385	26	. 25300	133	. 49532	36	. 01891	148	. 11595	16	. 89610	13	39
22	. 44411	26	. 25167	132	. 49568	36	. 01743	147	. 11611	16	. 89597	13	38
23	. 44437	27	. 25035	132	. 49604	36	. 01596	147	. 11627	16	. 89584	13	37
24	. 44464	26	. 24903	131	. 49640	37	. 01449	147	. 11643	16	. 89571	13	36
25	0. 44490	26	2. 24772	132	0. 49677	36	2. 01302	147	1. 11659	16	0. 89558	13	35
26	. 44516	26	. 24640	131	. 49713	36	. 01155	147	. 11675	16	. 89545	13	34
27	. 44542	26	. 24509	131	. 49749	37	. 01008	146	. 11691	17	. 89532	13	33
28	. 44568	26	. 24378	131	. 49786	36	. 00862	147	. 11708	16	. 89519	13	32
29	. 44594	26	. 24247	131	. 49822	36	. 00715	146	. 11724	16	. 89506	13	31
30	0. 44620	26	2. 24116	131	0. 49858	36	2. 00569	146	1. 11740	16	0. 89493	13	30
31	. 44646	26	. 23985	130	. 49894	37	. 00423	146	. 11756	16	. 89480	13	29
32	. 44672	26	. 23855	131	. 49931	36	. 00277	146	. 11772	17	. 89467	13	28
33	. 44698	26	. 23724	130	. 49967	37	2. 00131	145	. 11789	16	. 89454	13	27
34	. 44724	26	. 23594	130	. 50004	36	1. 99986	145	. 11805	16	. 89441	13	26
35	0. 44750	26	2. 23464	130	0. 50040	36	1. 99841	146	1. 11821	17	0. 89428	13	25
36	. 44776	26	. 23334	129	. 50076	37	. 99695	145	. 11838	16	. 89415	13	24
37	. 44802	26	. 23205	130	. 50113	36	. 99550	144	. 11854	16	. 89402	13	23
38	. 44828	26	. 23075	129	. 50149	36	. 99406	145	. 11870	16	. 89389	13	22
39	. 44854	26	. 22946	129	. 50185	37	. 99261	145	. 11886	17	. 89376	13	21
40	0. 44880	26	2. 22817	129	0. 50222	36	1. 99116	144	1. 11903	16	0. 89363	13	20
41	. 44906	26	. 22688	129	. 50258	37	. 98972	144	. 11919	17	. 89350	13	19
42	. 44932	26	. 22559	129	. 50295	36	. 98828	144	. 11936	16	. 89337	13	18
43	. 44958	26	. 22430	128	. 50331	37	. 98684	144	. 11952	16	. 89324	13	17
44	. 44984	26	. 22302	128	. 50368	36	. 98540	144	. 11968	17	. 89311	13	16
45	0. 45010	26	2. 22174	129	0. 50404	37	1. 98396	143	1. 11985	16	0. 89298	13	15
46	. 45036	26	. 22045	127	. 50441	36	. 98253	143	. 12001	17	. 89285	13	14
47	. 45062	26	. 21918	128	. 50477	37	. 98110	144	. 12018	16	. 89272	13	13
48	. 45088	26	. 21790	128	. 50514	36	. 97966	143	. 12034	17	. 89259	14	12
49	. 45114	26	. 21662	127	. 50550	37	. 97823	142	. 12051	16	. 89245	13	11
50	0. 45140	26	2. 21535	128	0. 50587	36	1. 97681	143	1. 12067	16	0. 89232	13	10
51	. 45166	26	. 21407	127	. 50623	37	. 97538	143	. 12083	17	. 89219	13	9
52	. 45192	26	. 21280	127	. 50660	36	. 97395	142	. 12100	17	. 89206	13	8
53	. 45218	25	. 21153	127	. 50696	37	. 97253	142	. 12117	16	. 89193	13	7
54	. 45243	26	. 21026	126	. 50733	36	. 97111	142	. 12133	17	. 89180	13	6
55	0. 45269	26	2. 20900	127	0. 50769	37	1. 96969	142	1. 12150	16	0. 89167	14	5
56	. 45295	26	. 20773	126	. 50806	37	. 96827	142	. 12166	17	. 89153	13	4
57	. 45321	26	. 20647	126	. 50843	36	. 96685	141	. 12183	16	. 89140	13	3
58	. 45347	26	. 20521	126	. 50879	37	. 96544	142	. 12199	17	. 89127	13	2
59	. 45373	26	. 20395	126	. 50916	37	. 96402	141	. 12216	17	. 89114	13	1
60	0. 45399	26	2. 20269	126	0. 50953	37	1. 96261	141	1. 12233	17	0. 89101	13	0
↑ 116°→	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ←63°

27°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	←152° ↓
′													′
0	0. 45399	26	2. 20269	126	0. 50953	36	1. 96261	141	1. 12233	16	0. 89101	14	60
1	. 45425	26	. 20143	125	. 50989	37	. 96120	141	. 12249	17	. 89087	13	59
2	. 45451	26	. 20018	126	. 51026	37	. 95979	141	. 12266	17	. 89074	13	58
3	. 45477	26	. 19892	125	. 51063	36	. 95838	140	. 12283	16	. 89061	13	57
4	. 45503	26	. 19767	125	. 51099	37	. 95698	141	. 12299	17	. 89048	13	56
5	0. 45529	25	2. 19642	125	0. 51136	37	1. 95557	140	1. 12316	17	0. 89035	14	55
6	. 45554	26	. 19517	124	. 51173	36	. 95417	140	. 12333	16	. 89021	13	54
7	. 45580	26	. 19393	125	. 51209	37	. 95277	140	. 12349	17	. 89008	13	53
8	. 45606	26	. 19268	124	. 51246	37	. 95137	140	. 12366	17	. 88995	13	52
9	. 45632	26	. 19144	125	. 51283	36	. 94997	139	. 12383	17	. 88981	14	51
10	0. 45658	26	2. 19019	124	0. 51319	37	1. 94858	140	1. 12400	16	0. 88968	13	50
11	. 45684	26	. 18895	123	. 51356	37	. 94718	139	. 12416	17	. 88955	13	49
12	. 45710	26	. 18772	124	. 51393	37	. 94579	139	. 12433	17	. 88942	14	48
13	. 45736	26	. 18648	124	. 51430	37	. 94440	139	. 12450	17	. 88928	13	47
14	. 45762	25	. 18524	123	. 51467	36	. 94301	139	. 12467	17	. 88915	13	46
15	0. 45787	26	2. 18401	124	0. 51503	37	1. 94162	139	1. 12484	17	0. 88902	14	45
16	. 45813	26	. 18277	123	. 51540	37	. 94023	138	. 12501	17	. 88888	13	44
17	. 45839	26	. 18154	123	. 51577	37	. 93885	139	. 12518	16	. 88875	13	43
18	. 45865	26	. 18031	122	. 51614	37	. 93746	138	. 12534	17	. 88862	14	42
19	. 45891	26	. 17909	123	. 51651	37	. 93608	138	. 12551	17	. 88848	13	41
20	0. 45917	25	2. 17780	123	0. 51688	36	1. 93470	138	1. 12568	17	0. 88835	13	40
21	. 45942	26	. 17663	122	. 51724	37	. 93332	137	. 12585	17	. 88822	14	39
22	. 45968	26	. 17541	122	. 51761	37	. 93195	138	. 12602	17	. 88808	13	38
23	. 45994	26	. 17419	122	. 51798	37	. 93057	137	. 12619	17	. 88795	13	37
24	. 46020	26	. 17297	122	. 51835	37	. 92920	138	. 12636	17	. 88782	14	36
25	0. 46046	26	2. 17175	122	0. 51872	37	1. 92782	137	1. 12653	17	0. 88768	13	35
26	. 46072	25	. 17053	121	. 51909	37	. 92645	137	. 12670	17	. 88755	14	34
27	. 46097	26	. 16932	122	. 51946	37	. 92508	137	. 12687	17	. 88741	13	33
28	. 46123	26	. 16810	121	. 51983	37	. 92371	136	. 12704	17	. 88728	13	32
29	. 46149	26	. 16689	121	. 52020	37	. 92235	137	. 12721	17	. 88715	14	31
30	0. 46175	26	2. 16568	121	0. 52057	37	1. 92098	136	1. 12738	17	0. 88701	13	30
31	. 46201	25	. 16447	121	. 52094	37	. 91962	136	. 12755	17	. 88688	14	29
32	. 46226	26	. 16326	120	. 52131	37	. 91826	136	. 12772	17	. 88674	13	28
33	. 46252	26	. 16206	121	. 52168	37	. 91690	136	. 12789	18	. 88661	14	27
34	. 46278	26	. 16085	120	. 52205	37	. 91554	136	. 12807	17	. 88647	13	26
35	0. 46304	26	2. 15965	120	0. 52242	37	1. 91418	136	1. 12824	17	0. 88634	14	25
36	. 46330	25	. 15845	120	. 52279	37	. 91282	135	. 12841	17	. 88620	13	24
37	. 46355	26	. 15725	120	. 52316	37	. 91147	135	. 12858	17	. 88607	14	23
38	. 46381	26	. 15605	120	. 52353	37	. 91012	136	. 12875	17	. 88593	13	22
39	. 46407	26	. 15485	119	. 52390	37	. 90876	135	. 12892	18	. 88580	14	21
40	0. 46433	25	2. 15366	120	0. 52427	37	1. 90741	134	1. 12910	17	0. 88566	13	20
41	. 46458	26	. 15246	119	. 52464	37	. 90607	135	. 12927	17	. 88553	14	19
42	. 46484	26	. 15127	119	. 52501	37	. 90472	135	. 12944	17	. 88539	13	18
43	. 46510	26	. 15008	119	. 52538	37	. 90337	134	. 12961	18	. 88526	14	17
44	. 46536	25	. 14889	119	. 52575	38	. 90203	134	. 12979	17	. 88512	13	16
45	0. 46561	26	2. 14770	119	0. 52613	37	1. 90069	134	1. 12996	17	0. 88499	14	15
46	. 46587	26	. 14651	118	. 52650	37	. 89935	134	. 13013	18	. 88485	13	14
47	. 46613	26	. 14533	119	. 52687	37	. 89801	134	. 13031	17	. 88472	14	13
48	. 46639	25	. 14414	118	. 52724	37	. 89667	134	. 13048	17	. 88458	13	12
49	. 46664	26	. 14296	118	. 52761	37	. 89533	133	. 13065	18	. 88445	14	11
50	0. 46690	26	2. 14178	118	0. 52798	38	1. 89400	134	1. 13083	17	0. 88431	14	10
51	. 46716	26	. 14060	118	. 52836	37	. 89266	133	. 13100	17	. 88417	13	9
52	. 46742	25	. 13942	117	. 52873	37	. 89133	133	. 13117	18	. 88404	14	8
53	. 46767	26	. 13825	118	. 52910	37	. 89000	133	. 13135	17	. 88390	13	7
54	. 46793	26	. 13707	117	. 52947	38	. 88867	133	. 13152	18	. 88377	14	6
55	0. 46819	25	2. 13590	117	0. 52985	37	1. 88734	132	1. 13170	17	0. 88363	14	5
56	. 46844	26	. 13473	117	. 53022	37	. 88602	133	. 13187	18	. 88349	13	4
57	. 46870	26	. 13356	117	. 53059	37	. 88469	132	. 13205	17	. 88336	14	3
58	. 46896	25	. 13239	117	. 53096	38	. 88337	132	. 13222	17	. 88322	14	2
59	. 46921	26	. 13122	117	. 53134	37	. 88205	132	. 13239	18	. 88308	13	1
60	0. 46947		2. 13005		0. 53171		1. 88073		1. 13257		0. 88295		0
↑ 117°→	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	←62° ↑

Natural Trigonometric Functions

28°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	←151° ↓
0	0. 46947	26	2. 13005	116	0. 53171	37	1. 88073	132	1. 13257	18	0. 88295	14	60
1	. 46973	26	. 12889	116	. 53208	38	. 87941	132	. 13275	17	. 88281	14	59
2	. 46999	25	. 12773	116	. 53246	37	. 87809	132	. 13292	18	. 88267	13	58
3	. 47024	26	. 12657	117	. 53283	37	. 87677	131	. 13310	17	. 88254	14	57
4	. 47050	26	. 12540	115	. 53320	38	. 87546	131	. 13327	18	. 88240	14	56
5	0. 47076	25	2. 12425	116	0. 53358	37	1. 87415	132	1. 13345	17	0. 88226	13	55
6	. 47101	26	. 12309	116	. 53395	37	. 87283	131	. 13362	18	. 88213	14	54
7	. 47127	26	. 12193	115	. 53432	38	. 87152	131	. 13380	18	. 88199	14	53
8	. 47153	25	. 12078	115	. 53470	37	. 87021	130	. 13398	17	. 88185	13	52
9	. 47178	26	. 11963	116	. 53507	38	. 86891	131	. 13415	18	. 88172	14	51
10	0. 47204	25	2. 11847	115	0. 53545	37	1. 86760	130	1. 13433	18	0. 88158	14	50
11	. 47229	26	. 11732	115	. 53582	38	. 86630	131	. 13451	17	. 88144	14	49
12	. 47255	26	. 11617	114	. 53620	37	. 86499	130	. 13468	18	. 88130	13	48
13	. 47281	25	. 11503	115	. 53657	37	. 86369	130	. 13486	18	. 88117	14	47
14	. 47306	26	. 11388	114	. 53694	38	. 86239	130	. 13504	17	. 88103	14	46
15	0. 47332	26	2. 11274	115	0. 53732	37	1. 86109	130	1. 13521	18	0. 88089	14	45
16	. 47358	25	. 11159	114	. 53769	38	. 85979	129	. 13539	18	. 88075	13	44
17	. 47383	26	. 11045	114	. 53807	37	. 85850	130	. 13557	18	. 88062	14	43
18	. 47409	25	. 10931	114	. 53844	38	. 85720	129	. 13575	18	. 88048	14	42
19	. 47434	26	. 10817	113	. 53882	38	. 85591	129	. 13593	17	. 88034	14	41
20	0. 47460	26	2. 10704	114	0. 53920	37	1. 85462	129	1. 13610	18	0. 88020	14	40
21	. 47486	25	. 10590	113	. 53957	38	. 85333	129	. 13628	18	. 88006	13	39
22	. 47511	26	. 10477	114	. 53995	37	. 85204	129	. 13646	18	. 87993	14	38
23	. 47537	25	. 10363	113	. 54032	38	. 85075	129	. 13664	18	. 87979	14	37
24	. 47562	26	. 10250	113	. 54070	37	. 84946	128	. 13682	18	. 87965	14	36
25	0. 47588	26	2. 10137	113	0. 54107	38	1. 84818	129	1. 13700	18	0. 87951	14	35
26	. 47614	25	. 10024	113	. 54145	38	. 84689	128	. 13718	17	. 87937	14	34
27	. 47639	26	. 09911	112	. 54183	37	. 84561	128	. 13735	18	. 87923	14	33
28	. 47665	25	. 09799	113	. 54220	38	. 84433	128	. 13753	18	. 87909	13	32
29	. 47690	26	. 09686	112	. 54258	38	. 84305	128	. 13771	18	. 87896	14	31
30	0. 47716	25	2. 09574	112	0. 54296	37	1. 84177	128	1. 13789	18	0. 87882	14	30
31	. 47741	26	. 09462	112	. 54333	38	. 84049	127	. 13807	18	. 87868	14	29
32	. 47767	26	. 09350	112	. 54371	38	. 83922	128	. 13825	18	. 87854	14	28
33	. 47793	25	. 09238	112	. 54409	37	. 83794	127	. 13843	18	. 87840	14	27
34	. 47818	26	. 09126	112	. 54446	38	. 83667	127	. 13861	18	. 87826	14	26
35	0. 47844	25	2. 09014	111	0. 54484	38	1. 83540	127	1. 13879	18	0. 87812	14	25
36	. 47869	26	. 08903	112	. 54522	38	. 83413	127	. 13897	19	. 87798	14	24
37	. 47895	25	. 08791	111	. 54560	37	. 83286	127	. 13916	18	. 87784	14	23
38	. 47920	26	. 08680	111	. 54597	38	. 83159	126	. 13934	18	. 87770	14	22
39	. 47946	25	. 08569	111	. 54635	38	. 83033	127	. 13952	18	. 87756	13	21
40	0. 47971	26	2. 08458	111	0. 54673	38	1. 82906	126	1. 13970	18	0. 87743	14	20
41	. 47997	25	. 08347	111	. 54711	37	. 82780	126	. 13988	18	. 87729	14	19
42	. 48022	26	. 08236	110	. 54748	38	. 82654	126	. 14006	18	. 87715	14	18
43	. 48048	25	. 08126	111	. 54786	38	. 82528	126	. 14024	18	. 87701	14	17
44	. 48073	26	. 08015	110	. 54824	38	. 82402	126	. 14042	19	. 87687	14	16
45	0. 48099	25	2. 07905	110	0. 54862	38	1. 82276	126	1. 14061	18	0. 87673	14	15
46	. 48124	26	. 07795	110	. 54900	38	. 82150	125	. 14079	18	. 87659	14	14
47	. 48150	25	. 07685	110	. 54938	37	. 82025	126	. 14097	18	. 87645	14	13
48	. 48175	26	. 07575	110	. 54975	38	. 81899	125	. 14115	19	. 87631	14	12
49	. 48201	25	. 07465	109	. 55013	38	. 81774	125	. 14134	18	. 87617	14	11
50	0. 48226	26	2. 07356	110	0. 55051	38	1. 81649	125	1. 14152	18	0. 87603	14	10
51	. 48252	25	. 07246	109	. 55089	38	. 81524	125	. 14170	18	. 87589	14	9
52	. 48277	26	. 07137	110	. 55127	38	. 81399	125	. 14188	19	. 87575	14	8
53	. 48303	25	. 07027	109	. 55165	38	. 81274	124	. 14207	18	. 87561	15	7
54	. 48328	26	. 06918	109	. 55203	38	. 81150	125	. 14225	18	. 87546	14	6
55	0. 48354	25	2. 06809	108	0. 55241	38	1. 81025	124	1. 14243	19	0. 87532	14	5
56	. 48379	26	. 06701	109	. 55279	38	. 80901	124	. 14262	18	. 87518	14	4
57	. 48405	25	. 06592	109	. 55317	38	. 80777	124	. 14280	19	. 87504	14	3
58	. 48430	26	. 06483	108	. 55355	38	. 80653	124	. 14299	18	. 87490	14	2
59	. 48456	25	. 06375	108	. 55393	38	. 80529	124	. 14317	18	. 87476	14	1
60	0. 48481		2. 06267		0. 55431		1. 80405		1. 14335		0. 87462		0
↑ 118°→ cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ←61°

29° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 150° ↓
0	0. 48481	25	2. 06267	109	0. 55431	38	1. 80405	124	1. 14335	19	0. 87462	14	60
1	. 48506	26	. 06158	108	. 55469	38	. 80281	123	. 14354	18	. 87448	14	59
2	. 48532	25	. 06050	108	. 55507	38	. 80158	124	. 14372	19	. 87434	14	58
3	. 48557	26	. 05942	107	. 55545	38	. 80034	123	. 14391	18	. 87420	14	57
4	. 48583	25	. 05835	108	. 55583	38	. 79911	123	. 14409	19	. 87406	15	56
5	0. 48608	26	2. 05727	108	0. 55621	38	1. 79788	123	1. 14428	18	0. 87391	14	55
6	. 48634	25	. 05619	107	. 55659	38	. 79665	123	. 14446	19	. 87377	14	54
7	. 48659	25	. 05512	107	. 55697	39	. 79542	123	. 14465	18	. 87363	14	53
8	. 48684	26	. 05405	107	. 55736	38	. 79419	123	. 14483	19	. 87349	14	52
9	. 48710	25	. 05298	107	. 55774	38	. 79296	122	. 14502	19	. 87335	14	51
10	0. 48735	26	2. 05191	107	0. 55812	38	1. 79174	123	1. 14521	18	0. 87321	15	50
11	. 48761	25	. 05084	107	. 55850	38	. 79051	122	. 14539	19	. 87306	14	49
12	. 48786	25	. 04977	107	. 55888	38	. 78929	122	. 14558	18	. 87292	14	48
13	. 48811	26	. 04870	106	. 55926	38	. 78807	122	. 14576	19	. 87278	14	47
14	. 48837	25	. 04764	107	. 55964	39	. 78685	122	. 14595	19	. 87264	14	46
15	0. 48862	26	2. 04657	106	0. 56003	38	1. 78563	122	1. 14614	18	0. 87250	15	45
16	. 48888	25	. 04551	106	. 56041	38	. 78441	122	. 14632	19	. 87235	14	44
17	. 48913	25	. 04445	106	. 56079	38	. 78319	121	. 14651	19	. 87221	14	43
18	. 48938	26	. 04339	106	. 56117	39	. 78198	121	. 14670	19	. 87207	14	42
19	. 48964	25	. 04233	105	. 56156	38	. 78077	122	. 14689	18	. 87193	15	41
20	0. 48989	25	2. 04128	106	0. 56194	38	1. 77955	121	1. 14707	19	0. 87178	14	40
21	. 49014	26	. 04022	106	. 56232	38	. 77834	121	. 14726	19	. 87164	14	39
22	. 49040	25	. 03916	105	. 56270	39	. 77713	121	. 14745	19	. 87150	14	38
23	. 49065	25	. 03811	105	. 56309	38	. 77592	121	. 14764	18	. 87136	15	37
24	. 49090	26	. 03706	105	. 56347	38	. 77471	120	. 14782	19	. 87121	14	36
25	0. 49116	25	2. 03601	105	0. 56385	39	1. 77351	121	1. 14801	19	0. 87107	14	35
26	. 49141	25	. 03496	105	. 56424	38	. 77230	120	. 14820	19	. 87093	14	34
27	. 49166	26	. 03391	105	. 56462	39	. 77110	120	. 14839	19	. 87079	15	33
28	. 49192	25	. 03286	104	. 56501	38	. 76990	121	. 14858	19	. 87064	14	32
29	. 49217	25	. 03182	105	. 56539	38	. 76869	120	. 14877	19	. 87050	14	31
30	0. 49242	26	2. 03077	104	0. 56577	39	1. 76749	120	1. 14896	18	0. 87036	15	30
31	. 49268	25	. 02973	104	. 56616	38	. 76629	119	. 14914	19	. 87021	14	29
32	. 49293	25	. 02869	104	. 56654	39	. 76510	120	. 14933	19	. 87007	14	28
33	. 49318	26	. 02765	104	. 56693	38	. 76390	119	. 14952	19	. 86993	15	27
34	. 49344	25	. 02661	104	. 56731	38	. 76271	120	. 14971	19	. 86978	14	26
35	0. 49369	25	2. 02557	104	0. 56769	39	1. 76151	119	1. 14990	19	0. 86964	15	25
36	. 49394	25	. 02453	104	. 56808	38	. 76032	119	. 15009	19	. 86949	14	24
37	. 49419	25	. 02349	104	. 56846	39	. 75913	119	. 15028	19	. 86935	14	23
38	. 49445	26	. 02246	103	. 56885	38	. 75794	119	. 15047	19	. 86921	15	22
39	. 49470	25	. 02143	104	. 56923	39	. 75675	119	. 15066	19	. 86906	14	21
40	0. 49495	26	2. 02039	103	0. 56962	38	1. 75556	119	1. 15085	20	0. 86892	14	20
41	. 49521	25	. 01936	103	. 57000	39	. 75437	118	. 15105	19	. 86878	15	19
42	. 49546	25	. 01833	103	. 57039	39	. 75319	119	. 15124	19	. 86863	14	18
43	. 49571	25	. 01730	102	. 57078	38	. 75200	118	. 15143	19	. 86849	15	17
44	. 49596	26	. 01628	103	. 57116	39	. 75082	118	. 15162	19	. 86834	14	16
45	0. 49622	25	2. 01525	103	0. 57155	38	1. 74964	118	1. 15181	19	0. 86820	15	15
46	. 49647	25	. 01422	102	. 57193	39	. 74846	118	. 15200	19	. 86805	14	14
47	. 49672	25	. 01320	102	. 57232	39	. 74728	118	. 15219	20	. 86791	14	13
48	. 49697	25	. 01218	102	. 57271	39	. 74610	118	. 15239	19	. 86777	15	12
49	. 49723	26	. 01116	102	. 57309	38	. 74492	118	. 15258	19	. 86762	14	11
50	0. 49748	25	2. 01014	102	0. 57348	39	1. 74375	117	1. 15277	19	0. 86748	15	10
51	. 49773	25	. 00912	102	. 57386	39	. 74257	118	. 15296	19	. 86733	14	9
52	. 49798	25	. 00810	102	. 57425	39	. 74140	117	. 15315	20	. 86719	15	8
53	. 49824	26	. 00708	101	. 57464	39	. 74022	118	. 15335	19	. 86704	14	7
54	. 49849	25	. 00607	102	. 57503	38	. 73905	117	. 15354	19	. 86690	15	6
55	0. 49874	25	2. 00505	101	0. 57541	39	1. 73788	117	1. 15373	20	0. 86675	14	5
56	. 49899	25	. 00404	101	. 57580	39	. 73671	116	. 15393	19	. 86661	15	4
57	. 49924	26	. 00303	101	. 57619	38	. 73555	117	. 15412	19	. 86646	14	3
58	. 49950	25	. 00202	101	. 57657	39	. 73438	117	. 15431	20	. 86632	15	2
59	. 49975	25	. 00101	101	. 57696	39	. 73321	117	. 15451	19	. 86617	14	1
60	0. 50000	25	2. 00000	101	0. 57735	39	1. 73205	116	1. 15470	19	0. 86603	14	0
↑ 119° →	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ← 60°

Natural Trigonometric Functions

30° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 149° ↓
0	0. 50000	25	2. 00000	101	0. 57735	39	1. 73205	116	1. 15470	19	0. 86603	15	60
1	. 50025	25	1. 99899	100	. 57774	39	. 73089	116	. 15489	20	. 86588	15	59
2	. 50050	26	. 99799	101	. 57813	38	. 72973	116	. 15509	19	. 86573	14	58
3	. 50076	25	. 99698	100	. 57851	39	. 72857	116	. 15528	20	. 86559	15	57
4	. 50101	25	. 99598	100	. 57890	39	. 72741	116	. 15548	19	. 86544	14	56
5	0. 50126	25	1. 99498	100	0. 57929	39	1. 72625	116	1. 15567	20	0. 86530	15	55
6	. 50151	25	. 99398	100	. 57968	39	. 72509	116	. 15587	19	. 86515	14	54
7	. 50176	25	. 99298	100	. 58007	39	. 72393	115	. 15606	20	. 86501	15	53
8	. 50201	26	. 99198	100	. 58046	39	. 72278	115	. 15626	19	. 86486	15	52
9	. 50227	25	. 99098	100	. 58085	39	. 72163	116	. 15645	20	. 86471	14	51
10	0. 50252	25	1. 98998	99	0. 58124	38	1. 72047	115	1. 15665	19	0. 86457	15	50
11	. 50277	25	. 98899	100	. 58162	39	. 71932	115	. 15684	20	. 86442	15	49
12	. 50302	25	. 98799	99	. 58201	39	. 71817	115	. 15704	20	. 86427	14	48
13	. 50327	25	. 98700	99	. 58240	39	. 71702	114	. 15724	19	. 86413	15	47
14	. 50352	25	. 98601	99	. 58279	39	. 71588	115	. 15743	20	. 86398	14	46
15	0. 50377	26	1. 98502	99	0. 58318	39	1. 71473	115	1. 15763	19	0. 86384	15	45
16	. 50403	25	. 98403	99	. 58357	39	. 71358	114	. 15782	20	. 86369	15	44
17	. 50428	25	. 98304	99	. 58396	39	. 71244	115	. 15802	20	. 86354	14	43
18	. 50453	25	. 98205	98	. 58435	39	. 71129	114	. 15822	19	. 86340	15	42
19	. 50478	25	. 98107	99	. 58474	39	. 71015	114	. 15841	20	. 86325	15	41
20	0. 50503	25	1. 98008	98	0. 58513	39	1. 70901	114	1. 15861	20	0. 86310	15	40
21	. 50528	25	. 97910	99	. 58552	39	. 70787	114	. 15881	20	. 86295	14	39
22	. 50553	25	. 97811	98	. 58591	40	. 70673	113	. 15901	19	. 86281	15	38
23	. 50578	25	. 97713	98	. 58631	39	. 70560	114	. 15920	20	. 86266	15	37
24	. 50603	25	. 97615	98	. 58670	39	. 70446	114	. 15940	20	. 86251	14	36
25	0. 50628	26	1. 97517	97	0. 58709	39	1. 70332	113	1. 15960	20	0. 86237	15	35
26	. 50654	25	. 97420	98	. 58748	39	. 70219	113	. 15980	20	. 86222	15	34
27	. 50679	25	. 97322	98	. 58787	39	. 70106	114	. 16000	19	. 86207	15	33
28	. 50704	25	. 97224	97	. 58826	39	. 69992	113	. 16019	20	. 86192	14	32
29	. 50729	25	. 97127	98	. 58865	40	. 69879	113	. 16039	20	. 86178	15	31
30	0. 50754	25	1. 97029	97	0. 58905	39	1. 69766	113	1. 16059	20	0. 86163	15	30
31	. 50779	25	. 96932	97	. 58944	39	. 69653	112	. 16079	20	. 86148	15	29
32	. 50804	25	. 96835	97	. 58983	39	. 69541	113	. 16099	20	. 86133	14	28
33	. 50829	25	. 96738	97	. 59022	39	. 69428	112	. 16119	20	. 86119	15	27
34	. 50854	25	. 96641	97	. 59061	40	. 69316	113	. 16139	20	. 86104	15	26
35	0. 50879	25	1. 96544	96	0. 59101	39	1. 69203	112	1. 16159	20	0. 86089	15	25
36	. 50904	25	. 96448	97	. 59140	39	. 69091	112	. 16179	20	. 86074	15	24
37	. 50929	25	. 96351	96	. 59179	39	. 68979	113	. 16199	20	. 86059	14	23
38	. 50954	25	. 96255	97	. 59218	40	. 68866	112	. 16219	20	. 86045	15	22
39	. 50979	25	. 96158	96	. 59258	39	. 68754	111	. 16239	20	. 86030	15	21
40	0. 51004	25	1. 96062	96	0. 59297	39	1. 68643	112	1. 16259	20	0. 86015	15	20
41	. 51029	25	. 95966	96	. 59336	40	. 68531	112	. 16279	20	. 86000	15	19
42	. 51054	25	. 95870	96	. 59376	39	. 68419	111	. 16299	20	. 85985	15	18
43	. 51079	25	. 95774	96	. 59415	39	. 68308	112	. 16319	20	. 85970	14	17
44	. 51104	25	. 95678	95	. 59454	40	. 68196	111	. 16339	20	. 85956	15	16
45	0. 51129	25	1. 95583	96	0. 59494	39	1. 68085	111	1. 16359	21	0. 85941	15	15
46	. 51154	25	. 95487	95	. 59533	40	. 67974	111	. 16380	20	. 85926	15	14
47	. 51179	25	. 95392	96	. 59573	39	. 67863	111	. 16400	20	. 85911	15	13
48	. 51204	25	. 95296	95	. 59612	39	. 67752	111	. 16420	20	. 85896	15	12
49	. 51229	25	. 95201	95	. 59651	40	. 67641	111	. 16440	20	. 85881	15	11
50	0. 51254	25	1. 95106	95	0. 59691	39	1. 67530	111	1. 16460	21	0. 85866	15	10
51	. 51279	25	. 95011	95	. 59730	40	. 67419	110	. 16481	20	. 85851	15	9
52	. 51304	25	. 94916	95	. 59770	39	. 67309	111	. 16501	20	. 85836	15	8
53	. 51329	25	. 94821	95	. 59809	40	. 67198	110	. 16521	20	. 85821	15	7
54	. 51354	25	. 94726	94	. 59849	39	. 67088	110	. 16541	21	. 85806	14	6
55	0. 51379	25	1. 94632	95	0. 59888	40	1. 66978	111	1. 16562	20	0. 85792	15	5
56	. 51404	25	. 94537	94	. 59928	39	. 66867	110	. 16582	20	. 85777	15	4
57	. 51429	25	. 94443	94	. 59967	40	. 66757	110	. 16602	21	. 85762	15	3
58	. 51454	25	. 94349	95	. 60007	39	. 66647	109	. 16623	20	. 85747	15	2
59	. 51479	25	. 94254	94	. 60046	40	. 66538	110	. 16643	20	. 85732	15	1
60	0. 51504		1. 94160		0. 60086		1. 66428		1. 16663		0. 85717		0
↑ 120° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ← 59°

31° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 148° ↓
0	0. 51504	25	1. 94160	94	0. 60086	40	1. 66428	110	1. 16663	21	0. 85717	15	60
1	. 51529	25	. 94066	93	. 60126	39	. 66318	109	. 16684	20	. 85702	15	59
2	. 51554	25	. 93973	94	. 60165	40	. 66209	110	. 16704	21	. 85687	15	58
3	. 51579	25	. 93879	94	. 60205	40	. 66099	109	. 16725	20	. 85672	15	57
4	. 51604	24	. 93785	93	. 60245	39	. 65990	109	. 16745	21	. 85657	15	56
5	0. 51628	25	1. 93692	94	0. 60284	40	1. 65881	109	1. 16766	20	0. 85642	15	55
6	. 51653	25	. 93598	93	. 60324	40	. 65772	109	. 16786	20	. 85627	15	54
7	. 51678	25	. 93505	93	. 60364	39	. 65663	109	. 16806	21	. 85612	15	53
8	. 51703	25	. 93412	93	. 60403	40	. 65554	109	. 16827	21	. 85597	15	52
9	. 51728	25	. 93319	93	. 60443	40	. 65445	108	. 16848	20	. 85582	15	51
10	0. 51753	25	1. 93226	93	0. 60483	39	1. 65337	109	1. 16868	21	0. 85567	16	50
11	. 51778	25	. 93133	93	. 60522	40	. 65228	108	. 16889	20	. 85551	15	49
12	. 51803	25	. 93040	93	. 60562	40	. 65120	109	. 16909	21	. 85536	15	48
13	. 51828	24	. 92947	92	. 60602	40	. 65011	108	. 16930	20	. 85521	15	47
14	. 51852	25	. 92855	93	. 60342	39	. 64903	108	. 16950	21	. 85506	15	46
15	0. 51877	25	1. 92762	92	0. 60681	40	1. 64795	108	1. 16971	21	0. 85491	15	45
16	. 51902	25	. 92670	92	. 60721	40	. 64687	108	. 16992	20	. 85476	15	44
17	. 51927	25	. 92578	92	. 60761	40	. 64579	108	. 17012	21	. 85461	15	43
18	. 51952	25	. 92486	92	. 60801	40	. 64471	108	. 17033	21	. 85446	15	42
19	. 51977	25	. 92394	92	. 60841	40	. 64363	107	. 17054	21	. 85431	15	41
20	0. 52002	24	1. 92302	92	0. 60881	40	1. 64256	108	1. 17075	20	0. 85416	15	40
21	. 52026	25	. 92210	92	. 60921	39	. 64148	107	. 17095	21	. 85401	16	39
22	. 52051	25	. 92118	91	. 60960	40	. 64041	107	. 17116	21	. 85385	15	38
23	. 52076	25	. 92027	92	. 61000	40	. 63934	108	. 17137	21	. 85370	15	37
24	. 52101	25	. 91935	91	. 61040	40	. 63826	107	. 17158	20	. 85355	15	36
25	0. 52126	25	1. 91844	92	0. 61080	40	1. 63719	107	1. 17178	21	0. 85340	15	35
26	. 52151	24	. 91752	91	. 61120	40	. 63612	107	. 17199	21	. 85325	15	34
27	. 52175	25	. 91661	91	. 61160	40	. 63505	107	. 17220	21	. 85310	16	33
28	. 52200	25	. 91570	91	. 61200	40	. 63398	106	. 17241	21	. 85294	15	32
29	. 52225	25	. 91479	91	. 61240	40	. 63292	107	. 17262	21	. 85279	15	31
30	0. 52250	25	1. 91388	91	0. 61280	40	1. 63185	106	1. 17283	21	0. 85264	15	30
31	. 52275	24	. 91297	90	. 61320	40	. 63079	107	. 17304	21	. 85249	15	29
32	. 52299	25	. 91207	91	. 61360	40	. 62972	106	. 17325	21	. 85234	16	28
33	. 52324	25	. 91116	90	. 61400	40	. 62866	106	. 17346	21	. 85218	15	27
34	. 52349	25	. 91026	91	. 61440	40	. 62760	106	. 17367	21	. 85203	15	26
35	0. 52374	25	1. 90935	90	0. 61480	40	1. 62654	106	1. 17388	21	0. 85188	15	25
36	. 52399	24	. 90845	90	. 61520	41	. 62548	106	. 17409	21	. 85173	16	24
37	. 52423	25	. 90755	90	. 61561	40	. 62442	106	. 17430	21	. 85157	15	23
38	. 52448	25	. 90665	90	. 61601	40	. 62336	106	. 17451	21	. 85142	15	22
39	. 52473	25	. 90575	90	. 61641	40	. 62230	105	. 17472	21	. 85127	15	21
40	0. 52498	24	1. 90485	90	0. 61681	40	1. 62125	106	1. 17493	21	0. 85112	16	20
41	. 52522	25	. 90395	90	. 61721	40	. 62019	105	. 17514	21	. 85096	15	19
42	. 52547	25	. 90305	89	. 61761	40	. 61914	105	. 17535	21	. 85081	15	18
43	. 52572	25	. 90216	90	. 61801	41	. 61809	106	. 17556	21	. 85066	15	17
44	. 52597	24	. 90126	89	. 61842	40	. 61703	105	. 17577	21	. 85051	16	16
45	0. 52621	25	1. 90037	89	0. 61882	40	1. 61598	105	1. 17598	22	0. 85035	15	15
46	. 52646	25	. 89948	90	. 61922	40	. 61493	105	. 17620	21	. 85020	15	14
47	. 52671	25	. 89858	89	. 61962	41	. 61388	105	. 17641	21	. 85005	16	13
48	. 52696	24	. 89769	89	. 62003	40	. 61283	104	. 17662	21	. 84989	15	12
49	. 52720	25	. 89680	89	. 62043	40	. 61179	105	. 17683	21	. 84974	15	11
50	0. 52745	25	1. 89591	88	0. 62083	41	1. 61074	104	1. 17704	22	0. 84959	16	10
51	. 52770	24	. 89503	89	. 62124	40	. 60970	105	. 17726	21	. 84943	15	9
52	. 52794	25	. 89414	89	. 62164	40	. 60865	104	. 17747	21	. 84928	15	8
53	. 52819	25	. 89325	88	. 62204	41	. 60761	104	. 17768	22	. 84913	16	7
54	. 52844	25	. 89237	89	. 62245	40	. 60657	104	. 17790	21	. 84897	15	6
55	0. 52869	24	1. 89148	88	0. 62285	40	1. 60553	104	1. 17811	21	0. 84882	16	5
56	. 52893	25	. 89060	88	. 62325	41	. 60449	104	. 17832	22	. 84866	15	4
57	. 52918	25	. 88972	88	. 62366	40	. 60345	104	. 17854	21	. 84851	15	3
58	. 52943	24	. 88884	88	. 62406	40	. 60241	104	. 17875	21	. 84836	16	2
59	. 52967	25	. 88796	88	. 62446	41	. 60137	104	. 17896	22	. 84820	15	1
60	0. 52992		1. 88708		0. 62487		1. 60033		1. 17918		0. 84805		0
↑ 121° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ← 58°

32° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 147° ↓
0	0. 52992	25	1. 88708	88	0. 62487	40	1. 60033	103	1. 17918	21	0. 84805	16	60
1	. 53017	24	. 88620	88	. 62527	41	. 59930	104	. 17939	22	. 84789	15	59
2	. 53041	25	. 88532	87	. 62568	40	. 59826	103	. 17961	21	. 84774	15	58
3	. 53066	25	. 88445	88	. 62608	41	. 59723	103	. 17982	22	. 84759	16	57
4	. 53091	24	. 88357	87	. 62649	40	. 59620	103	. 18004	21	. 84743	15	56
5	0. 53115	25	1. 88270	87	0. 62689	41	1. 59517	103	1. 18025	22	0. 84728	16	55
6	. 53140	24	. 88183	88	. 62730	40	. 59414	103	. 18047	21	. 84712	15	54
7	. 53164	25	. 88095	87	. 62770	41	. 59311	103	. 18068	22	. 84697	16	53
8	. 53189	25	. 88008	87	. 62811	41	. 59208	103	. 18090	21	. 84681	15	52
9	. 53214	24	. 87921	87	. 62852	40	. 59105	103	. 18111	22	. 84666	16	51
10	0. 53238	25	1. 87834	86	0. 62892	41	1. 59002	102	1. 18133	22	0. 84650	15	50
11	. 53263	25	. 87748	87	. 62933	40	. 58900	103	. 18155	21	. 84635	16	49
12	. 53288	24	. 87661	87	. 62973	41	. 58797	102	. 18176	22	. 84619	15	48
13	. 53312	25	. 87574	86	. 63014	41	. 58695	102	. 18198	22	. 84604	16	47
14	. 53337	24	. 87488	87	. 63055	40	. 58593	103	. 18220	21	. 84588	15	46
15	0. 53361	25	1. 87401	86	0. 63095	41	1. 58490	102	1. 18241	22	0. 84573	16	45
16	. 53386	25	. 87315	86	. 63136	41	. 58388	102	. 18263	22	. 84557	15	44
17	. 53411	24	. 87229	87	. 63177	40	. 58286	102	. 18285	22	. 84542	16	43
18	. 53435	25	. 87142	86	. 63217	41	. 58184	101	. 18307	21	. 84526	15	42
19	. 53460	24	. 87056	86	. 63258	41	. 58083	102	. 18328	22	. 84511	16	41
20	0. 53484	25	1. 86970	85	0. 63299	41	1. 57981	102	1. 18350	22	0. 84495	15	40
21	. 53509	25	. 86885	86	. 63340	40	. 57879	101	. 18372	22	. 84480	16	39
22	. 53534	24	. 86799	86	. 63380	41	. 57778	102	. 18394	22	. 84464	16	38
23	. 53558	25	. 86713	86	. 63421	41	. 57676	101	. 18416	21	. 84448	15	37
24	. 53583	24	. 86627	85	. 63462	41	. 57575	101	. 18437	22	. 84433	16	36
25	0. 53607	25	1. 86542	85	0. 63503	41	1. 57474	102	1. 18459	22	0. 84417	15	35
26	. 53632	24	. 86457	86	. 63544	40	. 57372	101	. 18481	22	. 84402	16	34
27	. 53656	25	. 86371	85	. 63584	41	. 57271	101	. 18503	22	. 84386	16	33
28	. 53681	24	. 86286	85	. 63625	41	. 57170	101	. 18525	22	. 84370	15	32
29	. 53705	25	. 86201	85	. 63666	41	. 57069	101	. 18547	22	. 84355	16	31
30	0. 53730	24	1. 86116	85	0. 63707	41	1. 56969	101	1. 18569	22	0. 84339	15	30
31	. 53754	25	. 86031	85	. 63748	41	. 56868	101	. 18591	22	. 84324	16	29
32	. 53779	25	. 85946	85	. 63789	41	. 56767	100	. 18613	22	. 84308	16	28
33	. 53804	24	. 85861	84	. 63830	41	. 56667	101	. 18635	22	. 84292	15	27
34	. 53828	25	. 85777	85	. 63871	41	. 56566	100	. 18657	22	. 84277	16	26
35	0. 53853	24	1. 85692	84	0. 63912	41	1. 56466	100	1. 18679	22	0. 84261	16	25
36	. 53877	25	. 85608	85	. 63953	41	. 56366	101	. 18701	22	. 84245	15	24
37	. 53902	24	. 85523	84	. 63994	41	. 56265	100	. 18723	22	. 84230	16	23
38	. 53926	25	. 85439	84	. 64035	41	. 56165	100	. 18745	22	. 84214	16	22
39	. 53951	24	. 85355	84	. 64076	41	. 56065	99	. 18767	23	. 84198	16	21
40	0. 53975	25	1. 85271	84	0. 64117	41	1. 55966	100	1. 18790	22	0. 84182	15	20
41	. 54000	24	. 85187	84	. 64158	41	. 55866	100	. 18812	22	. 84167	16	19
42	. 54024	25	. 85103	84	. 64199	41	. 55766	100	. 18834	22	. 84151	16	18
43	. 54049	24	. 85019	84	. 64240	41	. 55666	99	. 18856	22	. 84135	15	17
44	. 54073	24	. 84935	83	. 64281	41	. 55567	100	. 18878	23	. 84120	16	16
45	0. 54097	25	1. 84852	84	0. 64322	41	1. 55467	99	1. 18901	22	0. 84104	16	15
46	. 54122	24	. 84768	83	. 64363	41	. 55368	99	. 18923	22	. 84088	16	14
47	. 54146	25	. 84685	84	. 64404	42	. 55269	99	. 18945	22	. 84072	15	13
48	. 54171	24	. 84601	83	. 64446	41	. 55170	99	. 18967	23	. 84057	16	12
49	. 54195	25	. 84518	83	. 64487	41	. 55071	99	. 18990	22	. 84041	16	11
50	0. 54220	24	1. 84435	83	0. 64528	41	1. 54972	99	1. 19012	22	0. 84025	16	10
51	. 54244	25	. 84352	83	. 64569	41	. 54873	99	. 19034	23	. 84009	15	9
52	. 54269	24	. 84269	83	. 64610	42	. 54774	99	. 19057	22	. 83994	16	8
53	. 54293	24	. 84186	83	. 64652	41	. 54675	99	. 19079	23	. 83978	16	7
54	. 54317	25	. 84103	83	. 64693	41	. 54576	98	. 19102	22	. 83962	16	6
55	0. 54342	24	1. 84020	82	0. 64734	41	1. 54478	99	1. 19124	22	0. 83946	16	5
56	. 54366	25	. 83938	83	. 64775	42	. 54379	98	. 19146	23	. 83930	15	4
57	. 54391	24	. 83855	82	. 64817	41	. 54281	98	. 19169	22	. 83915	16	3
58	. 54415	25	. 83773	83	. 64858	41	. 54183	98	. 19191	23	. 83899	16	2
59	. 54440	24	. 83690	82	. 64899	42	. 54085	99	. 19214	22	. 83883	16	1
60	0. 54464		1. 83608		0. 64941		1. 53986		1. 19236		0. 83867		0
↑ 122° →	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ← 57°

33° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 146° ↓
0	0. 54464	24	1. 83608	82	0. 64941	41	1. 53986	98	1. 19236	23	0. 83867	16	60
1	. 54488	25	. 83526	82	. 64982	42	. 53888	97	. 19259	22	. 83851	16	59
2	. 54513	24	. 83444	82	. 65024	41	. 53791	98	. 19281	23	. 83835	16	58
3	. 54537	24	. 83362	82	. 65065	41	. 53693	98	. 19304	23	. 83819	15	57
4	. 54561	25	. 83280	82	. 65106	42	. 53595	98	. 19327	22	. 83804	16	56
5	0. 54586	24	1. 83198	82	0. 65148	41	1. 53497	97	1. 19349	23	0. 83788	16	55
6	. 54610	25	. 83116	82	. 65189	42	. 53400	98	. 19372	22	. 83772	16	54
7	. 54635	24	. 83034	81	. 65231	41	. 53302	97	. 19394	23	. 83756	16	53
8	. 54659	24	. 82953	82	. 65272	42	. 53205	98	. 19417	23	. 83740	16	52
9	. 54683	25	. 82871	81	. 65314	41	. 53107	97	. 19440	23	. 83724	16	51
10	0. 54708	24	1. 82790	81	0. 65355	42	1. 53010	97	1. 19463	22	0. 83708	16	50
11	. 54732	24	. 82709	82	. 65397	41	. 52913	97	. 19485	23	. 83692	16	49
12	. 54756	25	. 82627	81	. 65438	42	. 52816	97	. 19508	23	. 83676	16	48
13	. 54781	24	. 82546	81	. 65480	41	. 52719	97	. 19531	22	. 83660	16	47
14	. 54805	24	. 82465	81	. 65521	42	. 52622	97	. 19553	23	. 83645	15	46
15	0. 54829	25	1. 82384	81	0. 65563	41	1. 52525	96	1. 19576	23	0. 83629	16	45
16	. 54854	24	. 82303	81	. 65604	42	. 52429	97	. 19599	23	. 83613	16	44
17	. 54878	24	. 82222	80	. 65646	42	. 52332	97	. 19622	23	. 83597	16	43
18	. 54902	25	. 82142	81	. 65688	41	. 52235	96	. 19645	23	. 83581	16	42
19	. 54927	24	. 82061	80	. 65729	42	. 52139	96	. 19668	23	. 83565	16	41
20	0. 54951	24	1. 81981	81	0. 65771	42	1. 52043	97	1. 19691	22	0. 83549	16	40
21	. 54975	24	. 81900	80	. 65813	41	. 51946	96	. 19713	23	. 83533	16	39
22	. 54999	25	. 81820	80	. 65854	42	. 51850	96	. 19736	23	. 83517	16	38
23	. 55024	24	. 81740	81	. 65896	42	. 51754	96	. 19759	23	. 83501	16	37
24	. 55048	24	. 81659	80	. 65938	42	. 51658	96	. 19782	23	. 83485	16	36
25	0. 55072	25	1. 81579	80	0. 65980	41	1. 51562	96	1. 19805	23	0. 83469	16	35
26	. 55097	24	. 81499	80	. 66021	42	. 51466	96	. 19828	23	. 83453	16	34
27	. 55121	24	. 81419	79	. 66063	42	. 51370	95	. 19851	23	. 83437	16	33
28	. 55145	24	. 81340	80	. 66105	42	. 51275	96	. 19874	23	. 83421	16	32
29	. 55169	25	. 81260	80	. 66147	42	. 51179	95	. 19897	23	. 83405	16	31
30	0. 55194	24	1. 81180	79	0. 66189	41	1. 51084	96	1. 19920	24	0. 83389	16	30
31	. 55218	24	. 81101	80	. 66230	42	. 50988	95	. 19944	23	. 83373	17	29
32	. 55242	24	. 81021	79	. 66272	42	. 50893	96	. 19967	23	. 83356	16	28
33	. 55266	25	. 80942	80	. 66314	42	. 50797	95	. 19990	23	. 83340	16	27
34	. 55291	24	. 80862	79	. 66356	42	. 50702	95	. 20013	23	. 83324	16	26
35	0. 55315	24	1. 80783	79	0. 66398	42	1. 50607	95	1. 20036	23	0. 83308	16	25
36	. 55339	24	. 80704	79	. 66440	42	. 50512	95	. 20059	24	. 83292	16	24
37	. 55363	25	. 80625	79	. 66482	42	. 50417	95	. 20083	23	. 83276	16	23
38	. 55388	24	. 80546	79	. 66524	42	. 50322	94	. 20106	23	. 83260	16	22
39	. 55412	24	. 80467	79	. 66566	42	. 50228	95	. 20129	23	. 83244	16	21
40	0. 55436	24	1. 80388	79	0. 66608	42	1. 50133	95	1. 20152	24	0. 83228	16	20
41	. 55460	24	. 80309	78	. 66650	42	. 50038	94	. 20176	23	. 83212	17	19
42	. 55484	25	. 80231	79	. 66692	42	. 49944	95	. 20199	23	. 83195	16	18
43	. 55509	24	. 80152	78	. 66734	42	. 49849	94	. 20222	24	. 83179	16	17
44	. 55533	24	. 80074	79	. 66776	42	. 49755	94	. 20246	23	. 83163	16	16
45	0. 55557	24	1. 79995	78	0. 66818	42	1. 49661	95	1. 20269	23	0. 83147	16	15
46	. 55581	24	. 79917	78	. 66860	42	. 49566	94	. 20292	24	. 83131	16	14
47	. 55605	25	. 79839	78	. 66902	42	. 49472	94	. 20316	23	. 83115	17	13
48	. 55630	24	. 79761	79	. 66944	42	. 49378	94	. 20339	24	. 83098	16	12
49	. 55654	24	. 79682	78	. 66986	42	. 49284	94	. 20363	23	. 83082	16	11
50	0. 55678	24	1. 79604	77	0. 67028	43	1. 49190	93	1. 20386	24	0. 83066	16	10
51	. 55702	24	. 79527	78	. 67071	42	. 49097	94	. 20410	23	. 83050	16	9
52	. 55726	24	. 79449	78	. 67113	42	. 49003	94	. 20433	24	. 83034	17	8
53	. 55750	25	. 79371	78	. 67155	42	. 48909	93	. 20457	23	. 83017	16	7
54	. 55775	24	. 79293	77	. 67197	42	. 48816	94	. 20480	24	. 83001	16	6
55	0. 55799	24	1. 79216	78	0. 67239	43	1. 48722	93	1. 20504	23	0. 82985	16	5
56	. 55823	24	. 79138	77	. 67282	42	. 48629	93	. 20527	24	. 82969	16	4
57	. 55847	24	. 79061	77	. 67324	42	. 48536	94	. 20551	24	. 82953	17	3
58	. 55871	24	. 78984	78	. 67366	43	. 48442	93	. 20575	23	. 82936	16	2
59	. 55895	24	. 78906	77	. 67409	42	. 48349	93	. 20598	24	. 82920	16	1
60	0. 55919		1. 78829		0. 67451		1. 48256		1. 20622		0. 82904		0
↑ 123° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	← 56° ↑

34° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 145° ↓
′													′
0	0. 55919	24	1. 78829	77	0. 67451	42	1. 48256	93	1. 20622	23	0. 82904	17	60
1	. 55943	25	. 78752	77	. 67493	43	. 48163	93	20645	24	. 82887	16	59
2	. 55968	24	. 78675	77	. 67536	42	. 48070	93	. 20669	24	. 82871	16	58
3	. 55992	24	. 78598	77	. 67578	42	. 47977	92	. 20693	24	. 82855	16	57
4	. 56016	24	. 78521	76	. 67620	43	. 47885	93	. 20717	23	. 82839	17	56
5	0. 56040	24	1. 78445	77	0. 67663	42	1. 47792	93	1. 20740	24	0. 82822	16	55
6	. 56064	24	. 78368	77	. 67705	43	. 47699	92	. 20764	24	. 82806	16	54
7	. 56088	24	. 78291	76	. 67748	42	. 47607	93	. 20788	24	. 82790	17	53
8	. 56112	24	. 78215	77	. 67790	42	. 47514	92	. 20812	24	. 82773	16	52
9	. 56136	24	. 78138	76	. 67832	43	. 47422	92	. 20836	23	. 82757	16	51
10	0. 56160	24	1. 78062	76	0. 67875	42	1. 47330	92	1. 20859	24	0. 82741	17	50
11	. 56184	24	. 77986	76	. 67917	43	. 47238	92	. 20883	24	. 82724	16	49
12	. 56208	24	. 77910	77	. 67960	42	. 47146	93	. 20907	24	. 82708	16	48
13	. 56232	24	. 77833	76	. 68002	43	. 47053	91	. 20931	24	. 82692	17	47
14	. 56256	24	. 77757	76	. 68045	43	. 46962	92	. 20955	24	. 82675	16	46
15	0. 56280	25	1. 77681	75	0. 68088	42	1. 46870	92	1. 20979	24	0. 82659	16	45
16	. 56305	24	. 77606	76	. 68130	43	. 46778	92	. 21003	24	. 82643	17	44
17	. 56329	24	. 77530	76	. 68173	42	. 46686	91	. 21027	24	. 82626	16	43
18	. 56353	24	. 77454	76	. 68215	43	. 46595	92	. 21051	24	. 82610	17	42
19	. 56377	24	. 77378	75	. 68258	43	. 46503	92	. 21075	24	. 82593	16	41
20	0. 56401	24	1. 77303	76	0. 68301	42	1. 46411	91	1. 21099	24	0. 82577	16	40
21	. 56425	24	. 77227	75	. 68343	43	. 46320	91	. 21123	24	. 82561	17	39
22	. 56449	24	. 77152	75	. 68386	43	. 46229	92	. 21147	24	. 82544	16	38
23	. 56473	24	. 77077	76	. 68429	42	. 46137	91	. 21171	24	. 82528	17	37
24	. 56497	24	. 77001	75	. 68471	43	. 46046	91	. 21195	25	. 82511	16	36
25	0. 56521	24	1. 76926	75	0. 68514	43	1. 45955	91	1. 21220	24	0. 82495	17	35
26	. 56545	24	. 76851	75	. 68557	43	. 45864	91	. 21244	24	. 82478	16	34
27	. 56569	24	. 76776	75	. 68600	42	. 45773	91	. 21268	24	. 82462	16	33
28	. 56593	24	. 76701	75	. 68642	43	. 45682	90	. 21292	24	. 82446	17	32
29	. 56617	24	. 76626	74	. 68685	43	. 45592	91	. 21316	25	. 82429	16	31
30	0. 56641	24	1. 76552	75	0. 68728	43	1. 45501	91	1. 21341	24	0. 82413	17	30
31	. 56665	24	. 76477	75	. 68771	43	. 45410	90	. 21365	24	. 82396	16	29
32	. 56689	24	. 76402	74	. 68814	43	. 45320	91	. 21389	25	. 82380	17	28
33	. 56713	23	. 76328	75	. 68857	43	. 45229	90	. 21414	24	. 82363	16	27
34	. 56736	24	. 76253	74	. 68900	42	. 45139	90	. 21438	24	. 82347	17	26
35	0. 56760	24	1. 76179	74	0. 68942	43	1. 45049	91	1. 21462	25	0. 82330	16	25
36	. 56784	24	. 76105	74	. 68985	43	. 44958	90	. 21487	24	. 82314	17	24
37	. 56808	24	. 76031	75	. 69028	43	. 44868	90	. 21511	24	. 82297	16	23
38	. 56832	24	. 75956	74	. 69071	43	. 44778	90	. 21535	25	. 82281	17	22
39	. 56856	24	. 75882	74	. 69114	43	. 44688	90	. 21560	24	. 82264	16	21
40	0. 56880	24	1. 75808	74	0. 69157	43	1. 44598	90	1. 21584	25	0. 82248	17	20
41	. 56904	24	. 75734	73	. 69200	43	. 44508	90	. 21609	24	. 82231	17	19
42	. 56928	24	. 75661	74	. 69243	43	. 44418	89	. 21633	25	. 82214	16	18
43	. 56952	24	. 75587	74	. 69286	43	. 44329	90	. 21658	24	. 82198	17	17
44	. 56976	24	. 75513	73	. 69329	43	. 44239	90	. 21682	25	. 82181	16	16
45	0. 57000	24	1. 75440	74	0. 69372	44	1. 44149	89	1. 21707	24	0. 82165	17	15
46	. 57024	23	. 75366	73	. 69416	43	. 44060	90	. 21731	25	. 82148	16	14
47	. 57047	24	. 75293	74	. 69459	43	. 43970	89	. 21756	25	. 82132	17	13
48	. 57071	24	. 75219	73	. 69502	43	. 43881	89	. 21781	24	. 82115	17	12
49	. 57095	24	. 75146	73	. 69545	43	. 43792	89	. 21805	25	. 82098	16	11
50	0. 57119	24	1. 75073	73	0. 69588	43	1. 43703	89	1. 21830	25	0. 82082	17	10
51	. 57143	24	. 75000	73	. 69631	44	. 43614	89	. 21855	24	. 82065	17	9
52	. 57167	24	. 74927	73	. 69675	43	. 43525	89	. 21879	25	. 82048	16	8
53	. 57191	24	. 74854	73	. 69718	43	. 43436	89	. 21904	25	. 82032	17	7
54	. 57215	23	. 74781	73	. 69761	43	. 43347	89	. 21929	24	. 82015	16	6
55	0. 57238	24	1. 74708	73	0. 69804	43	1. 43258	89	1. 21953	25	0. 81999	17	5
56	. 57262	24	. 74635	73	. 69847	44	. 43169	89	. 21978	25	. 81982	17	4
57	. 57286	24	. 74562	72	. 69891	43	. 43080	88	. 22003	25	. 81965	16	3
58	. 57310	24	. 74490	73	. 69934	43	. 42992	89	. 22028	25	. 81949	17	2
59	. 57334	24	. 74417	72	. 69977	44	. 42903	88	. 22053	24	. 81932	17	1
60	0. 57358		1. 74345		0. 70021		1. 42815		1. 22077		0. 81915		0
↑ 124° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	← 55° ↑

235 Rd

35° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 144° ↓
0	0. 57358	23	1. 74345	73	0. 70021	43	1. 42815	89	1. 22077	25	0. 81915	16	60
1	. 57381	24	. 74272	72	. 70064	43	. 42726	88	. 22102	25	. 81899	17	59
2	. 57405	24	. 74200	72	. 70107	44	. 42638	88	. 22127	25	. 81882	17	58
3	. 57429	24	. 74128	72	. 70151	43	. 42550	88	. 22152	25	. 81865	17	57
4	. 57453	24	. 74056	73	. 70194	44	. 42462	88	. 22177	25	. 81848	16	56
5	0. 57477	24	1. 73983	72	0. 70238	43	1. 42374	88	1. 22202	25	0. 81832	17	55
6	. 57501	23	. 73911	71	. 70281	44	. 42286	88	. 22227	25	. 81815	17	54
7	. 57524	24	. 73840	72	. 70325	43	. 42198	88	. 22252	25	. 81798	16	53
8	. 57548	24	. 73768	72	. 70368	44	. 42110	88	. 22277	25	. 81782	17	52
9	. 57572	24	. 73696	72	. 70412	43	. 42022	88	. 22302	25	. 81765	17	51
10	0. 57596	23	1. 73624	72	0. 70455	44	1. 41934	87	1. 22327	25	0. 81748	17	50
11	. 57619	24	. 73552	71	. 70499	43	. 41847	88	. 22352	25	. 81731	17	49
12	. 57643	24	. 73481	72	. 70542	44	. 41759	87	. 22377	25	. 81714	16	48
13	. 57667	24	. 73409	71	. 70586	43	. 41672	88	. 22402	26	. 81698	17	47
14	. 57691	24	. 73338	71	. 70629	44	. 41584	87	. 22428	25	. 81681	17	46
15	0. 57715	23	1. 73267	72	0. 70673	44	1. 41497	88	1. 22453	25	0. 81664	17	45
16	. 57738	24	. 73195	71	. 70717	43	. 41409	87	. 22478	25	. 81647	16	44
17	. 57762	24	. 73124	71	. 70760	44	. 41322	87	. 22503	25	. 81631	17	43
18	. 57786	24	. 73053	71	. 70804	44	. 41235	87	. 22528	26	. 81614	17	42
19	. 57810	23	. 72982	71	. 70848	43	. 41148	87	. 22554	25	. 81597	17	41
20	0. 57833	24	1. 72911	71	0. 70891	44	1. 41061	87	1. 22579	25	0. 81580	17	40
21	. 57857	24	. 72840	71	. 70935	44	. 40974	87	. 22604	25	. 81563	17	39
22	. 57881	23	. 72769	71	. 70979	44	. 40887	87	. 22629	26	. 81546	16	38
23	. 57904	24	. 72698	70	. 71023	43	. 40800	86	. 22655	25	. 81530	17	37
24	. 57928	24	. 72628	71	. 71066	44	. 40714	87	. 22680	26	. 81513	17	36
25	0. 57952	24	1. 72557	70	0. 71110	44	1. 40627	87	1. 22706	25	0. 81496	17	35
26	. 57976	23	. 72487	71	. 71154	44	. 40540	86	. 22731	25	. 81479	17	34
27	. 57999	24	. 72416	70	. 71198	44	. 40454	87	. 22756	26	. 81462	17	33
28	. 58023	24	. 72346	71	. 71242	43	. 40367	86	. 22782	25	. 81445	17	32
29	. 58047	23	. 72275	70	. 71285	44	. 40281	86	. 22807	26	. 81428	16	31
30	0. 58070	24	1. 72205	70	0. 71329	44	1. 40195	86	1. 22833	25	0. 81412	17	30
31	. 58094	24	. 72135	70	. 71373	44	. 40109	87	. 22858	26	. 81395	17	29
32	. 58118	23	. 72065	70	. 71417	44	. 40022	86	. 22884	25	. 81378	17	28
33	. 58141	24	. 71995	70	. 71461	44	. 39936	86	. 22909	26	. 81361	17	27
34	. 58165	24	. 71925	70	. 71505	44	. 39850	86	. 22935	25	. 81344	17	26
35	0. 58189	23	1. 71855	70	0. 71549	44	1. 39764	85	1. 22960	26	0. 81327	17	25
36	. 58212	24	. 71785	70	. 71593	44	. 39679	86	. 22986	26	. 81310	17	24
37	. 58236	24	. 71715	69	. 71637	44	. 39593	86	. 23012	25	. 81293	17	23
38	. 58260	23	. 71646	70	. 71681	44	. 39507	86	. 23037	26	. 81276	17	22
39	. 58283	24	. 71576	70	. 71725	44	. 39421	85	. 23063	26	. 81259	17	21
40	0. 58307	23	1. 71506	69	0. 71769	44	1. 39336	86	1. 23089	25	0. 81242	17	20
41	. 58330	24	. 71437	69	. 71813	44	. 39250	85	. 23114	26	. 81225	17	19
42	. 58354	24	. 71368	70	. 71857	44	. 39165	86	. 23140	26	. 81208	17	18
43	. 58378	23	. 71298	69	. 71901	45	. 39079	85	. 23166	26	. 81191	17	17
44	. 58401	24	. 71229	69	. 71946	44	. 38994	85	. 23192	25	. 81174	17	16
45	0. 58425	24	1. 71160	69	0. 71990	44	1. 38909	85	1. 23217	26	0. 81157	17	15
46	. 58449	23	. 71091	69	. 72034	44	. 38824	86	. 23243	26	. 81140	17	14
47	. 58472	24	. 71022	69	. 72078	44	. 38738	85	. 23269	26	. 81123	17	13
48	. 58496	23	. 70953	69	. 72122	45	. 38653	85	. 23295	26	. 81106	17	12
49	. 58519	24	. 70884	69	. 72167	44	. 38568	84	. 23321	26	. 81089	17	11
50	0. 58543	24	1. 70815	69	0. 72211	44	1. 38484	85	1. 23347	26	0. 81072	17	10
51	. 58567	23	. 70746	69	. 72255	44	. 38399	85	. 23373	25	. 81055	17	9
52	. 58590	24	. 70677	68	. 72299	45	. 38314	85	. 23398	26	. 81038	17	8
53	. 58614	23	. 70609	69	. 72344	44	. 38229	84	. 23424	26	. 81021	17	7
54	. 58637	24	. 70540	68	. 72388	44	. 38145	85	. 23450	26	. 81004	17	6
55	0. 58661	23	1. 70472	69	0. 72432	45	1. 38060	84	1. 23476	26	0. 80987	17	5
56	. 58684	24	. 70403	68	. 72477	44	. 37976	85	. 23502	27	. 80970	17	4
57	. 58708	23	. 70335	68	. 72521	44	. 37891	84	. 23529	26	. 80953	17	3
58	. 58731	24	. 70267	69	. 72565	45	. 37807	85	. 23555	26	. 80936	17	2
59	. 58755	24	. 70198	68	. 72610	44	. 37722	84	. 23581	26	. 80919	17	1
60	0. 58779		1. 70130		0. 72654		1. 37638		1. 23607		0. 80902		0
↑ 125° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ← 54°

36° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 143° ↓
′													′
0	0. 58779	23	1. 70130	68	0. 72654	45	1. 37638	84	1. 23607	26	0. 80902	17	60
1	. 58802	24	. 70062	68	. 72699	44	. 37554	84	. 23633	26	. 80885	18	59
2	. 58826	23	. 69994	68	. 72743	45	. 37470	84	. 23659	26	. 80867	17	58
3	. 58849	24	. 69926	68	. 72788	44	. 37386	84	. 23685	26	. 80850	17	57
4	. 58873	23	. 69858	68	. 72832	45	. 37302	84	. 23711	27	. 80833	17	56
5	0. 58896	24	1. 69790	67	0. 72877	44	1. 37218	84	1. 23738	26	0. 80816	17	55
6	. 58920	23	. 69723	68	. 72921	45	. 37134	84	. 23764	26	. 80799	17	54
7	. 58943	24	. 69655	68	. 72966	44	. 37050	83	. 23790	26	. 80782	17	53
8	. 58967	23	. 69587	67	. 73010	45	. 36967	84	. 23816	27	. 80765	17	52
9	. 58990	24	. 69520	68	. 73055	45	. 36883	83	. 23843	26	. 80748	18	51
10	0. 59014	23	1. 69452	67	0. 73100	44	1. 36800	84	1. 23869	26	0. 80730	17	50
11	. 59037	24	. 69385	67	. 73144	45	. 36716	83	. 23895	27	. 80713	17	49
12	. 59061	23	. 69318	68	. 73189	45	. 36633	84	. 23922	26	. 80696	17	48
13	. 59084	24	. 69250	67	. 73234	44	. 36549	83	. 23948	27	. 80679	17	47
14	. 59108	23	. 69183	67	. 73278	45	. 36466	83	. 23975	26	. 80662	18	46
15	0. 59131	23	1. 69116	67	0. 73323	45	1. 36383	83	1. 24001	27	0. 80644	17	45
16	. 59154	24	. 69049	67	. 73368	45	. 36300	83	. 24028	26	. 80627	17	44
17	. 59178	23	. 68982	67	. 73413	44	. 36217	83	. 24054	27	. 80610	17	43
18	. 59201	24	. 68915	67	. 73457	45	. 36134	83	. 24081	26	. 80593	17	42
19	. 59225	23	. 68848	66	. 73502	45	. 36051	83	. 24107	27	. 80576	18	41
20	0. 59248	24	1. 68782	67	0. 73547	45	1. 35968	83	1. 24134	26	0. 80558	17	40
21	. 59272	23	. 68715	67	. 73592	45	. 35885	83	. 24160	27	. 80541	17	39
22	. 59295	23	. 68648	66	. 73637	44	. 35802	83	. 24187	26	. 80524	17	38
23	. 59318	24	. 68582	67	. 73681	45	. 35719	82	. 24213	27	. 80507	18	37
24	. 59342	23	. 68515	66	. 73726	45	. 35637	83	. 24240	27	. 80489	17	36
25	0. 59365	24	1. 68449	67	0. 73771	45	1. 35554	82	1. 24267	26	0. 80472	17	35
26	. 59389	23	. 68382	66	. 73816	45	. 35472	83	. 24293	27	. 80455	17	34
27	. 59412	24	. 68316	66	. 73861	45	. 35389	82	. 24320	27	. 80438	18	33
28	. 59436	23	. 68250	67	. 73906	45	. 35307	83	. 24347	26	. 80420	17	32
29	. 59459	23	. 68183	66	. 73951	45	. 35224	82	. 24373	27	. 80403	17	31
30	0. 59482	24	1. 68117	66	0. 73996	45	1. 35142	82	1. 24400	27	0. 80386	18	30
31	. 59506	23	. 68051	66	. 74041	45	. 35060	82	. 24427	27	. 80368	17	29
32	. 59529	23	. 67985	66	. 74086	45	. 34978	82	. 24454	27	. 80351	17	28
33	. 59552	24	. 67919	66	. 74131	45	. 34896	82	. 24481	27	. 80334	18	27
34	. 59576	23	. 67853	65	. 74176	45	. 34814	82	. 24508	26	. 80316	17	26
35	0. 59599	23	1. 67788	66	0. 74221	46	1. 34732	82	1. 24534	27	0. 80299	17	25
36	. 59622	24	. 67722	66	. 74267	45	. 34650	82	. 24561	27	. 80282	18	24
37	. 59646	23	. 67656	65	. 74312	45	. 34568	81	. 24588	27	. 80264	17	23
38	. 59669	24	. 67591	66	. 74357	45	. 34487	82	. 24615	27	. 80247	17	22
39	. 59693	23	. 67525	65	. 74402	45	. 34405	82	. 24642	27	. 80230	18	21
40	0. 59716	23	1. 67460	66	0. 74447	45	1. 34323	81	1. 24669	27	0. 80212	17	20
41	. 59739	24	. 67394	65	. 74492	46	. 34242	82	. 24696	27	. 80195	17	19
42	. 59763	23	. 67329	65	. 74538	45	. 34160	81	. 24723	27	. 80178	18	18
43	. 59786	23	. 67264	66	. 74583	45	. 34079	81	. 24750	27	. 80160	17	17
44	. 59809	23	. 67198	65	. 74628	46	. 33998	82	. 24777	27	. 80143	18	16
45	0. 59832	24	1. 67133	65	0. 74674	45	1. 33916	81	1. 24804	28	0. 80125	17	15
46	. 59856	23	. 67068	65	. 74719	45	. 33835	81	. 24832	27	. 80108	17	14
47	. 59879	23	. 67003	65	. 74764	46	. 33754	81	. 24859	27	. 80091	18	13
48	. 59902	24	. 66938	65	. 74810	45	. 33673	81	. 24886	27	. 80073	17	12
49	. 59926	23	. 66873	64	. 74855	45	. 33592	81	. 24913	27	. 80056	18	11
50	0. 59949	23	1. 66809	65	0. 74900	46	1. 33511	81	1. 24940	27	0. 80038	17	10
51	. 59972	23	. 66744	65	. 74946	45	. 33430	81	. 24967	28	. 80021	18	9
52	. 59995	24	. 66679	64	. 74991	46	. 33349	81	. 24995	27	. 80003	17	8
53	. 60019	23	. 66615	65	. 75037	45	. 33268	81	. 25022	27	. 79986	18	7
54	. 60042	23	. 66550	64	. 75082	46	. 33187	80	. 25049	28	. 79968	17	6
55	0. 60065	24	1. 66486	65	0. 75128	45	1. 33107	81	1. 25077	27	0. 79951	17	5
56	. 60089	23	. 66421	64	. 75173	46	. 33026	80	. 25104	27	. 79934	18	4
57	. 60112	23	. 66357	65	. 75219	45	. 32946	81	. 25131	28	. 79916	17	3
58	. 60135	23	. 66292	64	. 75264	46	. 32865	80	. 25159	27	. 79899	18	2
59	. 60158	23	. 66228	64	. 75310	45	. 32785	81	. 25186	28	. 79881	17	1
60	0. 60182	24	1. 66164		0. 75355		1. 32704		1. 25214		0. 79864		0
↑ 126° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ← 53°

37° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 142° ↓
0	0. 60182	23	1. 66164	64	0. 75355	46	1. 32704	80	1. 25214	27	0. 79864	18	60
1	. 60205	23	. 66100	64	. 75401	46	. 32624	80	. 25241	28	. 79846	17	59
2	. 60228	23	. 66036	64	. 75447	45	. 32544	80	. 25269	27	. 79829	18	58
3	. 60251	23	. 65972	64	. 75492	46	. 32464	80	. 25296	28	. 79811	18	57
4	. 60274	24	. 65908	64	. 75538	46	. 32384	80	. 25324	27	. 79793	17	56
5	0. 60298	23	1. 65844	64	0. 75584	45	1. 32304	80	1. 25351	28	0. 79776	18	55
6	. 60321	23	. 65780	63	. 75629	46	. 32224	80	. 25379	27	. 79758	17	54
7	. 60344	23	. 65717	64	. 75675	46	. 32144	80	. 25406	28	. 79741	18	53
8	. 60367	23	. 65653	64	. 75721	46	. 32064	80	. 25434	28	. 79723	17	52
9	. 60390	24	. 65589	63	. 75767	45	. 31984	80	. 25462	27	. 79706	18	51
10	0. 60414	23	1. 65526	64	0. 75812	46	1. 31904	79	1. 25489	28	0. 79688	17	50
11	. 60437	23	. 65462	63	. 75858	46	. 31825	80	. 25517	28	. 79671	18	49
12	. 60460	23	. 65399	64	. 75904	46	. 31745	79	. 25545	27	. 79653	18	48
13	. 60483	23	. 65335	63	. 75950	46	. 31666	80	. 25572	28	. 79635	17	47
14	. 60506	23	. 65272	63	. 75996	46	. 31586	79	. 25600	28	. 79618	18	46
15	0. 60529	24	1. 65209	63	0. 76042	46	1. 31507	80	1. 25628	28	0. 79600	17	45
16	. 60553	23	. 65146	63	. 76088	46	. 31427	79	. 25656	27	. 79583	18	44
17	. 60576	23	. 65083	63	. 76134	46	. 31348	79	. 25683	28	. 79565	18	43
18	. 60599	23	. 65020	63	. 76180	46	. 31269	79	. 25711	28	. 79547	17	42
19	. 60622	23	. 64957	63	. 76226	46	. 31190	80	. 25739	28	. 79530	18	41
20	0. 60645	23	1. 64894	63	0. 76272	46	1. 31110	79	1. 25767	28	0. 79512	18	40
21	. 60668	23	. 64831	63	. 76318	46	. 31031	79	. 25795	28	. 79494	17	39
22	. 60691	23	. 64768	63	. 76364	46	. 30952	79	. 25823	28	. 79477	18	38
23	. 60714	24	. 64705	62	. 76410	46	. 30873	78	. 25851	28	. 79459	18	37
24	. 60738	23	. 64643	63	. 76456	46	. 30795	79	. 25879	28	. 79441	17	36
25	0. 60761	23	1. 64580	62	0. 76502	46	1. 30716	79	1. 25907	28	0. 79424	18	35
26	. 60784	23	. 64518	63	. 76548	46	. 30637	79	. 25935	28	. 79406	18	34
27	. 60807	23	. 64455	62	. 76594	46	. 30558	78	. 25963	28	. 79388	17	33
28	. 60830	23	. 64393	63	. 76640	46	. 30480	79	. 25991	28	. 79371	18	32
29	. 60853	23	. 64330	62	. 76686	47	. 30401	78	. 26019	28	. 79353	18	31
30	0. 60876	23	1. 64268	62	0. 76733	46	1. 30323	79	1. 26047	28	0. 79335	17	30
31	. 60899	23	. 64206	62	. 76779	46	. 30244	78	. 26075	29	. 79318	18	29
32	. 60922	23	. 64144	63	. 76825	46	. 30166	79	. 26104	28	. 79300	18	28
33	. 60945	23	. 64081	62	. 76871	47	. 30087	78	. 26132	28	. 79282	18	27
34	. 60968	23	. 64019	62	. 76918	46	. 30009	78	. 26160	28	. 79264	17	26
35	0. 60991	24	1. 63957	62	0. 76964	46	1. 29931	78	1. 26188	28	0. 79247	18	25
36	. 61015	23	. 63895	61	. 77010	47	. 29853	78	. 26216	29	. 79229	18	24
37	. 61038	23	. 63834	62	. 77057	46	. 29775	79	. 26245	28	. 79211	18	23
38	. 61061	23	. 63772	62	. 77103	46	. 29696	78	. 26273	28	. 79193	17	22
39	. 61084	23	. 63710	62	. 77149	47	. 29618	77	. 26301	29	. 79176	18	21
40	0. 61107	23	1. 63648	61	0. 77196	46	1. 29541	78	1. 26330	28	0. 79158	18	20
41	. 61130	23	. 63587	62	. 77242	47	. 29463	78	. 26358	29	. 79140	18	19
42	. 61153	23	. 63525	61	. 77289	46	. 29385	78	. 26387	28	. 79122	17	18
43	. 61176	23	. 63464	62	. 77335	47	. 29307	78	. 26415	28	. 79105	18	17
44	. 61199	23	. 63402	61	. 77382	46	. 29229	77	. 26443	29	. 79087	18	16
45	0. 61222	23	1. 63341	62	0. 77428	47	1. 29152	78	1. 26472	28	0. 79069	18	15
46	. 61245	23	. 63279	61	. 77475	46	. 29074	77	. 26500	29	. 79051	18	14
47	. 61268	23	. 63218	61	. 77521	47	. 28997	78	. 26529	28	. 79033	17	13
48	. 61291	23	. 63157	61	. 77568	47	. 28919	77	. 26557	29	. 79016	18	12
49	. 61314	23	. 63096	61	. 77615	47	. 28842	78	. 26586	29	. 78998	18	11
50	0. 61337	23	1. 63035	61	0. 77661	46	1. 28764	77	1. 26615	28	0. 78980	18	10
51	. 61360	23	. 62974	61	. 77708	47	. 28687	77	. 26643	29	. 78962	18	9
52	. 61383	23	. 62913	61	. 77754	46	. 28610	77	. 26672	29	. 78944	18	8
53	. 61406	23	. 62852	61	. 77801	47	. 28533	77	. 26701	29	. 78926	18	7
54	. 61429	22	. 62791	61	. 77848	47	. 28456	77	. 26729	29	. 78908	17	6
55	0. 61451	23	1. 62730	61	0. 77895	46	1. 28379	77	1. 26758	29	0. 78891	18	5
56	. 61474	23	. 62669	60	. 77941	47	. 28302	77	. 26787	28	. 78873	18	4
57	. 61497	23	. 62609	61	. 77988	47	. 28225	77	. 26815	29	. 78855	18	3
58	. 61520	23	. 62548	61	. 78035	47	. 28148	77	. 26844	29	. 78837	18	2
59	. 61543	23	. 62487	61	. 78082	47	. 28071	77	. 26873	29	. 78819	18	1
60	0. 61566	23	1. 62427	60	0. 78129	47	1. 27994	77	1. 26902	29	0. 78801	18	0
↑ 127° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	← 52° ↑

38° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′ ← 141° ↓
0	0. 61566	23	1. 62427	61	0. 78129	46	1. 27994	77	1. 26902	29	0. 78801	18 60
1	. 61589	23	. 62366	60	. 78175	47	. 27917	76	. 26931	29	. 78783	18 59
2	. 61612	23	. 62306	60	. 78222	47	. 27841	77	. 26960	28	. 78765	18 58
3	. 61635	23	. 62246	61	. 78269	47	. 27764	76	. 26988	29	. 78747	18 57
4	. 61658	23	. 62185	60	. 78316	47	. 27688	77	. 27017	29	. 78729	18 56
5	0. 61681	23	1. 62125	60	0. 78363	47	1. 27611	76	1. 27046	29	0. 78711	17 55
6	. 61704	22	. 62065	60	. 78410	47	. 27535	77	. 27075	29	. 78694	18 54
7	. 61726	23	. 62005	60	. 78457	47	. 27458	76	. 27104	29	. 78676	18 53
8	. 61749	23	. 61945	60	. 78504	47	. 27382	76	. 27133	29	. 78658	18 52
9	. 61772	23	. 61885	60	. 78551	47	. 27306	76	. 27162	29	. 78640	18 51
10	0. 61795	23	1. 61825	60	0. 78598	47	1. 27230	77	1. 27191	30	0. 78622	18 50
11	. 61818	23	. 61765	60	. 78645	47	. 27153	76	. 27221	29	. 78604	18 49
12	. 61841	23	. 61705	59	. 78692	47	. 27077	76	. 27250	29	. 78586	18 48
13	. 61864	23	. 61646	60	. 78739	47	. 27001	76	. 27279	29	. 78568	18 47
14	. 61887	22	. 61586	60	. 78786	48	. 26925	76	. 27308	29	. 78550	18 46
15	0. 61909	23	1. 61526	59	0. 78834	47	1. 26849	75	1. 27337	29	0. 78532	18 45
16	. 61932	23	. 61467	60	. 78881	47	. 26774	76	. 27366	30	. 78514	18 44
17	. 61955	23	. 61407	59	. 78928	47	. 26698	76	. 27396	29	. 78496	18 43
18	. 61978	23	. 61348	60	. 78975	47	. 26622	76	. 27425	29	. 78478	18 42
19	. 62001	23	. 61288	59	. 79022	48	. 26546	75	. 27454	29	. 78460	18 41
20	0. 62024	22	1. 61229	59	0. 79070	47	1. 26471	76	1. 27483	30	0. 78442	18 40
21	. 62046	23	. 61170	59	. 79117	47	. 26395	76	. 27513	29	. 78424	19 39
22	. 62069	23	. 61111	60	. 79164	48	. 26319	75	. 27542	30	. 78405	18 38
23	. 62092	23	. 61051	59	. 79212	47	. 26244	75	. 27572	29	. 78387	18 37
24	. 62115	23	. 60992	59	. 79259	47	. 26169	76	. 27601	29	. 78369	18 36
25	0. 62138	22	1. 60933	59	0. 79306	48	1. 26093	75	1. 27630	30	0. 78351	18 35
26	. 62160	23	. 60874	59	. 79354	47	. 26018	75	. 27660	29	. 78333	18 34
27	. 62183	23	. 60815	59	. 79401	48	. 25943	76	. 27689	30	. 78315	18 33
28	. 62206	23	. 60756	58	. 79449	47	. 25867	75	. 27719	29	. 78297	18 32
29	. 62229	22	. 60698	59	. 79496	48	. 25792	75	. 27748	30	. 78279	18 31
30	0. 62251	23	1. 60639	59	0. 79544	47	1. 25717	75	1. 27778	29	0. 78261	18 30
31	. 62274	23	. 60580	59	. 79591	48	. 25642	75	. 27807	30	. 78243	18 29
32	. 62297	23	. 60521	58	. 79639	47	. 25567	75	. 27837	30	. 78225	19 28
33	. 62320	22	. 60463	59	. 79686	48	. 25492	75	. 27867	29	. 78206	18 27
34	. 62342	23	. 60404	58	. 79734	47	. 25417	74	. 27896	30	. 78188	18 26
35	0. 62365	23	1. 60346	59	0. 79781	48	1. 25343	75	1. 27926	30	0. 78170	18 25
36	. 62388	23	. 60287	58	. 79829	48	. 25268	75	. 27956	29	. 78152	18 24
37	. 62411	22	. 60229	58	. 79877	47	. 25193	75	. 27985	30	. 78134	18 23
38	. 62433	23	. 60171	59	. 79924	48	. 25118	74	. 28015	30	. 78116	18 22
39	. 62456	23	. 60112	58	. 79972	48	. 25044	75	. 28045	30	. 78098	19 21
40	0. 62479	23	1. 60054	58	0. 80020	47	1. 24969	74	1. 28075	30	0. 78079	18 20
41	. 62502	22	. 59996	58	. 80067	48	. 24895	75	. 28105	29	. 78061	18 19
42	. 62524	23	. 59938	58	. 80115	48	. 24820	74	. 28134	30	. 78043	18 18
43	. 62547	23	. 59880	58	. 80163	48	. 24746	74	. 28164	30	. 78025	18 17
44	. 62570	22	. 59822	58	. 80211	47	. 24672	75	. 28194	30	. 78007	19 16
45	0. 62592	23	1. 59764	58	0. 80258	48	1. 24597	74	1. 28224	30	0. 77988	18 15
46	. 62615	23	. 59706	58	. 80306	48	. 24523	74	. 28254	30	. 77970	18 14
47	. 62638	22	. 59648	58	. 80354	48	. 24449	74	. 28284	30	. 77952	18 13
48	. 62660	23	. 59590	57	. 80402	48	. 24375	74	. 28314	30	. 77934	18 12
49	. 62683	23	. 59533	58	. 80450	48	. 24301	74	. 28344	30	. 77916	19 11
50	0. 62706	22	1. 59475	57	0. 80498	48	1. 24227	74	1. 28374	30	0. 77897	18 10
51	. 62728	23	. 59418	58	. 80546	48	. 24153	74	. 28404	30	. 77879	18 9
52	. 62751	23	. 59360	58	. 80594	48	. 24079	74	. 28434	30	. 77861	18 8
53	. 62774	22	. 59302	57	. 80642	48	. 24005	74	. 28464	31	. 77843	19 7
54	. 62796	23	. 59245	57	. 80690	48	. 23931	73	. 28495	30	. 77824	18 6
55	0. 62819	23	1. 59188	58	0. 80738	48	1. 23858	74	1. 28525	30	0. 77806	18 5
56	. 62842	22	. 59130	57	. 80786	48	. 23784	74	. 28555	30	. 77788	19 4
57	. 62864	23	. 59073	57	. 80834	48	. 23710	73	. 28585	30	. 77769	18 3
58	. 62887	22	. 59016	57	. 80882	48	. 23637	74	. 28615	31	. 77751	18 2
59	. 62909	23	. 58959	57	. 80930	48	. 23563	73	. 28646	30	. 77733	18 1
60	0. 62932		1. 58902		0. 80978		1. 23490		1. 28676		0. 77715	18 0
↑ 128° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′ ← 51° ↑

39° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 140° ↓
0	0. 62932	23	1. 58902	57	0. 80978	49	1. 23490	74	1. 28676	30	0. 77715	19	60
1	. 62955	22	. 58845	57	. 81027	48	. 23416	73	. 28706	31	. 77696	18	59
2	. 62977	23	. 58788	57	. 81075	48	. 23343	73	. 28737	30	. 77678	18	58
3	. 63000	22	. 58731	57	. 81123	48	. 23270	74	. 28767	30	. 77660	19	57
4	. 63022	23	. 58674	57	. 81171	49	. 23196	73	. 28797	31	. 77641	18	56
5	0. 63045	23	1. 58617	57	0. 81220	48	1. 23123	73	1. 28828	30	0. 77623	18	55
6	. 63068	22	. 58560	57	. 81268	48	. 23050	73	. 28858	31	. 77605	19	54
7	. 63090	23	. 58503	56	. 81316	48	. 22977	73	. 28889	30	. 77586	18	53
8	. 63113	22	. 58447	57	. 81364	49	. 22904	73	. 28919	31	. 77568	18	52
9	. 63135	23	. 58390	57	. 81413	48	. 22831	73	. 28950	30	. 77550	19	51
10	0. 63158	22	1. 58333	56	0. 81461	49	1. 22758	73	1. 28980	31	0. 77531	18	50
11	. 63180	23	. 58277	56	. 81510	48	. 22685	73	. 29011	31	. 77513	19	49
12	. 63203	22	. 58221	57	. 81558	48	. 22612	73	. 29042	30	. 77494	18	48
13	. 63225	23	. 58164	56	. 81606	49	. 22539	72	. 29072	31	. 77476	18	47
14	. 63248	23	. 58108	57	. 81655	48	. 22467	73	. 29103	30	. 77458	19	46
15	0. 63271	22	1. 58051	56	0. 81703	49	1. 22394	73	1. 29133	31	0. 77439	18	45
16	. 63293	23	. 57995	56	. 81752	48	. 22321	72	. 29164	31	. 77421	19	44
17	. 63316	22	. 57939	56	. 81800	49	. 22249	73	. 29195	31	. 77402	18	43
18	. 63338	23	. 57883	56	. 81849	49	. 22176	72	. 29226	30	. 77384	18	42
19	. 63361	22	. 57827	56	. 81898	48	. 22104	73	. 29256	31	. 77366	19	41
20	0. 63383	23	1. 57771	56	0. 81946	49	1. 22031	72	1. 29287	31	0. 77347	18	40
21	. 63406	22	. 57715	56	. 81995	49	. 21959	73	. 29318	31	. 77329	19	39
22	. 63428	23	. 57659	56	. 82044	48	. 21886	72	. 29349	31	. 77310	18	38
23	. 63451	22	. 57603	56	. 82092	49	. 21814	72	. 29380	31	. 77292	19	37
24	. 63473	23	. 57547	56	. 82141	49	. 21742	72	. 29411	31	. 77273	18	36
25	0. 63496	22	1. 57491	55	0. 82190	48	1. 21670	72	1. 29442	31	0. 77255	19	35
26	. 63518	22	. 57436	56	. 82238	49	. 21598	72	. 29473	31	. 77236	18	34
27	. 63540	23	. 57380	56	. 82287	49	. 21526	72	. 29504	31	. 77218	19	33
28	. 63563	22	. 57324	55	. 82336	49	. 21454	72	. 29535	31	. 77199	18	32
29	. 63585	23	. 57269	56	. 82385	49	. 21382	72	. 29566	31	. 77181	19	31
30	0. 63608	22	1. 57213	55	0. 82434	49	1. 21310	72	1. 29597	31	0. 77162	18	30
31	. 63630	23	. 57158	55	. 82483	48	. 21238	72	. 29628	31	. 77144	19	29
32	. 63653	22	. 57103	56	. 82531	49	. 21166	72	. 29659	31	. 77125	18	28
33	. 63675	23	. 57047	55	. 82580	49	. 21094	71	. 29690	31	. 77107	19	27
34	. 63698	22	. 56992	55	. 82629	49	. 21023	72	. 29721	31	. 77088	18	26
35	0. 63720	22	1. 56937	56	0. 82678	49	1. 20951	72	1. 29752	32	0. 77070	19	25
36	. 63742	23	. 56881	55	. 82727	49	. 20879	71	. 29784	31	. 77051	18	24
37	. 63765	22	. 56826	55	. 82776	49	. 20808	72	. 29815	31	. 77033	19	23
38	. 63787	23	. 56771	55	. 82825	49	. 20736	71	. 29846	31	. 77014	18	22
39	. 63810	22	. 56716	55	. 82874	49	. 20665	72	. 29877	32	. 76996	19	21
40	0. 63832	22	1. 56661	55	0. 82923	49	1. 20593	71	1. 29909	31	0. 76977	18	20
41	. 63854	23	. 56606	55	. 82972	50	. 20522	71	. 29940	31	. 76959	19	19
42	. 63877	22	. 56551	54	. 83022	49	. 20451	72	. 29971	32	. 76940	19	18
43	. 63899	23	. 56497	55	. 83071	49	. 20379	71	. 30003	31	. 76921	18	17
44	. 63922	22	. 56442	55	. 83120	49	. 20308	71	. 30034	32	. 76903	19	16
45	0. 63944	22	1. 56387	55	0. 83169	49	1. 20237	71	1. 30066	31	0. 76884	18	15
46	. 63966	23	. 56332	54	. 83218	50	. 20166	71	. 30097	32	. 76866	19	14
47	. 63989	22	. 56278	55	. 83268	49	. 20095	71	. 30129	31	. 76847	19	13
48	. 64011	22	. 56223	54	. 83317	49	. 20024	71	. 30160	32	. 76828	18	12
49	. 64033	23	. 56169	55	. 83366	49	. 19953	71	. 30192	31	. 76810	19	11
50	0. 64056	22	1. 56114	54	0. 83415	50	1. 19882	71	1. 30223	32	0. 76791	19	10
51	. 64078	22	. 56060	55	. 83465	49	. 19811	71	. 30255	32	. 76772	18	9
52	. 64100	23	. 56005	54	. 83514	50	. 19740	71	. 30287	31	. 76754	19	8
53	. 64123	22	. 55951	54	. 83564	49	. 19669	70	. 30318	32	. 76735	18	7
54	. 64145	22	. 55897	54	. 83613	49	. 19599	71	. 30350	32	. 76717	19	6
55	0. 64167	23	1. 55843	54	0. 83662	50	1. 19528	71	1. 30382	31	0. 76698	19	5
56	. 64190	22	. 55789	55	. 83712	49	. 19457	70	. 30413	32	. 76679	18	4
57	. 64212	22	. 55734	54	. 83761	50	. 19387	71	. 30445	32	. 76661	19	3
58	. 64234	22	. 55680	54	. 83811	49	. 19316	70	. 30477	32	. 76642	19	2
59	. 64256	23	. 55626	54	. 83860	50	. 19246	71	. 30509	32	. 76623	19	1
60	0. 64279		1. 55572		0. 83910		1. 19175		1. 30541		0. 76604		0
↑ 129° →	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	← 50° ↑

40° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 139° ↓
0	0. 64279	22	1. 55572	54	0. 83910	50	1. 19175	70	1. 30541	32	0. 76604	18	60
1	. 64301	22	. 55518	53	. 83960	49	. 19105	70	. 30573	32	. 76586	19	59
2	. 64323	23	. 55465	54	. 84009	50	. 19035	71	. 30605	31	. 76567	19	58
3	. 64346	22	. 55411	54	. 84059	49	. 18964	70	. 30636	32	. 76548	18	57
4	. 64368	22	. 55357	54	. 84108	50	. 18894	70	. 30668	32	. 76530	19	56
5	0. 64390	22	1. 55303	53	0. 84158	50	1. 18824	70	1. 30700	32	0. 76511	19	55
6	. 64412	23	. 55250	54	. 84208	50	. 18754	70	. 30732	32	. 76492	19	54
7	. 64435	22	. 55196	53	. 84258	49	. 18684	70	. 30764	32	. 76473	18	53
8	. 64457	22	. 55143	54	. 84307	50	. 18614	70	. 30796	33	. 76455	19	52
9	. 64479	22	. 55089	53	. 84357	50	. 18544	70	. 30829	32	. 76436	19	51
10	0. 64501	23	1. 55036	54	0. 84407	50	1. 18474	70	1. 30861	32	0. 76417	19	50
11	. 64524	22	. 54982	53	. 84457	50	. 18404	70	. 30893	32	. 76398	18	49
12	. 64546	22	. 54929	53	. 84507	49	. 18334	70	. 30925	32	. 76380	19	48
13	. 64568	22	. 54876	54	. 84556	50	. 18264	70	. 30957	32	. 76361	19	47
14	. 64590	22	. 54822	53	. 84606	50	. 18194	69	. 30989	33	. 76342	19	46
15	0. 64612	23	1. 54769	53	0. 84656	50	1. 18125	70	1. 31022	32	0. 76323	19	45
16	. 64635	22	. 54716	53	. 84706	50	. 18055	69	. 31054	32	. 76304	18	44
17	. 64657	22	. 54663	53	. 84756	50	. 17986	70	. 31086	33	. 76286	19	43
18	. 64679	22	. 54610	53	. 84806	50	. 17916	70	. 31119	32	. 76267	19	42
19	. 64701	22	. 54557	53	. 84856	50	. 17846	69	. 31151	32	. 76248	19	41
20	0. 64723	23	1. 54504	53	0. 84906	50	1. 17777	69	1. 31183	33	0. 76229	19	40
21	. 64746	22	. 54451	53	. 84956	50	. 17708	70	. 31216	32	. 76210	18	39
22	. 64768	22	. 54398	53	. 85006	51	. 17638	69	. 31248	33	. 76192	19	38
23	. 64790	22	. 54345	53	. 85057	50	. 17569	69	. 31281	32	. 76173	19	37
24	. 64812	22	. 54292	52	. 85107	50	. 17500	70	. 31313	33	. 76154	19	36
25	0. 64834	22	1. 54240	53	0. 85157	50	1. 17430	69	1. 31346	32	0. 76135	19	35
26	. 64856	22	. 54187	53	. 85207	50	. 17361	69	. 31378	33	. 76116	19	34
27	. 64878	23	. 54134	52	. 85257	51	. 17292	69	. 31411	32	. 76097	19	33
28	. 64901	22	. 54082	53	. 85308	50	. 17223	69	. 31443	33	. 76078	19	32
29	. 64923	22	. 54029	52	. 85358	50	. 17154	69	. 31476	33	. 76059	18	31
30	0. 64945	22	1. 53977	53	0. 85408	50	1. 17085	69	1. 31509	32	0. 76041	19	30
31	. 64967	22	. 53924	52	. 85458	51	. 17016	69	. 31541	33	. 76022	19	29
32	. 64989	22	. 53872	52	. 85509	50	. 16947	69	. 31574	33	. 76003	19	28
33	. 65011	22	. 53820	52	. 85559	50	. 16878	69	. 31607	33	. 75984	19	27
34	. 65033	22	. 53768	53	. 85609	51	. 16809	68	. 31640	32	. 75965	19	26
35	0. 65055	22	1. 53715	52	0. 85660	50	1. 16741	69	1. 31672	33	0. 75946	19	25
36	. 65077	23	. 53663	52	. 85710	51	. 16672	69	. 31705	33	. 75927	19	24
37	. 65100	22	. 53611	52	. 85761	50	. 16603	68	. 31738	33	. 75908	19	23
38	. 65122	22	. 53559	52	. 85811	51	. 16535	69	. 31771	33	. 75889	19	22
39	. 65144	22	. 53507	52	. 85862	50	. 16466	68	. 31804	33	. 75870	19	21
40	0. 65166	22	1. 53455	52	0. 85912	51	1. 16398	69	1. 31837	33	0. 75851	19	20
41	. 65188	22	. 53403	52	. 85963	51	. 16329	68	. 31870	33	. 75832	19	19
42	. 65210	22	. 53351	52	. 86014	50	. 16261	69	. 31903	33	. 75813	19	18
43	. 65232	22	. 53299	52	. 86064	51	. 16192	68	. 31936	33	. 75794	19	17
44	. 65254	22	. 53247	51	. 86115	51	. 16124	68	. 31969	33	. 75775	19	16
45	0. 65276	22	1. 53196	52	0. 86166	50	1. 16056	69	1. 32002	33	0. 75756	18	15
46	. 65298	22	. 53144	52	. 86216	51	. 15987	68	. 32035	33	. 75738	19	14
47	. 65320	22	. 53092	51	. 86267	51	. 15919	68	. 32068	33	. 75719	19	13
48	. 65342	22	. 53041	52	. 86318	50	. 15851	68	. 32101	33	. 75700	20	12
49	. 65364	22	. 52989	51	. 86368	51	. 15783	68	. 32134	34	. 75680	19	11
50	0. 65386	22	1. 52938	52	0. 86419	51	1. 15715	68	1. 32168	33	0. 75661	19	10
51	. 65408	22	. 52886	51	. 86470	51	. 15647	68	. 32201	33	. 75642	19	9
52	. 65430	22	. 52835	51	. 86521	51	. 15579	68	. 32234	33	. 75623	19	8
53	. 65452	22	. 52784	52	. 86572	51	. 15511	68	. 32267	34	. 75604	19	7
54	. 65474	22	. 52732	51	. 86623	51	. 15443	68	. 32301	33	. 75585	19	6
55	0. 65496	22	1. 52681	51	0. 86674	51	1. 15375	67	1. 32334	34	0. 75566	19	5
56	. 65518	22	. 52630	51	. 86725	51	. 15308	68	. 32368	33	. 75547	19	4
57	. 65540	22	. 52579	52	. 86776	51	. 15240	68	. 32401	33	. 75528	19	3
58	. 65562	22	. 52527	51	. 86827	51	. 15172	68	. 32434	34	. 75509	19	2
59	. 65584	22	. 52476	51	. 86878	51	. 15104	67	. 32468	33	. 75490	19	1
60	0. 65606		1. 52425		0. 86929		1. 15037		1. 32501		0. 75471		0
↑ 130° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ 49°

41° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 138° ↓
′													′
0	0. 65606	22	1. 52425	51	0. 86929	51	1. 15037	68	1. 32501	34	0. 75471	19	60
1	. 65628	22	. 52374	51	. 86980	51	. 14969	67	. 32535	33	. 75452	19	59
2	. 65650	22	. 52323	50	. 87031	51	. 14902	68	. 32568	34	. 75433	19	58
3	. 65672	22	. 52273	51	. 87082	51	. 14834	67	. 32602	34	. 75414	19	57
4	. 65694	22	. 52222	51	. 87133	51	. 14767	68	. 32636	33	. 75395	20	56
5	0. 65716	22	1. 52171	51	0. 87184	52	1. 14699	67	1. 32669	34	0. 75375	19	55
6	. 65738	21	. 52120	51	. 87236	51	. 14632	67	. 32703	34	. 75356	19	54
7	. 65759	22	. 52069	50	. 87287	51	. 14565	67	. 32737	33	. 75337	19	53
8	. 65781	22	. 52019	51	. 87338	51	. 14498	68	. 32770	34	. 75318	19	52
9	. 65803	22	. 51968	50	. 87389	52	. 14430	67	. 32804	34	. 75299	19	51
10	0. 65825	22	1. 51918	51	0. 87441	51	1. 14363	67	1. 32838	34	0. 75280	19	50
11	. 65847	22	. 51867	50	. 87492	51	. 14296	67	. 32872	33	. 75261	20	49
12	. 65869	22	. 51817	51	. 87543	52	. 14229	67	. 32905	34	. 75241	19	48
13	. 65891	22	. 51766	50	. 87595	51	. 14162	67	. 32939	34	. 75222	19	47
14	. 65913	22	. 51716	51	. 87646	52	. 14095	67	. 32973	34	. 75203	19	46
15	0. 65935	21	1. 51665	50	0. 87698	51	1. 14028	67	1. 33007	34	0. 75184	19	45
16	. 65956	22	. 51615	50	. 87749	52	. 13961	67	. 33041	34	. 75165	19	44
17	. 65978	22	. 51565	50	. 87801	51	. 13894	66	. 33075	34	. 75146	20	43
18	. 66000	22	. 51515	50	. 87852	52	. 13828	67	. 33109	34	. 75126	19	42
19	. 66022	22	. 51465	50	. 87904	51	. 13761	67	. 33143	34	. 75107	19	41
20	0. 66044	22	1. 51415	51	0. 87955	52	1. 13694	67	1. 33177	34	0. 75088	19	40
21	. 66066	22	. 51364	50	. 88007	52	. 13627	66	. 33211	34	. 75069	19	39
22	. 66088	21	. 51314	49	. 88059	51	. 13561	67	. 33245	34	. 75050	20	38
23	. 66109	22	. 51265	50	. 88110	52	. 13494	66	. 33279	35	. 75030	19	37
24	. 66131	22	. 51215	50	. 88162	52	. 13428	67	. 33314	34	. 75011	19	36
25	0. 66153	22	1. 51165	50	0. 88214	51	1. 13361	66	1. 33348	34	0. 74992	19	35
26	. 66175	22	. 51115	50	. 88265	52	. 13295	67	. 33382	34	. 74973	20	34
27	. 66197	21	. 51065	50	. 88317	52	. 13228	66	. 33416	35	. 74953	19	33
28	. 66218	22	. 51015	49	. 88369	52	. 13162	66	. 33451	34	. 74934	19	32
29	. 66240	22	. 50966	50	. 88421	52	. 13096	67	. 33485	34	. 74915	19	31
30	0. 66262	22	1. 50916	50	0. 88473	51	1. 13029	66	1. 33519	35	0. 74896	20	30
31	. 66284	22	. 50866	49	. 88524	52	. 12963	66	. 33554	34	. 74876	19	29
32	. 66306	21	. 50817	50	. 88576	52	. 12897	66	. 33588	34	. 74857	19	28
33	. 66327	22	. 50767	49	. 88628	52	. 12831	66	. 33622	35	. 74838	20	27
34	. 66349	22	. 50718	49	. 88680	52	. 12765	66	. 33657	34	. 74818	19	26
35	0. 66371	22	1. 50669	50	0. 88732	52	1. 12699	66	1. 33691	35	0. 74799	19	25
36	. 66393	21	. 50619	49	. 88784	52	. 12633	66	. 33726	34	. 74780	20	24
37	. 66414	22	. 50570	49	. 88836	52	. 12567	66	. 33760	35	. 74760	19	23
38	. 66436	22	. 50521	50	. 88888	52	. 12501	66	. 33795	35	. 74741	19	22
39	. 66458	22	. 50471	49	. 88940	52	. 12435	66	. 33830	34	. 74722	19	21
40	0. 66480	21	1. 50422	49	0. 88992	53	1. 12369	66	1. 33864	35	0. 74703	20	20
41	. 66501	22	. 50373	49	. 89045	52	. 12303	65	. 33899	35	. 74683	19	19
42	. 66523	22	. 50324	49	. 89097	52	. 12238	66	. 33934	34	. 74664	20	18
43	. 66545	21	. 50275	49	. 89149	52	. 12172	66	. 33968	35	. 74644	19	17
44	. 66566	22	. 50226	49	. 89201	52	. 12106	65	. 34003	35	. 74625	19	16
45	0. 66588	22	1. 50177	49	0. 89253	53	1. 12041	66	1. 34038	35	0. 74606	20	15
46	. 66610	22	. 50128	49	. 89306	52	. 11975	66	. 34073	35	. 74586	19	14
47	. 66632	21	. 50079	49	. 89358	52	. 11909	65	. 34108	34	. 74567	19	13
48	. 66653	22	. 50030	49	. 89410	53	. 11844	66	. 34142	35	. 74548	20	12
49	. 66675	22	. 49981	48	. 89463	52	. 11778	65	. 34177	35	. 74528	19	11
50	0. 66697	21	1. 49933	49	0. 89515	52	1. 11713	65	1. 34212	35	0. 74509	20	10
51	. 66718	22	. 49884	49	. 89567	53	. 11648	66	. 34247	35	. 74489	19	9
52	. 66740	22	. 49835	48	. 89620	52	. 11582	65	. 34282	35	. 74470	19	8
53	. 66762	21	. 49787	49	. 89672	53	. 11517	65	. 34317	35	. 74451	20	7
54	. 66783	22	. 49738	48	. 89725	52	. 11452	65	. 34352	35	. 74431	19	6
55	0. 66805	22	1. 49690	49	0. 89777	53	1. 11387	66	1. 34387	36	0. 74412	20	5
56	. 66827	21	. 49641	48	. 89830	53	. 11321	65	. 34423	35	. 74392	19	4
57	. 66848	22	. 49593	49	. 89883	52	. 11256	65	. 34458	35	. 74373	20	3
58	. 66870	21	. 49544	48	. 89935	53	. 11191	65	. 34493	35	. 74353	19	2
59	. 66891	22	. 49496	48	. 89988	52	. 11126	65	. 34528	35	. 74334	20	1
60	0. 66913		1. 49448		0. 90040		1. 11061		1. 34563		0. 74314		0
↑ 131° →	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ← 48°

42° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 137° ↓
′													′
0	0. 66913	22	1. 49448	49	0. 90040	53	1. 11061	65	1. 34563	36	0. 74314	19	60
1	. 66935	21	. 49399	48	. 90093	53	. 10996	65	. 34599	35	. 74295	19	59
2	. 66956	22	. 49351	48	. 90146	53	. 10931	64	. 34634	35	. 74276	20	58
3	. 66978	21	. 49303	48	. 90199	52	. 10867	65	. 34669	35	. 74256	19	57
4	. 66999	22	. 49255	48	. 90251	53	. 10802	65	. 34704	36	. 74237	20	56
5	0. 67021	22	1. 49207	48	0. 90304	53	1. 10737	65	1. 34740	35	0. 74217	19	55
6	. 67043	21	. 49159	48	. 90357	53	. 10672	65	. 34775	36	. 74198	20	54
7	. 67064	22	. 49111	48	. 90410	53	. 10607	64	. 34811	35	. 74178	19	53
8	. 67086	21	. 49063	48	. 90463	53	. 10543	65	. 34846	36	. 74159	20	52
9	. 67107	22	. 49015	48	. 90516	53	. 10478	64	. 34882	35	. 74139	19	51
10	0. 67129	22	1. 48967	48	0. 90569	52	1. 10414	65	1. 34917	36	0. 74120	20	50
11	. 67151	21	. 48919	48	. 90621	53	. 10349	64	. 34953	35	. 74100	20	49
12	. 67172	22	. 48871	47	. 90674	53	. 10285	65	. 34988	36	. 74080	19	48
13	. 67194	21	. 48824	48	. 90727	54	. 10220	64	. 35024	36	. 74061	20	47
14	. 67215	22	. 48776	48	. 90781	53	. 10156	65	. 35060	35	. 74041	19	46
15	0. 67237	21	1. 48728	47	0. 90834	53	1. 10091	64	1. 35095	36	0. 74022	20	45
16	. 67258	22	. 48681	48	. 90887	53	. 10027	64	. 35131	36	. 74002	19	44
17	. 67280	21	. 48633	47	. 90940	53	. 09963	64	. 35167	36	. 73983	20	43
18	. 67301	22	. 48586	48	. 90993	53	. 09899	65	. 35203	35	. 73963	19	42
19	. 67323	21	. 48538	47	. 91046	53	. 09834	64	. 35238	36	. 73944	20	41
20	0. 67344	22	1. 48491	48	0. 91099	54	1. 09770	64	1. 35274	36	0. 73924	20	40
21	. 67366	21	. 48443	47	. 91153	53	. 09706	64	. 35310	36	. 73904	19	39
22	. 67387	22	. 48396	47	. 91206	53	. 09642	64	. 35346	36	. 73885	20	38
23	. 67409	21	. 48349	48	. 91259	54	. 09578	64	. 35382	36	. 73865	19	37
24	. 67430	22	. 48301	47	. 91313	53	. 09514	64	. 35418	36	. 73846	20	36
25	0. 67452	21	1. 48254	47	0. 91366	53	1. 09450	64	1. 35454	36	0. 73826	20	35
26	. 67473	22	. 48207	47	. 91419	54	. 09386	64	. 35490	36	. 73806	19	34
27	. 67495	21	. 48160	47	. 91473	53	. 09322	64	. 35526	36	. 73787	20	33
28	. 67516	22	. 48113	47	. 91526	54	. 09258	64	. 35562	36	. 73767	20	32
29	. 67538	21	. 48066	47	. 91580	53	. 09195	63	. 35598	36	. 73747	19	31
30	0. 67559	21	1. 48019	47	0. 91633	54	1. 09131	64	1. 35634	36	0. 73728	20	30
31	. 67580	22	. 47972	47	. 91687	53	. 09067	64	. 35670	37	. 73708	20	29
32	. 67602	21	. 47925	47	. 91740	54	. 09003	63	. 35707	36	. 73688	19	28
33	. 67623	22	. 47878	47	. 91794	53	. 08940	64	. 35743	36	. 73669	20	27
34	. 67645	21	. 47831	47	. 91847	54	. 08876	63	. 35779	36	. 73649	20	26
35	0. 67666	22	1. 47784	46	0. 91901	54	1. 08813	64	1. 35815	37	0. 73629	19	25
36	. 67688	21	. 47738	47	. 91955	53	. 08749	63	. 35852	36	. 73610	20	24
37	. 67709	21	. 47691	47	. 92008	54	. 08686	64	. 35888	36	. 73590	20	23
38	. 67730	22	. 47644	46	. 92062	54	. 08622	63	. 35924	37	. 73570	19	22
39	. 67752	21	. 47598	47	. 92116	54	. 08559	63	. 35961	36	. 73551	20	21
40	0. 67773	22	1. 47551	47	0. 92170	54	1. 08496	64	1. 35997	37	0. 73531	20	20
41	. 67795	21	. 47504	46	. 92224	53	. 08432	63	. 36034	36	. 73511	20	19
42	. 67816	21	. 47458	47	. 92277	54	. 08369	63	. 36070	37	. 73491	19	18
43	. 67837	22	. 47411	46	. 92331	54	. 08306	63	. 36107	36	. 73472	20	17
44	. 67859	21	. 47365	46	. 92385	54	. 08243	64	. 36143	37	. 73452	20	16
45	0. 67880	21	1. 47319	47	0. 92439	54	1. 08179	63	1. 36180	37	0. 73432	19	15
46	. 67901	22	. 47272	46	. 92493	54	. 08116	63	. 36217	36	. 73413	20	14
47	. 67923	21	. 47226	46	. 92547	54	. 08053	63	. 36253	37	. 73393	20	13
48	. 67944	21	. 47180	46	. 92601	54	. 07990	63	. 36290	37	. 73373	20	12
49	. 67965	22	. 47134	47	. 92655	54	. 07927	63	. 36327	36	. 73353	20	11
50	0. 67987	21	1. 47087	46	0. 92709	54	1. 07864	63	1. 36363	37	0. 73333	19	10
51	. 68008	21	. 47041	46	. 92763	54	. 07801	63	. 36400	37	. 73314	20	9
52	. 68029	22	. 46995	46	. 92817	54	. 07738	62	. 36437	37	. 73294	20	8
53	. 68051	21	. 46949	46	. 92872	55	. 07676	63	. 36474	37	. 73274	20	7
54	. 68072	21	. 46903	46	. 92926	54	. 07613	63	. 36511	37	. 73254	20	6
55	0. 68093	22	1. 46857	46	0. 92980	54	1. 07550	63	1. 36548	37	0. 73234	19	5
56	. 68115	21	. 46811	46	. 93034	54	. 07487	62	. 36585	37	. 73215	20	4
57	. 68136	21	. 46765	46	. 93088	55	. 07425	63	. 36622	37	. 73195	20	3
58	. 68157	22	. 46719	45	. 93143	54	. 07362	63	. 36659	37	. 73175	20	2
59	. 68179	21	. 46674	46	. 93197	55	. 07299	62	. 36696	37	. 73155	20	1
60	0. 68200		1. 46628		0. 93252		1. 07237		1. 36733		0. 73135		0
↑ 132° → cos		Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ← 47°

43°→ ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	←136° Diff. 1′ ↓
0	0. 68200	21	1. 46628	46	0. 93252	54	1. 07237	63	1. 36733	37	0. 73135	19 60
1	. 68221	21	. 46582	45	. 93306	54	. 07174	62	. 36770	37	. 73116	20 59
2	. 68242	22	. 46537	46	. 93360	55	. 07112	63	. 36807	37	. 73096	20 58
3	. 68264	21	. 46491	46	. 93415	54	. 07049	62	. 36844	37	. 73076	20 57
4	. 68285	21	. 46445	45	. 93469	55	. 06987	62	. 36881	38	. 73056	20 56
5	0. 68306	21	1. 46400	46	0. 93524	54	1. 06925	63	1. 36919	37	0. 73036	20 55
6	. 68327	22	. 46354	45	. 93578	55	. 06862	62	. 36956	37	. 73016	20 54
7	. 68349	21	. 46309	46	. 93633	55	. 06800	62	. 36993	37	. 72996	20 53
8	. 68370	21	. 46263	45	. 93688	54	. 06738	62	. 37030	38	. 72976	19 52
9	. 68391	21	. 46218	45	. 93742	55	. 06676	63	. 37068	37	. 72957	20 51
10	0. 68412	22	1. 46173	46	0. 93797	55	1. 06613	62	1. 37105	38	0. 72937	20 50
11	. 68434	21	. 46127	45	. 93852	54	. 06551	62	. 37143	37	. 72917	20 49
12	. 68455	21	. 46082	45	. 93906	55	. 06489	62	. 37180	38	. 72897	20 48
13	. 68476	21	. 46037	45	. 93961	55	. 06427	62	. 37218	37	. 72877	20 47
14	. 68497	21	. 45992	46	. 94016	55	. 06365	62	. 37255	38	. 72857	20 46
15	0. 68518	21	1. 45946	45	0. 94071	54	1. 06303	62	1. 37293	37	0. 72837	20 45
16	. 68539	22	. 45901	45	. 94125	55	. 06241	62	. 37330	38	. 72817	20 44
17	. 68561	21	. 45856	45	. 94180	55	. 06179	62	. 37368	38	. 72797	20 43
18	. 68582	21	. 45811	45	. 94235	55	. 06117	61	. 37406	37	. 72777	20 42
19	. 68603	21	. 45766	45	. 94290	55	. 06056	62	. 37443	38	. 72757	20 41
20	0. 68624	21	1. 45721	45	0. 94345	55	1. 05994	62	1. 37481	38	0. 72737	20 40
21	. 68645	21	. 45676	45	. 94400	55	. 05932	62	. 37519	37	. 72717	20 39
22	. 68666	22	. 45631	44	. 94455	55	. 05870	61	. 37556	38	. 72697	20 38
23	. 68688	21	. 45587	45	. 94510	55	. 05809	62	. 37594	38	. 72677	20 37
24	. 68709	21	. 45542	45	. 94565	55	. 05747	62	. 37632	38	. 72657	20 36
25	0. 68730	21	1. 45497	45	0. 94620	56	1. 05685	61	1. 37670	38	0. 72637	20 35
26	. 68751	21	. 45452	44	. 94676	55	. 05624	62	. 37708	38	. 72617	20 34
27	. 68772	21	. 45408	45	. 94731	55	. 05562	61	. 37746	38	. 72597	20 33
28	. 68793	21	. 45363	44	. 94786	55	. 05501	62	. 37784	38	. 72577	20 32
29	. 68814	21	. 45319	45	. 94841	55	. 05439	61	. 37822	38	. 72557	20 31
30	0. 68835	22	1. 45274	45	0. 94896	56	1. 05378	61	1. 37860	38	0. 72537	20 30
31	. 68857	21	. 45229	44	. 94952	55	. 05317	62	. 37898	38	. 72517	20 29
32	. 68878	21	. 45185	44	. 95007	55	. 05255	61	. 37936	38	. 72497	20 28
33	. 68899	21	. 45141	44	. 95062	56	. 05194	61	. 37974	38	. 72477	20 27
34	. 68920	21	. 45096	45	. 95118	55	. 05133	61	. 38012	39	. 72457	20 26
35	0. 68941	21	1. 45052	44	0. 95173	56	1. 05072	62	1. 38051	38	0. 72437	20 25
36	. 68962	21	. 45007	45	. 95229	55	. 05010	61	. 38089	38	. 72417	20 24
37	. 68983	21	. 44963	44	. 95284	56	. 04949	61	. 38127	38	. 72397	20 23
38	. 69004	21	. 44919	44	. 95340	55	. 04888	61	. 38165	39	. 72377	20 22
39	. 69025	21	. 44875	44	. 95395	56	. 04827	61	. 38204	38	. 72357	20 21
40	0. 69046	21	1. 44831	44	0. 95451	55	1. 04766	61	1. 38242	38	0. 72337	20 20
41	. 69067	21	. 44787	45	. 95506	56	. 04705	61	. 38280	39	. 72317	20 19
42	. 69088	21	. 44742	44	. 95562	56	. 04644	61	. 38319	38	. 72297	20 18
43	. 69109	21	. 44698	44	. 95618	55	. 04583	61	. 38357	39	. 72277	20 17
44	. 69130	21	. 44654	44	. 95673	56	. 04522	61	. 38396	38	. 72257	21 16
45	0. 69151	21	1. 44610	43	0. 95729	56	1. 04461	60	1. 38434	39	0. 72236	20 15
46	. 69172	21	. 44567	44	. 95785	56	. 04401	61	. 38473	39	. 72216	20 14
47	. 69193	21	. 44523	44	. 95841	56	. 04340	61	. 38512	38	. 72196	20 13
48	. 69214	21	. 44479	44	. 95897	55	. 04279	61	. 38550	39	. 72176	20 12
49	. 69235	21	. 44435	44	. 95952	56	. 04218	60	. 38589	39	. 72156	20 11
50	0. 69256	21	1. 44391	44	0. 96008	56	1. 04158	61	1. 38628	38	0. 72136	20 10
51	. 69277	21	. 44347	43	. 96064	56	. 04097	61	. 38666	39	. 72116	21 9
52	. 69298	21	. 44304	44	. 96120	56	. 04036	60	. 38705	39	. 72095	20 8
53	. 69319	21	. 44260	43	. 96176	56	. 03976	61	. 38744	39	. 72075	20 7
54	. 69340	21	. 44217	44	. 96232	56	. 03915	60	. 38783	39	. 72055	20 6
55	0. 69361	21	1. 44173	44	0. 96288	56	1. 03855	61	1. 38822	38	0. 72035	20 5
56	. 69382	21	. 44129	43	. 96344	56	. 03794	60	. 38860	39	. 72015	20 4
57	. 69403	21	. 44086	44	. 96400	57	. 03734	60	. 38899	39	. 71995	21 3
58	. 69424	21	. 44042	43	. 96457	56	. 03674	61	. 38938	39	. 71974	20 2
59	. 69445	21	. 43999	43	. 96513	56	. 03613	60	. 38977	39	. 71954	20 1
60	0. 69466		1. 43956		0. 96569		1. 03553		1. 39016		0. 71934	20 0
↑		Diff.	sec	Diff.	cot	Diff.	tan	Diff.	csc	Diff.	sin	Diff. 1′ ↑ ←46°

Natural Trigonometric Functions

44° → ↓	sin	Diff. 1′	csc	Diff. 1′	tan	Diff. 1′	cot	Diff. 1′	sec	Diff. 1′	cos	Diff. 1′	← 135° ↓
′													′
0	0. 69466	21	1. 43956	44	0. 96569	56	1. 03553	60	1. 39016	39	0. 71934	20	60
1	. 69487	21	. 43912	43	. 96625	56	. 03493	60	. 39055	40	. 71914	20	59
2	. 69508	21	. 43869	43	. 96681	57	. 03433	61	. 39095	39	. 71894	21	58
3	. 69529	20	. 43826	43	. 96738	56	. 03372	60	. 39134	39	. 71873	20	57
4	. 69549	21	. 43783	44	. 96794	56	. 03312	60	. 39173	39	. 71853	20	56
5	0. 69570	21	1. 43739	43	0. 96850	57	1. 03252	60	1. 39212	39	0. 71833	20	55
6	. 69591	21	. 43696	43	. 96907	56	. 03192	60	. 39251	40	. 71813	21	54
7	. 69612	21	. 43653	43	. 96963	57	. 03132	60	. 39291	39	. 71792	20	53
8	. 69633	21	. 43610	43	. 97020	56	. 03072	60	. 39330	39	. 71772	20	52
9	. 69654	21	. 43567	43	. 97076	57	. 03012	60	. 39369	40	. 71752	20	51
10	0. 69675	21	1. 43524	43	0. 97133	56	1. 02952	60	1. 39409	39	0. 71732	21	50
11	. 69696	21	. 43481	43	. 97189	57	. 02892	60	. 39448	39	. 71711	20	49
12	. 69717	20	. 43438	43	. 97246	56	. 02832	60	. 39487	40	. 71691	20	48
13	. 69737	21	. 43395	43	. 97302	57	. 02772	59	. 39527	39	. 71671	21	47
14	. 69758	21	. 43352	42	. 97359	57	. 02713	60	. 39566	40	. 71650	20	46
15	0. 69779	21	1. 43310	43	0. 97416	56	1. 02653	60	1. 39606	40	0. 71630	20	45
16	. 69800	21	43267	43	. 97472	57	. 02593	60	. 39646	39	. 71610	20	44
17	. 69821	21	43224	43	. 97529	57	. 02533	59	. 39685	40	. 71590	21	43
18	. 69842	20	. 43181	42	. 97586	57	. 02474	60	. 39725	39	. 71569	20	42
19	. 69862	21	. 43139	43	. 97643	57	. 02414	59	. 39764	40	. 71549	20	41
20	0. 69883	21	1. 43096	43	0. 97700	56	1. 02355	60	1. 39804	40	0. 71529	21	40
21	. 69904	21	. 43053	42	. 97756	57	. 02295	59	. 39844	40	. 71508	20	39
22	. 69925	21	. 43011	43	. 97813	57	. 02236	60	. 39884	40	. 71488	20	38
23	. 69946	20	. 42968	42	. 97870	57	. 02176	59	. 39924	40	. 71468	21	37
24	. 69966	21	. 42926	43	. 97927	57	. 02117	60	. 39963	39	. 71447	20	36
25	0. 69987	21	1. 42883	42	0. 97984	57	1. 02057	59	1. 40003	40	0. 71427	20	35
26	. 70008	21	. 42841	42	. 98041	57	. 01998	59	. 40043	40	. 71407	21	34
27	. 70029	20	. 42799	43	. 98098	57	. 01939	60	. 40083	40	. 71386	20	33
28	. 70049	21	. 42756	42	. 98155	58	. 01879	59	. 40123	40	. 71366	21	32
29	. 70070	21	. 42714	42	. 98213	57	. 01820	59	. 40163	40	. 71345	20	31
30	0. 70091	21	1. 42672	42	0. 98270	57	1. 01761	59	1. 40203	40	0. 71325	20	30
31	. 70112	20	. 42630	43	. 98327	57	. 01702	60	. 40243	40	. 71305	21	29
32	. 70132	21	. 42587	42	. 98384	57	. 01642	59	. 40283	41	. 71284	20	28
33	. 70153	21	. 42545	42	. 98441	58	. 01583	59	. 40324	40	. 71264	21	27
34	. 70174	21	. 42503	42	. 98499	57	. 01524	59	. 40364	40	. 71243	20	26
35	0. 70195	20	1. 42461	42	0. 98556	57	1. 01465	59	1. 40404	40	0. 71223	20	25
36	. 70215	21	. 42419	42	. 98613	58	. 01406	59	. 40444	41	. 71203	21	24
37	. 70236	21	. 42377	42	. 98671	57	. 01347	59	. 40485	40	. 71182	20	23
38	. 70257	20	. 42335	42	. 98728	58	. 01288	59	. 40525	40	. 71162	21	22
39	. 70277	21	. 42293	42	. 98786	57	. 01229	59	. 40565	41	. 71141	20	21
40	0. 70298	21	1. 42251	42	0. 98843	58	1. 01170	58	1. 40606	40	0. 71121	21	20
41	. 70319	20	. 42209	41	. 98901	57	. 01112	59	. 40646	41	. 71100	20	19
42	. 70339	21	. 42168	42	. 98958	58	. 01053	59	. 40687	40	. 71080	21	18
43	. 70360	21	. 42126	42	. 99016	57	. 00994	59	. 40727	41	. 71059	20	17
44	. 70381	20	. 42084	42	. 99073	58	. 00935	59	. 40768	40	. 71039	20	16
45	0. 70401	21	1. 42042	41	0. 99131	58	1. 00876	58	1. 40808	41	0. 71019	21	15
46	. 70422	21	. 42001	42	. 99189	58	. 00818	59	. 40849	41	. 70998	20	14
47	. 70443	20	. 41959	41	. 99247	57	. 00759	58	. 40890	40	. 70978	21	13
48	. 70463	21	. 41918	42	. 99304	58	. 00701	59	. 40930	41	. 70957	20	12
49	. 70484	21	. 41876	41	. 99362	58	. 00642	59	. 40971	41	. 70937	21	11
50	0. 70505	20	1. 41835	42	0. 99420	58	1. 00583	58	1. 41012	41	0. 70916	20	10
51	. 70525	21	. 41793	41	. 99478	58	. 00525	58	. 41053	40	. 70896	21	9
52	. 70546	21	. 41752	42	. 99536	58	. 00467	59	. 41093	41	. 70875	20	8
53	. 70567	20	. 41710	41	. 99594	58	. 00408	58	. 41134	41	. 70855	21	7
54	. 70587	21	. 41669	42	. 99652	58	. 00350	59	. 41175	41	. 70834	21	6
55	0. 70608	20	1. 41627	41	0. 99710	58	1. 00291	58	1. 41216	41	0. 70813	20	5
56	. 70628	21	. 41586	41	. 99768	58	. 00233	58	. 41257	41	. 70793	21	4
57	. 70649	21	. 41545	41	. 99826	58	. 00175	59	. 41298	41	. 70772	20	3
58	. 70670	20	. 41504	41	. 99884	58	. 00116	58	. 41339	41	. 70752	21	2
59	. 70690	21	. 41463	42	0. 99942	58	. 00058	58	. 41380	41	. 70731	20	1
60	0. 70711		1. 41421		1. 00000		1. 00000		1. 41421		0. 70711		0
↑ 134° →	cos	Diff. 1′	sec	Diff. 1′	cot	Diff. 1′	tan	Diff. 1′	csc	Diff. 1′	sin	Diff. 1′	↑ ← 45°

1–250

No.	Log	No.	Log	No.	Log	No.	Log	No.	Log
1	0. 00000	51	1. 70757	101	2. 00432	151	2. 17898	201	2. 30320
2	0. 30103	52	1. 71600	102	2. 00860	152	2. 18184	202	2. 30535
3	0. 47712	53	1. 72428	103	2. 01284	153	2. 18469	203	2. 30750
4	0. 60206	54	1. 73239	104	2. 01703	154	2. 18752	204	2. 30963
5	0. 69897	55	1. 74036	105	2. 02119	155	2. 19033	205	2. 31175
6	0. 77815	56	1. 74819	106	2. 02531	156	2. 19312	206	2. 31387
7	0. 84510	57	1. 75587	107	2. 02938	157	2. 19590	207	2. 31597
8	0. 90309	58	1. 76343	108	2. 03342	158	2. 19866	208	2. 31806
9	0. 95424	59	1. 77085	109	2. 03743	159	2. 20140	209	2. 32015
10	1. 00000	60	1. 77815	110	2. 04139	160	2. 20412	210	2. 32222
11	1. 04139	61	1. 78533	111	2. 04532	161	2. 20683	211	2. 32428
12	1. 07918	62	1. 79239	112	2. 04922	162	2. 20952	212	2. 32634
13	1. 11394	63	1. 79934	113	2. 05308	163	2. 21219	213	2. 32838
14	1. 14613	64	1. 80618	114	2. 05690	164	2. 21484	214	2. 33041
15	1. 17609	65	1. 81291	115	2. 06070	165	2. 21748	215	2. 33244
16	1. 20412	66	1. 81954	116	2. 06446	166	2. 22011	216	2. 33445
17	1. 23045	67	1. 82607	117	2. 06819	167	2. 22272	217	2. 33646
18	1. 25527	68	1. 83251	118	2. 07188	168	2. 22531	218	2. 33846
19	1. 27875	69	1. 83885	119	2. 07555	169	2. 22789	219	2. 34044
20	1. 30103	70	1. 84510	120	2. 07918	170	2. 23045	220	2. 34242
21	1. 32222	71	1. 85126	121	2. 08279	171	2. 23300	221	2. 34439
22	1. 34242	72	1. 85733	122	2. 08636	172	2. 23553	222	2. 34635
23	1. 36173	73	1. 86332	123	2. 08991	173	2. 23805	223	2. 34830
24	1. 38021	74	1. 86923	124	2. 09342	174	2. 24055	224	2. 35025
25	1. 39794	75	1. 87506	125	2. 09691	175	2. 24304	225	2. 35218
26	1. 41497	76	1. 88081	126	2. 10037	176	2. 24551	226	2. 35411
27	1. 43136	77	1. 88649	127	2. 10380	177	2. 24797	227	2. 35603
28	1. 44716	78	1. 89209	128	2. 10721	178	2. 25042	228	2. 35793
29	1. 46240	79	1. 89763	129	2. 11059	179	2. 25285	229	2. 35984
30	1. 47712	80	1. 90309	130	2. 11394	180	2. 25527	230	2. 36173
31	1. 49136	81	1. 90849	131	2. 11727	181	2. 25768	231	2. 36361
32	1. 50515	82	1. 91381	132	2. 12057	182	2. 26007	232	2. 36549
33	1. 51851	83	1. 91908	133	2. 12385	183	2. 26245	233	2. 36736
34	1. 53148	84	1. 92428	134	2. 12710	184	2. 26482	234	2. 36922
35	1. 54407	85	1. 92942	135	2. 13033	185	2. 26717	235	2. 37107
36	1. 55630	86	1. 93450	136	2. 13354	186	2. 26951	236	2. 37291
37	1. 56820	87	1. 93952	137	2. 13672	187	2. 27184	237	2. 37475
38	1. 57978	88	1. 94448	138	2. 13988	188	2. 27416	238	2. 37658
39	1. 59106	89	1. 94939	139	2. 14301	189	2. 27646	239	2. 37840
40	1. 60206	90	1. 95424	140	2. 14613	190	2. 27875	240	2. 38021
41	1. 61278	91	1. 95904	141	2. 14922	191	2. 28103	241	2. 38202
42	1. 62325	92	1. 96379	142	2. 15229	192	2. 28330	242	2. 38382
43	1. 63347	93	1. 96848	143	2. 15534	193	2. 28556	243	2. 38561
44	1. 64345	94	1. 97313	144	2. 15836	194	2. 28780	244	2. 38739
45	1. 65321	95	1. 97772	145	2. 16137	195	2. 29003	245	2. 38917
46	1. 66276	96	1. 98227	146	2. 16435	196	2. 29226	246	2. 39094
47	1. 67210	97	1. 98677	147	2. 16732	197	2. 29447	247	2. 39270
48	1. 68124	98	1. 99123	148	2. 17026	198	2. 29667	248	2. 39445
49	1. 69020	99	1. 99564	149	2. 17319	199	2. 29885	249	2. 39620
50	1. 69897	100	2. 00000	150	2. 17609	200	2. 30103	250	2. 39794

1000–1500

No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d
100	00000	43	00043	44	00087	43	00130	43	00173	44	00217	43	00260	43	00303	43	00346	43	00389	43
101	00432	43	00475	43	00518	43	00561	43	00604	43	00647	42	00689	43	00732	43	00775	42	00817	43
102	00860	43	00903	42	00945	43	00988	42	01030	42	01072	43	01115	42	01157	42	01199	43	01242	42
103	01284	42	01326	42	01368	42	01410	42	01452	42	01494	42	01536	42	01578	42	01620	42	01662	41
104	01703	42	01745	42	01787	41	01828	42	01870	42	01912	41	01953	42	01995	41	02036	42	02078	41
105	02119	41	02160	42	02202	41	02243	41	02284	41	02325	41	02366	41	02407	42	02449	41	02490	41
106	02531	41	02572	40	02612	41	02653	41	02694	41	02735	41	02776	40	02816	41	02857	41	02898	40
107	02938	41	02979	40	03019	41	03060	40	03100	41	03141	40	03181	41	03222	40	03262	40	03302	40
108	03342	41	03383	40	03423	40	03463	40	03503	40	03543	40	03583	40	03623	40	03663	40	03703	40
109	03743	39	03782	40	03822	40	03862	40	03902	39	03941	40	03981	40	04021	39	04060	40	04100	39
110	04139	40	04179	39	04218	40	04258	39	04297	39	04336	40	04376	39	04415	39	04454	39	04493	39
111	04532	39	04571	39	04610	40	04650	39	04689	38	04727	39	04766	39	04805	39	04844	39	04883	39
112	04922	39	04961	38	04999	39	05038	39	05077	38	05115	39	05154	38	05192	39	05231	38	05269	39
113	05308	38	05346	39	05385	38	05423	38	05461	39	05500	38	05538	38	05576	38	05614	38	05652	38
114	05690	39	05729	38	05767	38	05805	38	05843	38	05881	37	05918	38	05956	38	05994	38	06032	38
115	06070	38	06108	37	06145	38	06183	38	06221	37	06258	38	06296	37	06333	38	06371	37	06408	38
116	06446	37	06483	38	06521	37	06558	37	06595	38	06633	37	06670	37	06707	37	06744	37	06781	38
117	06819	37	06856	37	06893	37	06930	37	06967	37	07004	37	07041	37	07078	37	07115	36	07151	37
118	07188	37	07225	37	07262	36	07298	37	07335	37	07372	36	07408	37	07445	37	07482	36	07518	37
119	07555	36	07591	37	07628	36	07664	36	07700	37	07737	36	07773	36	07809	37	07846	36	07882	36
120	07918	36	07954	36	07990	37	08027	36	08063	36	08099	36	08135	36	08171	36	08207	36	08243	36
121	08279	35	08314	36	08350	36	08386	36	08422	36	08458	35	08493	36	08529	36	08565	35	08600	36
122	08636	36	08672	35	08707	36	08743	35	08778	36	08814	35	08849	35	08884	36	08920	35	08955	36
123	08991	35	09026	35	09061	35	09096	36	09132	35	09167	35	09202	35	09237	35	09272	35	09307	35
124	09342	35	09377	35	09412	35	09447	35	09482	35	09517	35	09552	35	09587	34	09621	35	09656	35
125	09691	35	09726	34	09760	35	09795	35	09830	34	09864	35	09899	35	09934	34	09968	35	10003	34
126	10037	35	10072	34	10106	34	10140	35	10175	34	10209	34	10243	35	10278	34	10312	34	10346	34
127	10380	35	10415	34	10449	34	10483	34	10517	34	10551	34	10585	34	10619	34	10653	34	10687	34
128	10721	34	10755	34	10789	34	10823	34	10857	33	10890	34	10924	34	10958	34	10992	33	11025	34
129	11059	34	11093	33	11126	34	11160	33	11193	34	11227	34	11261	33	11294	33	11327	34	11361	33
130	11394	34	11428	33	11461	33	11494	34	11528	33	11561	33	11594	34	11628	33	11661	33	11694	33
131	11727	33	11760	33	11793	33	11826	34	11860	33	11893	33	11926	33	11959	33	11992	32	12024	33
132	12057	33	12090	33	12123	33	12156	33	12189	33	12222	32	12254	33	12287	33	12320	32	12352	33
133	12385	33	12418	32	12450	33	12483	33	12516	32	12548	33	12581	32	12613	33	12646	32	12678	32
134	12710	33	12743	32	12775	33	12808	32	12840	32	12872	33	12905	32	12937	32	12969	32	13001	32
135	13033	33	13066	32	13098	32	13130	32	13162	32	13194	32	13226	32	13258	32	13290	32	13322	32
136	13354	32	13386	32	13418	32	13450	31	13481	32	13513	32	13545	32	13577	32	13609	31	13640	32
137	13672	32	13704	31	13735	32	13767	32	13799	31	13830	32	13862	31	13893	32	13925	31	13956	32
138	13988	31	14019	32	14051	31	14082	32	14114	31	14145	31	14176	32	14208	31	14239	31	14270	31
139	14301	32	14333	31	14364	31	14395	31	14426	31	14457	32	14489	31	14520	31	14551	31	14582	31
140	14613	31	14644	31	14675	31	14706	31	14737	31	14768	31	14799	30	14829	31	14860	31	14891	31
141	14922	31	14953	30	14983	31	15014	31	15045	31	15076	30	15106	31	15137	31	15168	30	15198	31
142	15229	30	15259	31	15290	30	15320	31	15351	30	15381	31	15412	30	15442	31	15473	30	15503	31
143	15534	30	15564	30	15594	31	15625	30	15655	30	15685	30	15715	31	15746	30	15776	30	15806	30
144	15836	30	15866	31	15897	30	15927	30	15957	30	15987	30	16017	30	16047	30	16077	30	16107	30
145	16137	30	16167	30	16197	30	16227	29	16256	30	16286	30	16316	30	16346	30	16376	30	16406	29
146	16435	30	16465	30	16495	29	16524	30	16554	30	16584	29	16613	30	16643	30	16673	29	16702	30
147	16732	29	16761	30	16791	29	16820	30	16850	29	16879	30	16909	29	16938	29	16967	30	16997	29
148	17026	30	17056	29	17085	29	17114	29	17143	30	17173	29	17202	29	17231	29	17260	29	17289	30
149	17319	29	17348	29	17377	29	17406	29	17435	29	17464	29	17493	29	17522	29	17551	29	17580	29
150	17609	29	17638	29	17667	29	17696	29	17725	29	17754	28	17782	29	17811	29	17840	29	17869	29
No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d

Prop. parts		
	44	43
1	4	4
2	9	9
3	13	13
4	18	17
5	22	22
6	26	26
7	31	30
8	35	34
9	40	39
	42	41
1	4	4
2	8	8
3	13	12
4	17	16
5	21	20
6	25	25
7	29	29
8	34	33
9	38	37
	40	39
1	4	4
2	8	8
3	12	12
4	16	16
5	20	20
6	24	23
7	28	27
8	32	31
9	36	35
	38	37
1	4	4
2	8	7
3	11	11
4	15	15
5	19	18
6	23	22
7	27	26
8	30	30
9	34	33
	36	35
1	4	4
2	7	7
3	11	10
4	14	14
5	18	18
6	22	21
7	25	24
8	29	28
9	32	32
	34	33
1	3	3
2	7	7
3	10	10
4	14	13
5	17	16
6	20	20
7	24	23
8	27	26
9	31	30

1500–2000

No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d
150	17609	29	17638	29	17667	29	17696	29	17725	29	17754	28	17782	29	17811	29	17840	29	17869	29
151	17898	28	17926	29	17955	29	17984	29	18013	28	18041	29	18070	29	18099	28	18127	29	18156	28
152	18184	29	18213	28	18241	29	18270	28	18298	29	18327	28	18355	29	18384	28	18412	29	18441	28
153	18469	29	18498	28	18526	28	18554	29	18583	28	18611	28	18639	28	18667	29	18696	28	18724	28
154	18752	28	18780	28	18808	29	18837	28	18865	28	18893	28	18921	28	18949	28	18977	28	19005	28
155	19033	28	19061	28	19089	28	19117	28	19145	28	19173	28	19201	28	19229	28	19257	28	19285	27
156	19312	28	19340	28	19368	28	19396	28	19424	27	19451	28	19479	28	19507	28	19535	27	19562	28
157	19590	28	19618	27	19645	28	19673	27	19700	28	19728	28	19756	27	19783	28	19811	27	19838	28
158	19866	27	19893	28	19921	27	19948	28	19976	27	20003	27	20030	28	20058	27	20085	27	20112	28
159	20140	27	20167	27	20194	28	20222	27	20249	27	20276	27	20303	27	20330	28	20358	27	20385	27
160	20412	27	20439	27	20466	27	20493	27	20520	28	20548	27	20575	27	20602	27	20629	27	20656	27
161	20683	27	20710	27	20737	26	20763	27	20790	27	20817	27	20844	27	20871	27	20898	27	20925	27
162	20952	26	20978	27	21005	27	21032	27	21059	26	21085	27	21112	27	21139	26	21165	27	21192	27
163	21219	26	21245	27	21272	27	21299	26	21325	27	21352	26	21378	27	21405	26	21431	27	21458	26
164	21484	27	21511	26	21537	27	21564	26	21590	27	21617	26	21643	26	21669	27	21696	26	21722	26
165	21748	27	21775	26	21801	26	21827	27	21854	26	21880	26	21906	26	21932	26	21958	27	21985	26
166	22011	26	22037	26	22063	26	22089	26	22115	26	22141	26	22167	27	22194	26	22220	26	22246	26
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171	23300	25	23325	25	23350	26	23376	25	23401	25	23426	26	23452	25	23477	25	23502	26	23528	25
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194	28780	23	28803	22	28825	22	28847	23	28870	22	28892	22	28914	23	28937	22	28959	22	28981	22
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199	29885	22	29907	22	29929	22	29951	22	29973	21	29994	22	30016	22	30038	22	30060	21	30081	22
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Prop. parts		
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2000–2500

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201	30320	21	30341	22	30363	21	30384	22	30406	22	30428	21	30449	22	30471	21	30492	22	30514	21
202	30535	22	30557	21	30578	22	30600	21	30621	22	30643	21	30664	21	30685	22	30707	21	30728	22
203	30750	21	30771	21	30792	22	30814	21	30835	21	30856	22	30878	21	30899	21	30920	22	30942	21
204	30963	21	30984	22	31006	21	31027	21	31048	21	31069	22	31091	21	31112	21	31133	21	31154	21
205	31175	22	31197	21	31218	21	31239	21	31260	21	31281	21	31302	21	31323	22	31345	21	31366	21
206	31387	21	31408	21	31429	21	31450	21	31471	21	31492	21	31513	21	31534	21	31555	21	31576	21
207	31597	21	31618	21	31639	21	31660	21	31681	21	31702	21	31723	21	31744	21	31765	20	31785	21
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209	32015	20	32035	21	32056	21	32077	21	32098	20	32118	21	32139	21	32160	21	32181	20	32201	21
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212	32634	20	32654	21	32675	20	32695	20	32715	21	32736	20	32756	21	32777	20	32797	21	32818	20
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233	36736	18	36754	19	36773	18	36791	19	36810	19	36829	18	36847	19	36866	18	36884	19	36903	19
234	36922	18	36940	19	36959	18	36977	19	36996	18	37014	19	37033	18	37051	19	37070	18	37088	19
235	37107	18	37125	19	37144	18	37162	19	37181	18	37199	19	37218	18	37236	18	37254	19	37273	18
236	37291	19	37310	18	37328	18	37346	19	37365	18	37383	18	37401	19	37420	18	37438	19	37457	18
237	37475	18	37493	18	37511	19	37530	18	37548	18	37566	19	37585	18	37603	18	37621	18	37639	19
238	37658	18	37676	18	37694	18	37712	19	37731	18	37749	18	37767	18	37785	18	37803	19	37822	18
239	37840	18	37858	18	37876	18	37894	18	37912	19	37931	18	37949	18	37967	18	37985	18	38003	18
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241	38202	18	38220	18	38238	18	38256	18	38274	18	38292	18	38310	18	38328	18	38346	18	38364	18
242	38382	17	38399	18	38417	18	38435	18	38453	18	38471	18	38489	18	38507	18	38525	18	38543	18
243	38561	17	38578	18	38596	18	38614	18	38632	18	38650	18	38668	18	38686	17	38703	18	38721	18
244	38739	18	38757	18	38775	17	38792	18	38810	18	38828	18	38846	17	38863	18	38881	18	38899	18
245	38917	17	38934	18	38952	18	38970	17	38987	18	39005	18	39023	18	39041	17	39058	18	39076	18
246	39094	17	39111	18	39129	17	39146	18	39164	18	39182	17	39199	18	39217	18	39235	17	39252	18
247	39270	17	39287	18	39305	17	39322	18	39340	18	39358	17	39375	18	39393	17	39410	18	39428	17
248	39445	18	39463	17	39480	18	39498	17	39515	18	39533	17	39550	18	39568	17	39585	17	39602	18
249	39620	17	39637	18	39655	17	39672	18	39690	17	39707	17	39724	18	39742	17	39759	18	39777	17
250	39794	17	39811	18	39829	17	39846	17	39863	18	39881	17	39898	17	39915	18	39933	17	39950	17
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Prop. parts	
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2500–3000

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251	39967	18	39985	17	40002	17	40019	18	40037	17	40054	17	40071	17	40088	18	40106	17	40123	17
252	40140	17	40157	18	40175	17	40192	17	40209	17	40226	17	40243	18	40261	17	40278	17	40295	17
253	40312	17	40329	17	40346	18	40364	17	40381	17	40398	17	40415	17	40432	17	40449	17	40466	17
254	40483	17	40500	18	40518	17	40535	17	40552	17	40569	17	40586	17	40603	17	40620	17	40637	17
255	40654	17	40671	17	40688	17	40705	17	40722	17	40739	17	40756	17	40773	17	40790	17	40807	17
256	40824	17	40841	17	40858	17	40875	17	40892	17	40909	17	40926	17	40943	17	40960	16	40976	17
257	40993	17	41010	17	41027	17	41044	17	41061	17	41078	17	41095	16	41111	17	41128	17	41145	17
258	41162	17	41179	17	41196	16	41212	17	41229	17	41246	17	41263	17	41280	16	41296	17	41313	17
259	41330	17	41347	16	41363	17	41380	17	41397	17	41414	16	41430	17	41447	17	41464	17	41481	16
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263	41996	16	42012	17	42029	16	42045	17	42062	16	42078	17	42095	16	42111	16	42127	17	42144	16
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268	42813	17	42830	16	42846	16	42862	16	42878	16	42894	17	42911	16	42927	16	42943	16	42959	16
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3000–3500

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301	47857	14	47871	14	47885	15	47900	14	47914	15	47929	14	47943	15	47958	14	47972	14	47986	15
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303	48144	15	48159	14	48173	14	48187	15	48202	14	48216	14	48230	14	48244	15	48259	14	48273	14
304	48287	15	48302	14	48316	14	48330	14	48344	15	48359	14	48373	14	48387	14	48401	15	48416	14
305	48430	14	48444	14	48458	15	48473	14	48487	14	48501	14	48515	15	48530	14	48544	14	48558	14
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310	49136	14	49150	14	49164	14	49178	14	49192	14	49206	14	49220	14	49234	14	49248	14	49262	14
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Prop. parts	
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435	63849	10	63859	10	63869	10	63879	10	63889	10	63899	10	63909	10	63919	10	63929	10	63939	10
436	63949	10	63959	10	63969	10	63979	9	63988	10	63998	10	64008	10	64018	10	64028	10	64038	10
437	64048	10	64058	10	64068	10	64078	10	64088	10	64098	10	64108	10	64118	10	64128	9	64137	10
438	64147	10	64157	10	64167	10	64177	10	64187	10	64197	10	64207	10	64217	10	64227	10	64237	9
439	64246	10	64256	10	64266	10	64276	10	64286	10	64296	10	64306	10	64316	10	64326	9	64335	10
440	64345	10	64355	10	64365	10	64375	10	64385	10	64395	9	64404	10	64414	10	64424	10	64434	10
441	64444	10	64454	10	64464	9	64473	10	64483	10	64493	10	64503	10	64513	10	64523	9	64532	10
442	64542	10	64552	10	64562	10	64572	10	64582	9	64591	10	64601	10	64611	10	64621	10	64631	9
443	64640	10	64650	10	64660	10	64670	10	64680	9	64689	10	64699	10	64709	10	64719	10	64729	9
444	64738	10	64748	10	64758	10	64768	9	64777	10	64787	10	64797	10	64807	9	64816	10	64826	10
445	64836	10	64846	10	64856	9	64865	10	64875	10	64885	10	64895	9	64904	10	64914	10	64924	9
446	64933	10	64943	10	64953	10	64963	9	64972	10	64982	10	64992	10	65002	9	65011	10	65021	10
447	65031	9	65040	10	65050	10	65060	10	65070	9	65079	10	65089	10	65099	9	65108	10	65118	10
448	65128	9	65137	10	65147	10	65157	10	65167	9	65176	10	65186	10	65196	9	65205	10	65215	10
449	65225	9	65234	10	65244	10	65254	9	65263	10	65273	10	65283	9	65292	10	65302	10	65312	9
450	65321	10	65331	10	65341	9	65350	10	65360	9	65369	10	65379	10	65389	9	65398	10	65408	10
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Prop. parts	
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4500–5000

No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d
450	65321	10	65331	10	65341	9	65350	10	65360	9	65369	10	65379	10	65389	9	65398	10	65408	10
451	65418	9	65427	10	65437	10	65447	9	65456	10	65466	9	65475	10	65485	10	65495	9	65504	10
452	65514	9	65523	10	65533	10	65543	9	65552	10	65562	9	65571	10	65581	10	65591	9	65600	10
453	65610	9	65619	10	65629	10	65639	9	65648	10	65658	9	65667	10	65677	9	65686	10	65696	10
454	65706	9	65715	10	65725	9	65734	10	65744	9	65753	10	65763	9	65772	10	65782	10	65792	9
455	65801	10	65811	9	65820	10	65830	9	65839	10	65849	9	65858	10	65868	9	65877	10	65887	9
456	65896	10	65906	10	65916	9	65925	10	65935	9	65944	10	65954	9	65963	10	65973	9	65982	10
457	65992	9	66001	10	66011	9	66020	10	66030	9	66039	10	66049	9	66058	10	66068	9	66077	10
458	66087	9	66096	10	66106	9	66115	9	66124	10	66134	9	66143	10	66153	9	66162	10	66172	9
459	66181	10	66191	9	66200	10	66210	9	66219	10	66229	9	66238	9	66247	10	66257	9	66266	10
460	66276	9	66285	10	66295	9	66304	10	66314	9	66323	9	66332	10	66342	9	66351	10	66361	9
461	66370	10	66380	9	66389	9	66398	10	66408	9	66417	10	66427	9	66436	9	66445	10	66455	9
462	66464	10	66474	9	66483	9	66492	10	66502	9	66511	10	66521	9	66530	9	66539	10	66549	9
463	66558	9	66567	10	66577	9	66586	10	66596	9	66605	9	66614	10	66624	9	66633	9	66642	10
464	66652	9	66661	10	66671	9	66680	9	66689	10	66699	9	66708	9	66717	10	66727	9	66736	9
465	66745	10	66755	9	66764	9	66773	10	66783	9	66792	9	66801	10	66811	9	66820	9	66829	10
466	66839	9	66848	9	66857	10	66867	9	66876	9	66885	9	66894	10	66904	9	66913	9	66922	10
467	66932	9	66941	9	66950	10	66960	9	66969	9	66978	9	66987	10	66997	9	67006	9	67015	10
468	67025	9	67034	9	67043	9	67052	10	67062	9	67071	9	67080	9	67089	10	67099	9	67108	9
469	67117	10	67127	9	67136	9	67145	9	67154	10	67164	9	67173	9	67182	9	67191	10	67201	9
470	67210	9	67219	9	67228	9	67237	10	67247	9	67256	9	67265	9	67274	10	67284	9	67293	9
471	67302	9	67311	10	67321	9	67330	9	67339	9	67348	9	67357	10	67367	9	67376	9	67385	9
472	67394	9	67403	10	67413	9	67422	9	67431	9	67440	9	67449	10	67459	9	67468	9	67477	9
473	67486	9	67495	9	67504	10	67514	9	67523	9	67532	9	67541	9	67550	10	67560	9	67569	9
474	67578	9	67587	9	67596	9	67605	9	67614	10	67624	9	67633	9	67642	9	67651	9	67660	9
475	67669	10	67679	9	67688	9	67697	9	67706	9	67715	9	67724	9	67733	9	67742	10	67752	9
476	67761	9	67770	9	67779	9	67788	9	67797	9	67806	9	67815	10	67825	9	67834	9	67843	9
477	67852	9	67861	9	67870	9	67879	9	67888	9	67897	9	67906	10	67916	9	67925	9	67934	9
478	67943	9	67952	9	67961	9	67970	9	67979	9	67988	9	67997	9	68006	9	68015	9	68024	10
479	68034	9	68043	9	68052	9	68061	9	68070	9	68079	9	68088	9	68097	9	68106	9	68115	9
480	68124	9	68133	9	68142	9	68151	9	68160	9	68169	9	68178	9	68187	9	68196	9	68205	10
481	68215	9	68224	9	68233	9	68242	9	68251	9	68260	9	68269	9	68278	9	68287	9	68296	9
482	68305	9	68314	9	68323	9	68332	9	68341	9	68350	9	68359	9	68368	9	68377	9	68386	9
483	68395	9	68404	9	68413	9	68422	9	68431	9	68440	9	68449	9	68458	9	68467	9	68476	9
484	68485	9	68494	8	68502	9	68511	9	68520	9	68529	9	68538	9	68547	9	68556	9	68565	9
485	68574	9	68583	9	68592	9	68601	9	68610	9	68619	9	68628	9	68637	9	68646	9	68655	9
486	68664	9	68673	8	68681	9	68690	9	68699	9	68708	9	68717	9	68726	9	68735	9	68744	9
487	68753	9	68762	9	68771	9	68780	9	68789	8	68797	9	68806	9	68815	9	68824	9	68833	9
488	68842	9	68851	9	68860	9	68869	9	68878	8	68886	9	68895	9	68904	9	68913	9	68922	9
489	68931	9	68940	9	68949	9	68958	8	68966	9	68975	9	68984	9	68993	9	69002	9	69011	9
490	69020	8	69028	9	69037	9	69046	9	69055	9	69064	9	69073	9	69082	8	69090	9	69099	9
491	69108	9	69117	9	69126	9	69135	9	69144	8	69152	9	69161	9	69170	9	69179	9	69188	9
492	69197	8	69205	9	69214	9	69223	9	69232	9	69241	8	69249	9	69258	9	69267	9	69276	9
493	69285	9	69294	8	69302	9	69311	9	69320	9	69329	9	69338	8	69346	9	69355	9	69364	9
494	69373	8	69381	9	69390	9	69399	9	69408	9	69417	8	69425	9	69434	9	69443	9	69452	9
495	69461	8	69469	9	69478	9	69487	9	69496	8	69504	9	69513	9	69522	9	69531	8	69539	9
496	69548	9	69557	9	69566	8	69574	9	69583	9	69592	9	69601	8	69609	9	69618	9	69627	9
497	69636	8	69644	9	69653	9	69662	9	69671	8	69679	9	69688	9	69697	8	69705	9	69714	9
498	69723	9	69732	8	69740	9	69749	9	69758	9	69767	8	69775	9	69784	9	69793	8	69801	9
499	69810	9	69819	8	69827	9	69836	9	69845	9	69854	8	69862	9	69871	9	69880	8	69888	9
500	69897	9	69906	8	69914	9	69923	9	69932	8	69940	9	69949	9	69958	8	69966	9	69975	9
No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d

Prop. parts

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5000–5500

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500	69897	9	69906	8	69914	9	69923	9	69932	8	69940	9	69949	9	69958	8	69966	9	69975	9
501	69984	8	69992	9	70001	9	70010	8	70018	9	70027	9	70036	8	70044	9	70053	9	70062	8
502	70070	9	70079	9	70088	8	70096	9	70105	9	70114	8	70122	9	70131	9	70140	8	70148	9
503	70157	8	70165	9	70174	9	70183	8	70191	9	70200	9	70209	8	70217	9	70226	8	70234	9
504	70243	9	70252	8	70260	9	70269	9	70278	8	70286	9	70295	8	70303	9	70312	9	70321	8
505	70329	9	70338	8	70346	9	70355	9	70364	8	70372	9	70381	8	70389	9	70398	8	70406	9
506	70415	9	70424	8	70432	9	70441	8	70449	9	70458	9	70467	8	70475	9	70484	8	70492	9
507	70501	8	70509	9	70518	8	70526	9	70535	9	70544	8	70552	9	70561	8	70569	9	70578	8
508	70586	9	70595	8	70603	9	70612	9	70621	8	70629	9	70638	8	70646	9	70655	9	70663	9
509	70672	8	70680	9	70689	8	70697	9	70706	8	70714	9	70723	8	70731	9	70740	9	70749	8
510	70757	9	70766	8	70774	9	70783	8	70791	9	70800	8	70808	9	70817	8	70825	9	70834	8
511	70842	9	70851	8	70859	9	70868	8	70876	9	70885	8	70893	9	70902	8	70910	9	70919	8
512	70927	8	70935	9	70944	8	70952	9	70961	8	70969	9	70978	8	70986	9	70995	8	71003	9
513	71012	8	71020	9	71029	8	71037	9	71046	8	71054	9	71063	8	71071	8	71079	9	71088	8
514	71096	9	71105	8	71113	9	71122	8	71130	9	71139	8	71147	8	71155	9	71164	8	71172	9
515	71181	8	71189	9	71198	8	71206	8	71214	9	71223	8	71231	9	71240	8	71248	9	71257	8
516	71265	8	71273	9	71282	8	71290	9	71299	8	71307	8	71315	9	71324	8	71332	9	71341	8
517	71349	8	71357	9	71366	8	71374	9	71383	8	71391	8	71399	9	71408	8	71416	9	71425	8
518	71433	8	71441	9	71450	8	71458	8	71466	9	71475	8	71483	9	71492	8	71500	8	71508	9
519	71517	8	71525	8	71533	9	71542	8	71550	9	71559	8	71567	8	71575	9	71584	8	71592	8
520	71600	9	71609	8	71617	8	71625	9	71634	8	71642	8	71650	9	71659	8	71667	8	71675	9
521	71684	8	71692	8	71700	9	71709	8	71717	8	71725	9	71734	8	71742	8	71750	9	71759	8
522	71767	8	71775	9	71784	8	71792	8	71800	9	71809	8	71817	8	71825	9	71834	8	71842	8
523	71850	8	71858	9	71867	8	71875	8	71883	9	71892	8	71900	8	71908	9	71917	8	71925	8
524	71933	9	71941	9	71950	8	71958	8	71966	9	71975	8	71983	8	71991	8	71999	9	72008	8
525	72016	8	72024	8	72032	9	72041	8	72049	8	72057	9	72066	8	72074	8	72082	8	72090	9
526	72099	8	72107	8	72115	8	72123	9	72132	8	72140	8	72148	8	72156	9	72165	8	72173	8
527	72181	8	72189	9	72198	8	72206	8	72214	8	72222	8	72230	9	72239	8	72247	8	72255	8
528	72263	9	72272	8	72280	8	72288	8	72296	8	72304	9	72313	8	72321	8	72329	8	72337	9
529	72346	8	72354	8	72362	8	72370	8	72378	9	72387	8	72395	8	72403	8	72411	8	72419	9
530	72428	8	72436	8	72444	8	72452	8	72460	9	72469	8	72477	8	72485	8	72493	8	72501	8
531	72509	9	72518	8	72526	8	72534	8	72542	8	72550	8	72558	9	72567	8	72575	8	72583	8
532	72591	8	72599	8	72607	9	72616	8	72624	8	72632	8	72640	8	72648	8	72656	9	72665	8
533	72673	8	72681	8	72689	8	72697	8	72705	8	72713	9	72722	8	72730	8	72738	8	72746	8
534	72754	8	72762	8	72770	9	72779	8	72787	8	72795	8	72803	8	72811	8	72819	8	72827	8
535	72835	8	72843	9	72852	8	72860	8	72868	8	72876	8	72884	8	72892	8	72900	8	72908	8
536	72916	9	72925	8	72933	8	72941	8	72949	8	72957	8	72965	8	72973	8	72981	8	72989	8
537	72997	9	73006	8	73014	8	73022	8	73030	8	73038	8	73046	8	73054	8	73062	8	73070	8
538	73078	8	73086	8	73094	8	73102	9	73111	8	73119	8	73127	8	73135	8	73143	8	73151	8
539	73159	8	73167	8	73175	8	73183	8	73191	8	73199	8	73207	8	73215	8	73223	8	73231	8
540	73239	8	73247	8	73255	8	73263	9	73272	8	73280	8	73288	8	73296	8	73304	8	73312	8
541	73320	8	73328	8	73336	8	73344	8	73352	8	73360	8	73368	8	73376	8	73384	8	73392	8
542	73400	8	73408	8	73416	8	73424	8	73432	8	73440	8	73448	8	73456	8	73464	8	73472	8
543	73480	8	73488	8	73496	8	73504	8	73512	8	73520	8	73528	8	73536	8	73544	8	73552	8
544	73560	8	73568	8	73576	8	73584	8	73592	8	73600	8	73608	8	73616	8	73624	8	73632	8
545	73640	8	73648	8	73656	8	73664	8	73672	7	73679	8	73687	8	73695	8	73703	8	73711	8
546	73719	8	73727	8	73735	8	73743	8	73751	8	73759	8	73767	8	73775	8	73783	8	73791	8
547	73799	8	73807	8	73815	8	73823	7	73830	8	73838	8	73846	8	73854	8	73862	8	73870	8
548	73878	8	73886	8	73894	8	73902	8	73910	8	73918	8	73926	7	73933	8	73941	8	73949	8
549	73957	8	73965	8	73973	8	73981	8	73989	8	73997	8	74005	8	74013	7	74020	8	74028	8
550	74036	8	74044	8	74052	8	74060	8	74068	8	74076	8	74084	8	74092	7	74099	8	74107	8
No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d

Prop. parts	
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Logarithms of Numbers

5500–6000

No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d
550	74036	8	74044	8	74052	8	74060	8	74068	8	74076	8	74084	8	74092	7	74099	8	74107	8
551	74115	8	74123	8	74131	8	74139	8	74147	8	74155	7	74162	8	74170	8	74178	8	74186	8
552	74194	8	74202	8	74210	8	74218	7	74225	8	74233	8	74241	8	74249	8	74257	8	74265	8
553	74273	7	74280	8	74288	8	74296	8	74304	8	74312	8	74320	7	74327	8	74335	8	74343	8
554	74351	8	74359	8	74367	7	74374	8	74382	8	74390	8	74398	8	74406	8	74414	7	74421	8
555	74429	8	74437	8	74445	8	74453	8	74461	7	74468	8	74476	8	74484	8	74492	8	74500	7
556	74507	8	74515	8	74523	8	74531	8	74539	8	74547	7	74554	8	74562	8	74570	8	74578	8
557	74586	7	74593	8	74601	8	74609	8	74617	7	74624	8	74632	8	74640	8	74648	8	74656	7
558	74663	8	74671	8	74679	8	74687	8	74695	7	74702	8	74710	8	74718	8	74726	7	74733	8
559	74741	8	74749	8	74757	7	74764	8	74772	8	74780	8	74788	8	74796	7	74803	8	74811	8
560	74819	8	74827	7	74834	8	74842	8	74850	8	74858	7	74865	8	74873	8	74881	8	74889	7
561	74896	8	74904	8	74912	8	74920	7	74927	8	74935	8	74943	7	74950	8	74958	8	74966	8
562	74974	7	74981	8	74989	8	74997	8	75005	7	75012	8	75020	8	75028	7	75035	8	75043	8
563	75051	8	75059	7	75066	8	75074	8	75082	7	75089	8	75097	8	75105	8	75113	7	75120	8
564	75128	8	75136	7	75143	8	75151	8	75159	7	75166	8	75174	8	75182	7	75189	8	75197	8
565	75205	8	75213	7	75220	8	75228	8	75236	7	75243	8	75251	8	75259	7	75266	8	75274	8
566	75282	7	75289	8	75297	8	75305	7	75312	8	75320	8	75328	7	75335	8	75343	8	75351	7
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575	75967	7	75974	8	75982	7	75989	8	75997	8	76005	7	76012	8	76020	7	76027	8	76035	7
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Prop. parts

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5000–5500

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501	69984	8	69992	9	70001	9	70010	8	70018	9	70027	9	70036	8	70044	9	70053	9	70062	8
502	70070	9	70079	9	70088	8	70096	9	70105	9	70114	8	70122	9	70131	9	70140	8	70148	9
503	70157	8	70165	9	70174	9	70183	8	70191	9	70200	9	70209	8	70217	9	70226	8	70234	9
504	70243	9	70252	8	70260	9	70269	9	70278	8	70286	9	70295	8	70303	9	70312	9	70321	8
505	70329	9	70338	8	70346	9	70355	9	70364	8	70372	9	70381	8	70389	9	70398	8	70406	9
506	70415	9	70424	8	70432	9	70441	8	70449	9	70458	9	70467	8	70475	9	70484	8	70492	9
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509	70672	8	70680	9	70689	8	70697	9	70706	8	70714	9	70723	8	70731	9	70740	9	70749	8
510	70757	9	70766	8	70774	9	70783	8	70791	9	70800	8	70808	9	70817	8	70825	9	70834	8
511	70842	9	70851	8	70859	9	70868	8	70876	9	70885	8	70893	9	70902	8	70910	9	70919	8
512	70927	8	70935	9	70944	8	70952	9	70961	8	70969	9	70978	8	70986	9	70995	8	71003	9
513	71012	8	71020	9	71029	8	71037	9	71046	8	71054	9	71063	8	71071	8	71079	9	71088	8
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525	72016	8	72024	8	72032	9	72041	8	72049	8	72057	9	72066	8	72074	8	72082	8	72090	9
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539	73159	8	73167	8	73175	8	73183	8	73191	8	73199	8	73207	8	73215	8	73223	8	73231	8
540	73239	8	73247	8	73255	8	73263	9	73272	8	73280	8	73288	8	73296	8	73304	8	73312	8
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543	73480	8	73488	8	73496	8	73504	8	73512	8	73520	8	73528	8	73536	8	73544	8	73552	8
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550	74036	8	74044	8	74052	8	74060	8	74068	8	74076	8	74084	8	74092	7	74099	8	74107	8
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Prop. parts	
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5500–6000

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552	74194	8	74202	8	74210	8	74218	7	74225	8	74233	8	74241	8	74249	8	74257	8	74265	8
553	74273	7	74280	8	74288	8	74296	8	74304	8	74312	8	74320	7	74327	8	74335	8	74343	8
554	74351	8	74359	8	74367	7	74374	8	74382	8	74390	8	74398	8	74406	8	74414	7	74421	8
555	74429	8	74437	8	74445	8	74453	8	74461	7	74468	8	74476	8	74484	8	74492	8	74500	7
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557	74586	7	74593	8	74601	8	74609	8	74617	7	74624	8	74632	8	74640	8	74648	8	74656	7
558	74663	8	74671	8	74679	8	74687	8	74695	7	74702	8	74710	8	74718	8	74726	7	74733	8
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Prop. parts	
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6000–6500

No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d
600	77815	7	77822	8	77830	7	77837	7	77844	7	77851	8	77859	7	77866	7	77873	7	77880	7
601	77887	8	77895	7	77902	7	77909	7	77916	8	77924	7	77931	7	77938	7	77945	7	77952	8
602	77960	7	77967	7	77974	7	77981	7	77988	8	77996	7	78003	7	78010	7	78017	8	78025	7
603	78032	7	78039	7	78046	7	78053	8	78061	7	78068	7	78075	7	78082	7	78089	8	78097	7
604	78104	7	78111	7	78118	7	78125	7	78132	8	78140	7	78147	7	78154	7	78161	7	78168	8
605	78176	7	78183	7	78190	7	78197	7	78204	7	78211	8	78219	7	78226	7	78233	7	78240	7
606	78247	7	78254	8	78262	7	78269	7	78276	7	78283	7	78290	7	78297	8	78305	7	78312	7
607	78319	7	78326	7	78333	7	78340	7	78347	8	78355	7	78362	7	78369	7	78376	7	78383	7
608	78390	8	78398	7	78405	7	78412	7	78419	7	78426	7	78433	7	78440	7	78447	8	78455	7
609	78462	7	78469	7	78476	7	78483	7	78490	7	78497	7	78504	8	78512	7	78519	7	78526	7
610	78533	7	78540	7	78547	7	78554	7	78561	8	78569	7	78576	7	78583	7	78590	7	78597	7
611	78604	7	78611	7	78618	7	78625	8	78633	7	78640	7	78647	7	78654	7	78661	7	78668	7
612	78675	7	78682	7	78689	7	78696	8	78704	7	78711	7	78718	7	78725	7	78732	7	78739	7
613	78746	7	78753	7	78760	7	78767	7	78774	7	78781	8	78789	7	78796	7	78803	7	78810	7
614	78817	7	78824	7	78831	7	78838	7	78845	7	78852	7	78859	7	78866	7	78873	7	78880	8
615	78888	7	78895	7	78902	7	78909	7	78916	7	78923	7	78930	7	78937	7	78944	7	78951	7
616	78958	7	78965	7	78972	7	78979	7	78986	7	78993	7	79000	7	79007	7	79014	7	79021	8
617	79029	7	79036	7	79043	7	79050	7	79057	7	79064	7	79071	7	79078	7	79085	7	79092	7
618	79099	7	79106	7	79113	7	79120	7	79127	7	79134	7	79141	7	79148	7	79155	7	79162	7
619	79169	7	79176	7	79183	7	79190	7	79197	7	79204	7	79211	7	79218	7	79225	7	79232	7
620	79239	7	79246	7	79253	7	79260	7	79267	7	79274	7	79281	7	79288	7	79295	7	79302	7
621	79309	7	79316	7	79323	7	79330	7	79337	7	79344	7	79351	7	79358	7	79365	7	79372	7
622	79379	7	79386	7	79393	7	79400	7	79407	7	79414	7	79421	7	79428	7	79435	7	79442	7
623	79449	7	79456	7	79463	7	79470	7	79477	7	79484	7	79491	7	79498	7	79505	6	79511	7
624	79518	7	79525	7	79532	7	79539	7	79546	7	79553	7	79560	7	79567	7	79574	7	79581	7
625	79588	7	79595	7	79602	7	79609	7	79616	7	79623	7	79630	7	79637	7	79644	6	79650	7
626	79657	7	79664	7	79671	7	79678	7	79685	7	79692	7	79699	7	79706	7	79713	7	79720	7
627	79727	7	79734	7	79741	7	79748	6	79754	7	79761	7	79768	7	79775	7	79782	7	79789	7
628	79796	7	79803	7	79810	7	79817	7	79824	7	79831	6	79837	7	79844	7	79851	7	79858	7
629	79865	7	79872	7	79879	7	79886	7	79893	7	79900	6	79906	7	79913	7	79920	7	79927	7
630	79934	7	79941	7	79948	7	79955	7	79962	7	79969	6	79975	7	79982	7	79989	7	79996	7
631	80003	7	80010	7	80017	7	80024	6	80030	7	80037	7	80044	7	80051	7	80058	7	80065	7
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633	80140	7	80147	7	80154	7	80161	7	80168	7	80175	7	80182	6	80188	7	80195	7	80202	7
634	80209	7	80216	7	80223	6	80229	7	80236	7	80243	7	80250	7	80257	7	80264	7	80271	6
635	80277	7	80284	7	80291	7	80298	7	80305	7	80312	6	80318	7	80325	7	80332	7	80339	7
636	80346	7	80353	6	80359	7	80366	7	80373	7	80380	7	80387	6	80393	7	80400	7	80407	7
637	80414	7	80421	7	80428	6	80434	7	80441	7	80448	7	80455	7	80462	6	80468	7	80475	7
638	80482	7	80489	7	80496	6	80502	7	80509	7	80516	7	80523	7	80530	6	80536	7	80543	7
639	80550	7	80557	7	80564	6	80570	7	80577	7	80584	7	80591	7	80598	6	80604	7	80611	7
640	80618	7	80625	7	80632	6	80638	7	80645	7	80652	7	80659	6	80665	7	80672	7	80679	7
641	80686	7	80693	6	80699	7	80706	7	80713	7	80720	6	80726	7	80733	7	80740	7	80747	7
642	80754	6	80760	7	80767	7	80774	7	80781	6	80787	7	80794	7	80801	7	80808	6	80814	7
643	80821	7	80828	7	80835	6	80841	7	80848	7	80855	7	80862	6	80868	7	80875	7	80882	7
644	80889	6	80895	7	80902	7	80909	7	80916	6	80922	7	80929	7	80936	7	80943	6	80949	7
645	80956	7	80963	6	80969	7	80976	7	80983	7	80990	6	80996	7	81003	7	81010	7	81017	6
646	81023	7	81030	7	81037	6	81043	7	81050	7	81057	7	81064	6	81070	7	81077	7	81084	6
647	81090	7	81097	7	81104	7	81111	6	81117	7	81124	7	81131	6	81137	7	81144	7	81151	7
648	81158	6	81164	7	81171	7	81178	6	81184	7	81191	7	81198	6	81204	7	81211	7	81218	6
649	81224	7	81231	7	81238	7	81245	6	81251	7	81258	7	81265	6	81271	7	81278	7	81285	6
650	81291	7	81298	7	81305	6	81311	7	81318	7	81325	6	81331	7	81338	7	81345	6	81351	7
No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d

Prop. parts	
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6500–7000

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650	81291	7	81298	7	81305	6	81311	7	81318	7	81325	6	81331	7	81338	7	81345	6	81351	7
651	81358	7	81365	6	81371	7	81378	7	81385	6	81391	7	81398	7	81405	6	81411	7	81418	7
652	81425	6	81431	7	81438	7	81445	6	81451	7	81458	7	81465	6	81471	7	81478	7	81485	6
653	81491	7	81498	7	81505	6	81511	7	81518	7	81525	6	81531	7	81538	6	81544	7	81551	7
654	81558	6	81564	7	81571	7	81578	6	81584	7	81591	7	81598	6	81604	7	81611	6	81617	7
655	81624	7	81631	6	81637	7	81644	7	81651	6	81657	7	81664	7	81671	6	81677	7	81684	6
656	81690	7	81697	7	81704	6	81710	7	81717	6	81723	7	81730	7	81737	6	81743	7	81750	7
657	81757	6	81763	7	81770	6	81776	7	81783	7	81790	6	81796	7	81803	6	81809	7	81816	7
658	81823	6	81829	7	81836	6	81842	7	81849	7	81856	6	81862	7	81869	6	81875	7	81882	7
659	81889	6	81895	7	81902	6	81908	7	81915	6	81921	7	81928	7	81935	6	81941	7	81948	6
660	81954	7	81961	7	81968	6	81974	7	81981	6	81987	7	81994	6	82000	7	82007	7	82014	6
661	82020	7	82027	6	82033	7	82040	6	82046	7	82053	7	82060	6	82066	7	82073	6	82079	7
662	82086	6	82092	7	82099	6	82105	7	82112	7	82119	6	82125	7	82132	6	82138	7	82145	6
663	82151	7	82158	6	82164	7	82171	7	82178	6	82184	7	82191	6	82197	7	82204	6	82210	7
664	82217	6	82223	7	82230	6	82236	7	82243	6	82249	7	82256	7	82263	6	82269	7	82276	6
665	82282	7	82289	6	82295	7	82302	6	82308	7	82315	6	82321	7	82328	6	82334	7	82341	6
666	82347	7	82354	6	82360	7	82367	6	82373	7	82380	7	82387	6	82393	7	82400	6	82406	7
667	82413	6	82419	7	82426	6	82432	7	82439	6	82445	7	82452	6	82458	7	82465	6	82471	7
668	82478	6	82484	7	82491	6	82497	7	82504	6	82510	7	82517	6	82523	7	82530	6	82536	7
669	82543	6	82549	7	82556	6	82562	7	82569	6	82575	7	82582	6	82588	7	82595	6	82601	6
670	82607	7	82614	6	82620	7	82627	6	82633	7	82640	6	82646	7	82653	6	82659	7	82666	6
671	82672	7	82679	6	82685	7	82692	6	82698	7	82705	6	82711	7	82718	6	82724	6	82730	7
672	82737	6	82743	7	82750	6	82756	7	82763	6	82769	7	82776	6	82782	7	82789	6	82795	7
673	82802	6	82808	6	82814	7	82821	6	82827	7	82834	6	82840	7	82847	6	82853	7	82860	6
674	82866	6	82872	7	82879	6	82885	7	82892	6	82898	7	82905	6	82911	7	82918	6	82924	6
675	82930	7	82937	6	82943	7	82950	6	82956	7	82963	6	82969	6	82975	7	82982	6	82988	7
676	82995	6	83001	7	83008	6	83014	6	83020	7	83027	6	83033	7	83040	6	83046	6	83052	7
677	83059	6	83065	7	83072	6	83078	7	83085	6	83091	6	83097	7	83104	6	83110	7	83117	6
678	83123	6	83129	7	83136	6	83142	7	83149	6	83155	6	83161	7	83168	6	83174	7	83181	6
679	83187	6	83193	7	83200	6	83206	7	83213	6	83219	6	83225	7	83232	6	83238	7	83245	6
680	83251	6	83257	7	83264	6	83270	6	83276	7	83283	6	83289	7	83296	6	83302	6	83308	7
681	83315	6	83321	6	83327	7	83334	6	83340	7	83347	6	83353	6	83359	7	83366	6	83372	6
682	83378	7	83385	6	83391	7	83398	6	83404	6	83410	7	83417	6	83423	6	83429	7	83436	6
683	83442	6	83448	7	83455	6	83461	6	83467	7	83474	6	83480	7	83487	6	83493	6	83499	7
684	83506	6	83512	6	83518	7	83525	6	83531	6	83537	7	83544	6	83550	6	83556	7	83563	6
685	83569	6	83575	7	83582	6	83588	6	83594	7	83601	6	83607	6	83613	7	83620	6	83626	6
686	83632	7	83639	6	83645	6	83651	7	83658	6	83664	6	83670	7	83677	6	83683	6	83689	7
687	83696	6	83702	6	83708	7	83715	6	83721	6	83727	7	83734	6	83740	6	83746	7	83753	6
688	83759	6	83765	6	83771	7	83778	6	83784	6	83790	7	83797	6	83803	6	83809	7	83816	6
689	83822	6	83828	7	83835	6	83841	6	83847	6	83853	7	83860	6	83866	6	83872	7	83879	6
690	83885	6	83891	6	83897	7	83904	6	83910	6	83916	7	83923	6	83929	6	83935	7	83942	6
691	83948	6	83954	6	83960	7	83967	6	83973	6	83979	6	83985	7	83992	6	83998	6	84004	7
692	84011	6	84017	6	84023	6	84029	7	84036	6	84042	6	84048	7	84055	6	84061	6	84067	6
693	84073	7	84080	6	84086	6	84092	6	84098	7	84105	6	84111	6	84117	6	84123	7	84130	6
694	84136	6	84142	6	84148	7	84155	6	84161	6	84167	6	84173	7	84180	6	84186	6	84192	6
695	84198	7	84205	6	84211	6	84217	6	84223	7	84230	6	84236	6	84242	6	84248	7	84255	6
696	84261	6	84267	6	84273	7	84280	6	84286	6	84292	6	84298	7	84305	6	84311	6	84317	6
697	84323	7	84330	6	84336	6	84342	6	84348	6	84354	7	84361	6	84367	6	84373	6	84379	7
698	84386	6	84392	6	84398	6	84404	6	84410	7	84417	6	84423	6	84429	6	84435	7	84442	6
699	84448	6	84454	6	84460	6	84466	7	84473	6	84479	6	84485	6	84491	6	84497	7	84504	6
700	84510	6	84516	6	84522	6	84528	7	84535	6	84541	6	84547	6	84553	6	84559	7	84566	6
No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d

Prop. parts	
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9	5

7000–7500

No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d
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701	84572	6	84578	6	84584	6	84590	7	84597	6	84603	6	84609	6	84615	6	84621	7	84628	6
702	84634	6	84640	6	84646	6	84652	6	84658	7	84665	6	84671	6	84677	6	84683	6	84689	7
703	84696	6	84702	6	84708	6	84714	6	84720	6	84726	7	84733	6	84739	6	84745	6	84751	6
704	84757	6	84763	7	84770	6	84776	6	84782	6	84788	6	84794	6	84800	7	84807	6	84813	6
705	84819	6	84825	6	84831	6	84837	7	84844	6	84850	6	84856	6	84862	6	84868	6	84874	6
706	84880	7	84887	6	84893	6	84899	6	84905	6	84911	6	84917	7	84924	6	84930	6	84936	6
707	84942	6	84948	6	84954	6	84960	7	84967	6	84973	6	84979	6	84985	6	84991	6	84997	6
708	85003	6	85009	7	85016	6	85022	6	85028	6	85034	6	85040	6	85046	6	85052	6	85058	7
709	85065	6	85071	6	85077	6	85083	6	85089	6	85095	6	85101	6	85107	7	85114	6	85120	6
710	85126	6	85132	6	85138	6	85144	6	85150	6	85156	7	85163	6	85169	6	85175	6	85181	6
711	85187	6	85193	6	85199	6	85205	6	85211	6	85217	7	85224	6	85230	6	85236	6	85242	6
712	85248	6	85254	6	85260	6	85266	6	85272	6	85278	7	85285	6	85291	6	85297	6	85303	6
713	85309	6	85315	6	85321	6	85327	6	85333	6	85339	6	85345	7	85352	6	85358	6	85364	6
714	85370	6	85376	6	85382	6	85388	6	85394	6	85400	6	85406	6	85412	6	85418	7	85425	6
715	85431	6	85437	6	85443	6	85449	6	85455	6	85461	6	85467	6	85473	6	85479	6	85485	6
716	85491	6	85497	6	85503	6	85509	7	85516	6	85522	6	85528	6	85534	6	85540	6	85546	6
717	85552	6	85558	6	85564	6	85570	6	85576	6	85582	6	85588	6	85594	6	85600	6	85606	6
718	85612	6	85618	7	85625	6	85631	6	85637	6	85643	6	85649	6	85655	6	85661	6	85667	6
719	85673	6	85679	6	85685	6	85691	6	85697	6	85703	6	85709	6	85715	6	85721	6	85727	6
720	85733	6	85739	6	85745	6	85751	6	85757	6	85763	6	85769	6	85775	6	85781	7	85788	6
721	85794	6	85800	6	85806	6	85812	6	85818	6	85824	6	85830	6	85836	6	85842	6	85848	6
722	85854	6	85860	6	85866	6	85872	6	85878	6	85884	6	85890	6	85896	6	85902	6	85908	6
723	85914	6	85920	6	85926	6	85932	6	85938	6	85944	6	85950	6	85956	6	85962	6	85968	6
724	85974	6	85980	6	85986	6	85992	6	85998	6	86004	6	86010	6	86016	6	86022	6	86028	6
725	86034	6	86040	6	86046	6	86052	6	86058	6	86064	6	86070	6	86076	6	86082	6	86088	6
726	86094	6	86100	6	86106	6	86112	6	86118	6	86124	6	86130	6	86136	5	86141	6	86147	6
727	86153	6	86159	6	86165	6	86171	6	86177	6	86183	6	86189	6	86195	6	86201	6	86207	6
728	86213	6	86219	6	86225	6	86231	6	86237	6	86243	6	86249	6	86255	6	86261	6	86267	6
729	86273	6	86279	6	86285	6	86291	6	86297	6	86303	5	86308	6	86314	6	86320	6	86326	6
730	86332	6	86338	6	86344	6	86350	6	86356	6	86362	6	86368	6	86374	6	86380	6	86386	6
731	86392	6	86398	6	86404	6	86410	5	86415	6	86421	6	86427	6	86433	6	86439	6	86445	6
732	86451	6	86457	6	86463	6	86469	6	86475	6	86481	6	86487	6	86493	6	86499	5	86504	6
733	86510	6	86516	6	86522	6	86528	6	86534	6	86540	6	86546	6	86552	6	86558	6	86564	6
734	86570	6	86576	5	86581	6	86587	6	86593	6	86599	6	86605	6	86611	6	86617	6	86623	6
735	86629	6	86635	6	86641	5	86646	6	86652	6	86658	6	86664	6	86670	6	86676	6	86682	6
736	86688	6	86694	6	86700	5	86705	6	86711	6	86717	6	86723	6	86729	6	86735	6	86741	6
737	86747	6	86753	6	86759	5	86764	6	86770	6	86776	6	86782	6	86788	6	86794	5	86800	6
738	86806	6	86812	5	86817	6	86823	6	86829	6	86835	6	86841	6	86847	6	86853	6	86859	5
739	86864	6	86870	6	86876	6	86882	6	86888	6	86894	6	86900	6	86906	5	86911	6	86917	6
740	86923	6	86929	6	86935	6	86941	6	86947	6	86953	5	86958	6	86964	6	86970	6	86976	6
741	86982	6	86988	6	86994	5	86999	6	87005	6	87011	6	87017	6	87023	6	87029	6	87035	5
742	87040	6	87046	6	87052	6	87058	6	87064	6	87070	5	87075	6	87081	6	87087	6	87093	6
743	87099	6	87105	6	87111	5	87116	6	87122	6	87128	6	87134	6	87140	6	87146	5	87151	6
744	87157	6	87163	6	87169	6	87175	6	87181	5	87186	6	87192	6	87198	6	87204	6	87210	6
745	87216	5	87221	6	87227	6	87233	6	87239	6	87245	6	87251	5	87256	6	87262	6	87268	6
746	87274	6	87280	6	87286	5	87291	6	87297	6	87303	6	87309	6	87315	5	87320	6	87326	6
747	87332	6	87338	6	87344	5	87349	6	87355	6	87361	6	87367	6	87373	6	87379	5	87384	6
748	87390	6	87396	6	87402	6	87408	5	87413	6	87419	6	87425	6	87431	6	87437	5	87442	6
749	87448	6	87454	6	87460	6	87466	5	87471	6	87477	6	87483	6	87489	6	87495	5	87500	6
750	87506	6	87512	6	87518	5	87523	6	87529	6	87535	6	87541	6	87547	5	87552	6	87558	6
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Prop. parts	
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7500–8000

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750	87506	6	87512	6	87518	5	87523	6	87529	6	87535	6	87541	6	87547	5	87552	6	87558	6
751	87564	6	87570	6	87576	5	87581	6	87587	6	87593	6	87599	5	87604	6	87610	6	87616	6
752	87622	6	87628	5	87633	6	87639	6	87645	6	87651	5	87656	6	87662	6	87668	6	87674	5
753	87679	6	87685	5	87691	6	87697	6	87703	5	87708	6	87714	6	87720	6	87726	5	87731	6
754	87737	6	87743	6	87749	5	87754	6	87760	6	87766	6	87772	5	87777	6	87783	6	87789	6
755	87795	6	87800	6	87806	6	87812	6	87818	5	87823	6	87829	6	87835	6	87841	5	87846	6
756	87852	6	87858	6	87864	5	87869	6	87875	6	87881	6	87887	5	87892	6	87898	6	87904	6
757	87910	5	87915	6	87921	6	87927	6	87933	5	87938	6	87944	6	87950	5	87955	6	87961	6
758	87967	6	87973	5	87978	6	87984	6	87990	6	87996	5	88001	6	88007	6	88013	5	88018	6
759	88024	6	88030	6	88036	5	88041	6	88047	6	88053	5	88058	6	88064	6	88070	6	88076	5
760	88081	6	88087	6	88093	5	88098	6	88104	6	88110	6	88116	5	88121	6	88127	6	88133	5
761	88138	6	88144	6	88150	6	88156	5	88161	6	88167	6	88173	5	88178	6	88184	6	88190	5
762	88195	6	88201	6	88207	6	88213	5	88218	6	88224	6	88230	5	88235	6	88241	6	88247	5
763	88252	6	88258	6	88264	6	88270	5	88275	6	88281	6	88287	5	88292	6	88298	6	88304	5
764	88309	6	88315	6	88321	5	88326	6	88332	6	88338	5	88343	6	88349	6	88355	5	88360	6
765	88366	6	88372	5	88377	6	88383	6	88389	6	88395	6	88400	6	88406	6	88412	5	88417	6
766	88423	6	88429	5	88434	6	88440	6	88446	5	88451	6	88457	6	88463	5	88468	6	88474	6
767	88480	5	88485	6	88491	6	88497	5	88502	6	88508	5	88513	6	88519	6	88525	5	88530	6
768	88536	6	88542	5	88547	6	88553	6	88559	5	88564	6	88570	6	88576	5	88581	6	88587	6
769	88593	5	88598	6	88604	6	88610	5	88615	6	88621	6	88627	5	88632	6	88638	5	88643	6
770	88649	6	88655	5	88660	6	88666	6	88672	5	88677	6	88683	6	88689	5	88694	6	88700	5
771	88705	6	88711	6	88717	5	88722	6	88728	6	88734	5	88739	6	88745	5	88750	6	88756	6
772	88762	5	88767	6	88773	6	88779	5	88784	6	88790	5	88795	6	88801	6	88807	5	88812	6
773	88818	6	88824	5	88829	6	88835	5	88840	6	88846	6	88852	5	88857	6	88863	5	88868	6
774	88874	6	88880	5	88885	6	88891	6	88897	5	88902	6	88908	5	88913	6	88919	6	88925	5
775	88930	6	88936	5	88941	6	88947	6	88953	5	88958	6	88964	5	88969	6	88975	6	88981	5
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778	89098	6	89104	5	89109	6	89115	5	89120	6	89126	5	89131	6	89137	6	89143	5	89148	6
779	89154	5	89159	6	89165	5	89170	6	89176	6	89182	5	89187	6	89193	5	89198	6	89204	5
780	89209	6	89215	5	89221	5	89226	6	89232	5	89237	6	89243	5	89248	6	89254	6	89260	5
781	89265	6	89271	5	89276	6	89282	5	89287	6	89293	5	89298	6	89304	6	89310	5	89315	6
782	89321	5	89326	6	89332	5	89337	6	89343	5	89348	6	89354	6	89360	5	89365	6	89371	5
783	89376	6	89382	5	89387	6	89393	6	89398	6	89404	5	89409	6	89415	6	89421	5	89426	6
784	89432	5	89437	6	89443	5	89448	6	89454	5	89459	6	89465	5	89470	6	89476	5	89481	6
785	89487	5	89492	6	89498	6	89504	5	89509	6	89515	5	89520	6	89526	5	89531	6	89537	5
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787	89597	6	89603	6	89609	5	89614	6	89620	5	89625	6	89631	5	89636	6	89642	5	89647	6
788	89653	5	89658	6	89664	5	89669	6	89675	5	89680	6	89686	5	89691	6	89697	5	89702	6
789	89708	5	89713	6	89719	5	89724	6	89730	5	89735	6	89741	5	89746	6	89752	5	89757	6
790	89763	5	89768	6	89774	5	89779	6	89785	5	89790	6	89796	5	89801	6	89807	5	89812	6
791	89818	5	89823	6	89829	5	89834	6	89840	5	89845	6	89851	5	89856	6	89862	5	89867	6
792	89873	5	89878	5	89883	6	89889	5	89894	6	89900	5	89905	6	89911	5	89916	6	89922	5
793	89927	6	89933	5	89938	6	89944	5	89949	6	89955	5	89960	6	89966	5	89971	6	89977	5
794	89982	6	89988	5	89993	5	89998	6	90004	5	90009	6	90015	5	90020	6	90026	5	90031	6
795	90037	5	90042	6	90048	5	90053	6	90059	5	90064	5	90069	6	90075	5	90080	6	90086	5
796	90091	6	90097	5	90102	6	90108	5	90113	6	90119	5	90124	5	90129	6	90135	5	90140	6
797	90146	5	90151	6	90157	5	90162	6	90168	5	90173	6	90179	5	90184	5	90189	6	90195	5
798	90200	6	90206	5	90211	6	90217	5	90222	5	90227	6	90233	5	90238	6	90244	5	90249	6
799	90255	5	90260	6	90266	5	90271	5	90276	6	90282	5	90287	6	90293	5	90298	6	90304	5
800	90309	5	90314	6	90320	5	90325	6	90331	5	90336	6	90342	5	90347	5	90352	6	90358	5
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Prop. parts	
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8000–8500

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800	90309	5	90314	6	90320	5	90325	6	90331	5	90336	6	90342	5	90347	5	90352	6	90358	5
801	90363	6	90369	5	90374	6	90380	5	90385	5	90390	6	90396	5	90401	6	90407	5	90412	5
802	90417	6	90423	5	90428	6	90434	5	90439	6	90445	5	90450	5	90455	6	90461	5	90466	6
803	90472	5	90477	5	90482	6	90488	5	90493	6	90499	5	90504	5	90509	6	90515	5	90520	6
804	90526	5	90531	5	90536	6	90542	5	90547	6	90553	5	90558	5	90563	6	90569	5	90574	6
805	90580	5	90585	5	90590	6	90596	5	90601	6	90607	5	90612	5	90617	6	90623	5	90628	6
806	90634	5	90639	5	90644	6	90650	5	90655	5	90660	6	90666	5	90671	6	90677	5	90682	5
807	90687	6	90693	5	90698	5	90703	6	90709	5	90714	6	90720	5	90725	5	90730	6	90736	5
808	90741	6	90747	5	90752	5	90757	6	90763	5	90768	5	90773	6	90779	5	90784	5	90789	6
809	90795	5	90800	6	90806	5	90811	5	90816	6	90822	5	90827	5	90832	6	90838	5	90843	6
810	90849	5	90854	5	90859	6	90865	5	90870	5	90875	6	90881	5	90886	5	90891	6	90897	5
811	90902	5	90907	6	90913	5	90918	6	90924	5	90929	5	90934	6	90940	5	90945	5	90950	6
812	90956	5	90961	5	90966	6	90972	5	90977	5	90982	6	90988	5	90993	5	90998	6	91004	5
813	91009	5	91014	6	91020	5	91025	5	91030	6	91036	5	91041	5	91046	6	91052	5	91057	5
814	91062	6	91068	5	91073	5	91078	6	91084	5	91089	5	91094	6	91100	5	91105	5	91110	6
815	91116	5	91121	5	91126	6	91132	5	91137	5	91142	6	91148	5	91153	5	91158	6	91164	5
816	91169	5	91174	6	91180	5	91185	5	91190	6	91196	5	91201	5	91206	6	91212	5	91217	5
817	91222	6	91228	5	91233	5	91238	5	91243	6	91249	5	91254	5	91259	6	91265	5	91270	5
818	91275	6	91281	5	91286	5	91291	6	91297	5	91302	5	91307	5	91312	6	91318	5	91323	5
819	91328	6	91334	5	91339	5	91344	6	91350	5	91355	5	91360	5	91365	6	91371	5	91376	5
820	91381	6	91387	5	91392	5	91397	6	91403	5	91408	5	91413	5	91418	6	91424	5	91429	5
821	91434	6	91440	5	91445	5	91450	5	91455	6	91461	5	91466	5	91471	6	91477	5	91482	5
822	91487	5	91492	6	91498	5	91503	5	91508	6	91514	5	91519	5	91524	5	91529	6	91535	5
823	91540	5	91545	6	91551	5	91556	5	91561	5	91566	6	91572	5	91577	5	91582	5	91587	6
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825	91645	6	91651	5	91656	5	91661	5	91666	6	91672	5	91677	5	91682	5	91687	6	91693	5
826	91698	5	91703	6	91709	5	91714	5	91719	5	91724	6	91730	5	91735	5	91740	5	91745	6
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830	91908	5	91913	5	91918	6	91924	5	91929	5	91934	5	91939	5	91944	6	91950	5	91955	5
831	91960	5	91965	6	91971	5	91976	5	91981	5	91986	5	91991	6	91997	5	92002	5	92007	5
832	92012	6	92018	5	92023	5	92028	5	92033	5	92038	6	92044	5	92049	5	92054	5	92059	6
833	92065	5	92070	5	92075	5	92080	5	92085	6	92091	5	92096	5	92101	5	92106	5	92111	6
834	92117	5	92122	5	92127	5	92132	5	92137	6	92143	5	92148	5	92153	5	92158	5	92163	6
835	92169	5	92174	5	92179	5	92184	5	92189	6	92195	5	92200	5	92205	5	92210	5	92215	6
836	92221	5	92226	5	92231	5	92236	5	92241	6	92247	5	92252	5	92257	5	92262	5	92267	6
837	92273	5	92278	5	92283	5	92288	5	92293	5	92298	6	92304	5	92309	5	92314	5	92319	5
838	92324	6	92330	5	92335	5	92340	5	92345	5	92350	5	92355	6	92361	5	92366	5	92371	5
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840	92428	5	92433	5	92438	5	92443	6	92449	5	92454	5	92459	5	92464	5	92469	5	92474	6
841	92480	5	92485	5	92490	5	92495	5	92500	5	92505	6	92511	5	92516	6	92521	5	92526	5
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844	92634	5	92639	6	92645	5	92650	5	92655	5	92660	5	92665	5	92670	6	92675	6	92681	5
845	92686	5	92691	5	92696	5	92701	5	92706	5	92711	5	92716	6	92722	5	92727	5	92732	5
846	92737	5	92742	5	92747	5	92752	6	92758	5	92763	5	92768	5	92773	5	92778	5	92783	5
847	92788	5	92793	6	92799	5	92804	5	92809	5	92814	5	92819	5	92824	5	92829	5	92834	6
848	92840	5	92845	5	92850	5	92855	5	92860	5	92865	5	92870	5	92875	6	92881	5	92886	5
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850	92942	5	92947	5	92952	5	92957	5	92962	5	92967	6	92973	5	92978	5	92983	5	92988	5
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Prop. parts	
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Prop. parts	
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8500–9000

No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d
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851	92993	5	92998	5	93003	5	93008	5	93013	5	93018	6	93024	5	93029	5	93034	5	93039	5
852	93044	5	93049	5	93054	5	93059	5	93064	5	93069	6	93075	5	93080	5	93085	5	93090	5
853	93095	5	93100	5	93105	5	93110	5	93115	5	93120	5	93125	6	93131	5	93136	5	93141	5
854	93146	5	93151	5	93156	5	93161	5	93166	5	93171	5	93176	5	93181	5	93186	6	93192	5
855	93197	5	93202	5	93207	5	93212	5	93217	5	93222	5	93227	5	93232	5	93237	5	93242	5
856	93247	5	93252	6	93258	5	93263	5	93268	5	93273	5	93278	5	93283	5	93288	5	93293	5
857	93298	5	93303	5	93308	5	93313	5	93318	5	93323	5	93328	6	93334	5	93339	5	93344	5
858	93349	5	93354	5	93359	5	93364	5	93369	5	93374	5	93379	5	93384	5	93389	5	93394	5
859	93399	5	93404	5	93409	5	93414	6	93420	5	93425	5	93430	5	93435	5	93440	5	93445	5
860	93450	5	93455	5	93460	5	93465	5	93470	5	93475	5	93480	5	93485	5	93490	5	93495	5
861	93500	5	93505	5	93510	5	93515	5	93520	6	93526	5	93531	5	93536	5	93541	5	93546	5
862	93551	5	93556	5	93561	5	93566	5	93571	5	93576	5	93581	5	93586	5	93591	5	93596	5
863	93601	5	93606	5	93611	5	93616	5	93621	5	93626	5	93631	5	93636	5	93641	5	93646	5
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874	94151	5	94156	5	94161	5	94166	5	94171	5	94176	5	94181	5	94186	5	94191	5	94196	5
875	94201	5	94206	5	94211	5	94216	5	94221	5	94226	5	94231	5	94236	4	94240	5	94245	5
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893	95085	5	95090	5	95095	5	95100	4	95105	4	95109	5	95114	5	95119	5	95124	5	95129	5
894	95134	5	95139	4	95143	5	95148	5	95153	5	95158	5	95163	5	95168	5	95173	4	95177	5
895	95182	5	95187	5	95192	5	95197	5	95202	5	95207	4	95211	5	95216	5	95221	5	95226	5
896	95231	5	95236	4	95240	5	95245	5	95250	5	95255	5	95260	5	95265	5	95270	4	95274	5
897	95279	5	95284	5	95289	5	95294	5	95299	4	95303	5	95308	5	95313	5	95318	5	95323	5
898	95328	4	95332	5	95337	5	95342	5	95347	5	95352	5	95357	4	95361	5	95366	5	95371	5
899	95376	5	95381	5	95386	4	95390	5	95395	5	95400	5	95405	5	95410	5	95415	4	95419	5
900	95424	5	95429	5	95434	5	95439	5	95444	4	95448	5	95453	5	95458	5	95463	5	95468	4
No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d

Prop. parts	
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9000–9500

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902	95521	4	95525	5	95530	5	95535	5	95540	5	95545	5	95550	4	95554	5	95559	5	95564	5
903	95569	5	95574	4	95578	5	95583	5	95588	5	95593	5	95598	4	95602	5	95607	5	95612	5
904	95617	5	95622	4	95626	5	95631	5	95636	5	95641	5	95646	4	95650	5	95655	5	95660	5
905	95665	5	95670	4	95674	5	95679	5	95684	5	95689	5	95694	4	95698	5	95703	5	95708	5
906	95713	5	95718	4	95722	5	95727	5	95732	5	95737	5	95742	4	95746	5	95751	5	95756	5
907	95761	5	95766	4	95770	5	95775	5	95780	5	95785	4	95789	5	95794	5	95799	5	95804	5
908	95809	4	95813	5	95818	5	95823	5	95828	4	95832	5	95837	5	95842	5	95847	5	95852	4
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910	95904	5	95909	5	95914	4	95918	5	95923	5	95928	5	95933	5	95938	4	95942	5	95947	5
911	95952	5	95957	4	95961	5	95966	5	95971	5	95976	4	95980	5	95985	5	95990	5	95995	4
912	95999	5	96004	5	96009	5	96014	5	96019	4	96023	5	96028	5	96033	5	96038	4	96042	5
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926	96661	5	96666	4	96670	5	96675	5	96680	5	96685	4	96689	5	96694	5	96699	4	96703	5
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941	97359	5	97364	4	97368	5	97373	4	97377	5	97382	5	97387	4	97391	5	97396	4	97400	5
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945	97543	5	97548	4	97552	5	97557	5	97562	4	97566	5	97571	4	97575	5	97580	5	97585	4
946	97589	5	97594	4	97598	5	97603	4	97607	5	97612	5	97617	4	97621	5	97626	4	97630	5
947	97635	5	97640	4	97644	5	97649	4	97653	5	97658	5	97663	4	97667	5	97672	4	97676	5
948	97681	4	97685	5	97690	5	97695	4	97699	5	97704	4	97708	5	97713	4	97717	5	97722	5
949	97727	4	97731	5	97736	4	97740	5	97745	4	97749	5	97754	5	97759	4	97763	5	97768	4
950	97772	5	97777	5	97782	4	97786	5	97791	4	97795	5	97800	4	97804	5	97809	4	97813	5
No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d

Prop. parts	
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8	3
9	4

9500–10000

No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d
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951	97818	5	97823	4	97827	5	97832	4	97836	5	97841	4	97845	5	97850	5	97855	4	97859	5
952	97864	4	97868	5	97873	4	97877	5	97882	4	97886	5	97891	5	97896	4	97900	5	97905	4
953	97909	5	97914	4	97918	5	97923	5	97928	4	97932	5	97937	4	97941	5	97946	4	97950	5
954	97955	4	97959	5	97964	4	97968	5	97973	5	97978	4	97982	5	97987	4	97991	5	97996	4
955	98000	5	98005	4	98009	5	98014	5	98019	4	98023	5	98028	4	98032	5	98037	4	98041	5
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959	98182	4	98186	5	98191	4	98195	5	98200	5	98204	5	98209	5	98214	4	98218	5	98223	4
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962	98318	4	98322	5	98327	4	98331	5	98336	4	98340	5	98345	4	98349	5	98354	4	98358	5
963	98363	4	98367	5	98372	4	98376	5	98381	4	98385	5	98390	4	98394	5	98399	4	98403	5
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972	98767	4	98771	5	98776	4	98780	4	98784	5	98789	4	98793	5	98798	4	98802	5	98807	4
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988	99476	4	99480	4	99484	5	99489	4	99493	5	99498	4	99502	4	99506	5	99511	4	99515	5
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993	99695	4	99699	5	99704	4	99708	4	99712	5	99717	4	99721	5	99726	4	99730	5	99734	5
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995	99782	5	99787	4	99791	4	99795	5	99800	4	99804	4	99808	5	99813	4	99817	5	99822	4
996	99826	4	99830	5	99835	4	99839	4	99843	5	99848	4	99852	4	99856	5	99861	4	99865	5
997	99870	4	99874	4	99878	5	99883	4	99887	4	99891	5	99896	4	99900	4	99904	5	99909	4
998	99913	4	99917	5	99922	4	99926	4	99930	5	99935	4	99939	5	99944	4	99948	4	99952	5
999	99957	4	99961	4	99965	5	99970	4	99974	4	99978	5	99983	4	99987	4	99991	5	99996	4
1000	00000	4	00004	5	00009	4	00013	4	00017	5	00022	4	00026	4	00030	5	00035	4	00039	4
No.	0	d	1	d	2	d	3	d	4	d	5	d	6	d	7	d	8	d	9	d

Prop. parts	
	5
1	0
2	1
3	2
4	2
5	2
6	3
7	3
8	4
9	4
	4
1	0
2	1
3	1
4	2
5	2
6	2
7	3
8	3
9	4

Meridional Parts

Lat.	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	Lat.
′											′
0	0. 0	59. 6	119. 2	178. 9	238. 6	298. 4	358. 2	418. 2	478. 3	538. 6	0
1	1. 0	60. 6	20. 2	79. 9	39. 6	299. 4	59. 2	19. 2	79. 3	39. 6	1
2	2. 0	61. 6	21. 2	80. 9	40. 6	300. 3	60. 2	20. 2	80. 3	40. 6	2
3	3. 0	62. 6	22. 2	81. 8	41. 6	01. 3	61. 2	21. 2	81. 3	41. 6	3
4	4. 0	63. 6	23. 2	82. 8	42. 6	02. 3	62. 2	22. 2	82. 3	42. 6	4
5	5. 0	64. 6	124. 2	183. 8	243. 6	303. 3	363. 2	423. 2	483. 3	543. 6	5
6	6. 0	65. 6	25. 2	84. 8	44. 5	04. 3	64. 2	24. 2	84. 3	44. 6	6
7	7. 0	66. 6	26. 2	85. 8	45. 5	05. 3	65. 2	25. 2	85. 4	45. 6	7
8	7. 9	67. 5	27. 2	86. 8	46. 5	06. 3	66. 2	26. 2	86. 4	46. 6	8
9	8. 9	68. 5	28. 2	87. 8	47. 5	07. 3	67. 2	27. 2	87. 4	47. 6	9
10	9. 9	69. 5	129. 2	188. 8	248. 5	308. 3	368. 2	428. 2	488. 4	548. 7	10
11	10. 9	70. 5	30. 1	89. 8	49. 5	09. 3	69. 2	29. 2	89. 4	49. 7	11
12	11. 9	71. 5	31. 1	90. 8	50. 5	10. 3	70. 2	30. 2	90. 4	50. 7	12
13	12. 9	72. 5	32. 1	91. 8	51. 5	11. 3	71. 2	31. 2	91. 4	51. 7	13
14	13. 9	73. 5	33. 1	92. 8	52. 5	12. 3	72. 2	32. 2	92. 4	52. 7	14
15	14. 9	74. 5	134. 1	193. 8	253. 5	313. 3	373. 2	433. 2	493. 4	553. 7	15
16	15. 9	75. 5	35. 1	94. 8	54. 5	14. 3	74. 2	34. 2	94. 4	54. 7	16
17	16. 9	76. 5	36. 1	95. 8	55. 5	15. 3	75. 2	35. 2	95. 4	55. 7	17
18	17. 9	77. 5	37. 1	96. 8	56. 5	16. 3	76. 2	36. 2	96. 4	56. 7	18
19	18. 9	78. 5	38. 1	97. 8	57. 5	17. 3	77. 2	37. 2	97. 4	57. 7	19
20	19. 9	79. 5	139. 1	198. 8	258. 5	318. 3	378. 2	438. 2	498. 4	558. 7	20
21	20. 9	80. 5	40. 1	199. 8	59. 5	19. 3	79. 2	39. 2	499. 4	59. 7	21
22	21. 9	81. 5	41. 1	200. 7	60. 5	20. 3	80. 2	40. 2	500. 4	60. 7	22
23	22. 8	82. 4	42. 1	01. 7	61. 5	21. 3	81. 2	41. 2	01. 4	61. 7	23
24	23. 8	83. 4	43. 1	02. 7	62. 5	22. 3	82. 2	42. 2	02. 4	62. 7	24
25	24. 8	84. 4	144. 1	203. 7	263. 5	323. 3	383. 2	443. 2	503. 4	563. 8	25
26	25. 8	85. 4	45. 1	04. 7	64. 5	24. 3	84. 2	44. 2	04. 4	64. 8	26
27	26. 8	86. 4	46. 1	05. 7	65. 5	25. 3	85. 2	45. 2	05. 4	65. 8	27
28	27. 8	87. 4	47. 0	06. 7	66. 5	26. 3	86. 2	46. 2	06. 4	66. 8	28
29	28. 8	88. 4	48. 0	07. 7	67. 5	27. 3	87. 2	47. 3	07. 4	67. 8	29
30	29. 8	89. 4	149. 0	208. 7	268. 5	328. 3	388. 2	448. 3	508. 4	568. 8	30
31	30. 8	90. 4	50. 0	09. 7	69. 4	29. 3	89. 2	49. 3	09. 4	69. 8	31
32	31. 8	91. 4	51. 0	10. 7	70. 4	30. 3	90. 2	50. 3	10. 5	70. 8	32
33	32. 8	92. 4	52. 0	11. 7	71. 4	31. 3	91. 2	51. 3	11. 5	71. 8	33
34	33. 8	93. 4	53. 0	12. 7	72. 4	32. 3	92. 2	52. 3	12. 5	72. 8	34
35	34. 8	94. 4	154. 0	213. 7	273. 4	333. 3	393. 2	453. 3	513. 5	573. 8	35
36	35. 8	95. 4	55. 0	14. 7	74. 4	34. 3	94. 2	54. 3	14. 5	74. 8	36
37	36. 8	96. 4	56. 0	15. 7	75. 4	35. 3	95. 2	55. 3	15. 5	75. 8	37
38	37. 7	97. 4	57. 0	16. 7	76. 4	36. 3	96. 2	56. 3	16. 5	76. 8	38
39	38. 7	98. 3	58. 0	17. 7	77. 4	37. 3	97. 2	57. 3	17. 5	77. 9	39
40	39. 7	99. 3	159. 0	218. 7	278. 4	338. 3	398. 2	458. 3	518. 5	578. 9	40
41	40. 7	100. 3	60. 0	19. 7	79. 4	39. 3	399. 2	59. 3	19. 5	79. 9	41
42	41. 7	01. 3	61. 0	20. 7	80. 4	40. 3	400. 2	60. 3	20. 5	80. 9	42
43	42. 7	02. 3	62. 0	21. 6	81. 4	41. 3	01. 2	61. 3	21. 5	81. 9	43
44	43. 7	03. 3	63. 0	22. 6	82. 4	42. 3	02. 2	62. 3	22. 5	82. 9	44
45	44. 7	104. 3	163. 9	223. 6	283. 4	343. 2	403. 2	463. 3	523. 5	583. 9	45
46	45. 7	05. 3	64. 9	24. 6	84. 4	44. 2	04. 2	64. 3	24. 5	84. 9	46
47	46. 7	06. 3	65. 9	25. 6	85. 4	45. 2	05. 2	65. 3	25. 5	85. 9	47
48	47. 7	07. 3	66. 9	26. 6	86. 4	46. 2	06. 2	66. 3	26. 5	86. 9	48
49	48. 7	08. 3	67. 9	27. 6	87. 4	47. 2	07. 2	67. 3	27. 5	87. 9	49
50	49. 7	109. 3	168. 9	228. 6	288. 4	348. 2	408. 2	468. 3	528. 5	588. 9	50
51	50. 7	10. 3	69. 9	29. 6	89. 4	49. 2	09. 2	69. 3	29. 5	90. 0	51
52	51. 7	11. 3	70. 9	30. 6	90. 4	50. 2	10. 2	70. 3	30. 5	91. 0	52
53	52. 6	12. 3	71. 9	31. 6	91. 4	51. 2	11. 2	71. 3	31. 6	92. 0	53
54	53. 6	13. 2	72. 9	32. 6	92. 4	52. 2	12. 2	72. 3	32. 6	93. 0	54
55	54. 6	114. 2	173. 9	233. 6	293. 4	353. 2	413. 2	473. 3	533. 6	594. 0	55
56	55. 6	15. 2	74. 9	34. 6	94. 4	54. 2	14. 2	74. 3	34. 6	95. 0	56
57	56. 6	16. 2	75. 9	35. 6	95. 4	55. 2	15. 2	75. 3	35. 6	96. 0	57
58	57. 6	17. 2	76. 9	36. 6	96. 4	56. 2	16. 2	76. 3	36. 6	97. 0	58
59	58. 6	18. 2	77. 9	37. 6	97. 4	57. 2	17. 2	77. 3	37. 6	98. 0	59
60	59. 6	119. 2	178. 9	238. 6	298. 4	358. 2	418. 2	478. 3	538. 6	599. 0	60
Lat.	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	Lat.

Meridional Parts

Lat.	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	Lat.
′	″										
0	599. 0	659. 7	720. 5	781. 5	842. 9	904. 4	966. 3	1028. 5	1091. 0	1153. 9	0
1	600. 0	60. 7	21. 5	82. 6	43. 9	05. 5	67. 3	29. 5	92. 1	55. 0	1
2	01. 0	61. 7	22. 5	83. 6	44. 9	06. 5	68. 4	30. 6	93. 1	56. 0	2
3	02. 1	62. 7	23. 5	84. 6	45. 9	07. 5	69. 4	31. 6	94. 2	57. 1	3
4	03. 1	63. 7	24. 5	85. 6	47. 0	08. 6	70. 4	32. 7	95. 2	58. 1	4
5	604. 1	664. 7	725. 6	786. 6	848. 0	909. 6	971. 5	1033. 7	1096. 3	1159. 2	5
6	05. 1	65. 7	26. 6	87. 7	49. 0	10. 6	72. 5	34. 7	97. 3	60. 2	6
7	06. 1	66. 7	27. 6	88. 7	50. 0	11. 6	73. 5	35. 8	98. 3	61. 3	7
8	07. 1	67. 8	28. 6	89. 7	51. 1	12. 7	74. 6	36. 8	1099. 4	62. 3	8
9	08. 1	68. 8	29. 6	90. 7	52. 1	13. 7	75. 6	37. 9	1100. 4	63. 4	9
10	609. 1	669. 8	730. 6	791. 7	853. 1	914. 7	976. 7	1038. 9	1101. 5	1164. 4	10
11	10. 1	70. 8	31. 7	92. 8	54. 1	15. 8	77. 7	39. 9	02. 5	65. 5	11
12	11. 1	71. 8	32. 7	93. 8	55. 1	16. 8	78. 7	41. 0	03. 6	66. 5	12
13	12. 1	72. 8	33. 7	94. 8	56. 2	17. 8	79. 8	42. 0	04. 6	67. 6	13
14	13. 2	73. 8	34. 7	95. 8	57. 2	18. 8	80. 8	43. 1	05. 7	68. 6	14
15	614. 2	674. 8	735. 7	796. 8	858. 2	919. 9	981. 8	1044. 1	1106. 7	1169. 7	15
16	15. 2	75. 9	36. 7	97. 9	59. 3	20. 9	82. 9	45. 1	07. 8	70. 7	16
17	16. 2	76. 9	37. 8	98. 9	60. 3	21. 9	83. 9	46. 2	08. 8	71. 8	17
18	17. 2	77. 9	38. 8	799. 9	61. 3	23. 0	84. 9	47. 2	09. 9	72. 8	18
19	18. 2	78. 9	39. 8	800. 9	62. 3	24. 0	86. 0	48. 3	10. 9	73. 9	19
20	619. 2	679. 9	740. 8	802. 0	863. 4	925. 0	987. 0	1049. 3	1111. 9	1175. 0	20
21	20. 2	80. 9	41. 8	03. 0	64. 4	26. 1	88. 0	50. 3	13. 0	76. 0	21
22	21. 2	81. 9	42. 8	04. 0	65. 4	27. 1	89. 1	51. 4	14. 0	77. 1	22
23	22. 2	82. 9	43. 9	05. 0	66. 4	28. 1	90. 1	52. 4	15. 1	78. 1	23
24	23. 3	84. 0	44. 9	06. 0	67. 5	29. 2	91. 1	53. 5	16. 1	79. 2	24
25	624. 3	685. 0	745. 9	807. 1	868. 5	930. 2	992. 2	1054. 5	1117. 2	1180. 2	25
26	25. 3	86. 0	46. 9	08. 1	69. 5	31. 2	93. 2	55. 6	18. 2	81. 3	26
27	26. 3	87. 0	47. 9	09. 1	70. 5	32. 2	94. 3	56. 6	19. 3	82. 3	27
28	27. 3	88. 0	48. 9	10. 1	71. 6	33. 3	95. 3	57. 6	20 3	83. 4	28
29	28. 3	89. 0	50. 0	11. 1	72. 6	34. 3	96. 3	58. 7	21. 4	84. 4	29
30	629. 3	690. 0	751. 0	812. 2	873. 6	935. 3	997. 4	1059. 7	1122. 4	1185. 5	30
31	30. 3	91. 1	52. 0	13. 2	74. 6	36. 4	98. 4	60. 8	23. 5	86. 5	31
32	31. 3	92. 1	53. 0	14. 2	75. 7	37. 4	999. 4	61. 8	24. 5	87. 6	32
33	32. 3	93. 1	54. 0	15. 2	76. 7	38. 4	1000. 5	62. 8	25. 6	88. 7	33
34	33. 4	94. 1	55. 1	16. 3	77. 7	39. 5	01. 5	63. 9	26. 6	89. 7	34
35	634. 4	695. 1	756. 1	817. 3	878. 7	940. 5	1002. 5	1064. 9	1127. 7	1190. 8	35
36	35. 4	96. 1	57. 1	18. 3	79. 8	41. 5	03. 6	66. 0	28. 7	91. 8	36
37	36. 4	97. 1	58. 1	19. 3	80. 8	42. 6	04. 6	67. 0	29. 8	92. 9	37
38	37. 4	98. 2	59. 1	20. 3	81. 8	43. 6	05. 7	68. 1	30. 8	93. 9	38
39	38. 4	699. 2	60. 1	21. 4	82. 9	44. 6	06. 7	69. 1	31. 9	95. 0	39
40	639. 4	700. 2	761. 2	822. 4	883. 9	945. 7	1007. 7	1070. 1	1132. 9	1196. 0	40
41	40. 4	01. 2	62. 2	23. 4	84. 9	46. 7	08. 8	71. 2	34. 0	97. 1	41
42	41. 4	02. 2	63. 2	24. 4	85. 9	47. 7	09. 8	72. 2	35. 0	98. 2	42
43	42. 5	03. 2	64. 2	25. 5	87. 0	48. 7	10. 8	73. 3	36. 1	1199. 2	43
44	43. 5	04. 2	65. 2	26. 5	88. 0	49. 8	11. 9	74. 3	37. 1	1200. 3	44
45	644. 5	705. 3	766. 3	827. 5	889. 0	950. 8	1012. 9	1075. 4	1138. 2	1201. 3	45
46	45. 5	06. 3	67. 3	28. 5	90. 0	51. 8	14. 0	76. 4	39. 2	02. 4	46
47	46. 5	07. 3	68. 3	29. 5	91. 1	52. 9	15. 0	77. 4	40. 3	03. 4	47
48	47. 5	08. 3	69. 3	30. 6	92. 1	53. 9	16. 0	78. 5	41. 3	04. 5	48
49	48. 5	09. 3	70. 3	31. 6	93. 1	54. 9	17. 1	79. 5	42. 4	05. 5	49
50	649. 5	710. 3	771. 4	832. 6	894. 2	956. 0	1018. 1	1080. 6	1143. 4	1206. 6	50
51	50. 5	11. 3	72. 4	33. 6	95. 2	57. 0	19. 2	81. 6	44. 5	07. 7	51
52	51. 6	12. 4	73. 4	34. 7	96. 2	58. 0	20. 2	82. 7	45. 5	08. 7	52
53	52. 6	13. 4	74. 4	35. 7	97. 2	59. 1	21. 2	83. 7	46. 6	09. 8	53
54	53. 6	14. 4	75. 4	36. 7	98. 3	60. 1	22. 3	84. 8	47. 6	10. 8	54
55	654. 6	715. 4	776. 4	837. 7	899. 3	961. 1	1023. 3	1085. 8	1148. 7	1211. 9	55
56	55. 6	16. 4	77. 5	38. 8	900. 3	62. 2	24. 3	86. 8	49. 7	12. 9	56
57	56. 6	17. 4	78. 5	39. 8	01. 4	63. 2	25. 4	87. 9	50. 8	14. 0	57
58	57. 6	18. 5	79. 5	40. 8	02. 4	64. 2	26. 4	88. 9	51. 8	15. 1	58
59	58. 6	19. 5	80. 5	41. 8	03. 4	65. 3	27. 5	90. 0	52. 9	16. 1	59
60	659. 7	720. 5	781. 5	842. 9	904. 4	966. 3	1028. 5	1091. 0	1153. 9	1217. 2	60
Lat.	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	Lat.

Meridional Parts

Lat.	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	Lat.
′											′
0	1217. 2	1280. 9	1345. 0	1409. 5	1474. 6	1540. 2	1606. 3	1672. 9	1740. 2	1808. 1	0
1	18. 2	81. 9	46. 0	10. 6	75. 7	41. 3	07. 4	74. 1	41. 4	09. 3	1
2	19. 3	83. 0	47. 1	11. 7	76. 8	42. 4	08. 5	75. 2	42. 5	10. 4	2
3	20. 4	84. 1	48. 2	12. 8	77. 9	43. 4	09. 6	76. 3	43. 6	11. 6	3
4	21. 4	85. 1	49. 3	13. 9	78. 9	44. 5	10. 7	77. 4	44. 7	12. 7	4
5	1222. 5	1286. 2	1350. 3	1414. 9	1480. 0	1545. 6	1611. 8	1678. 5	1745. 9	1813. 8	5
6	23. 5	87. 2	51. 4	16. 0	81. 1	46. 7	12. 9	79. 6	47. 0	15. 0	6
7	24. 6	88. 3	52. 5	17. 1	82. 2	47. 8	14. 0	80. 8	48. 1	16. 1	7
8	25. 6	89. 4	53. 5	18. 2	83. 3	48. 9	15. 1	81. 9	49. 3	17. 3	8
9	26. 7	90. 4	54. 6	19. 3	84. 4	50. 0	16. 2	83. 0	50. 4	18. 4	9
10	1227. 8	1291. 5	1355. 7	1420. 3	1485. 5	1551. 1	1617. 3	1684. 1	1751. 5	1819. 5	10
11	28. 8	92. 6	56. 8	21. 4	86. 6	52. 2	18. 4	85. 2	52. 6	20. 7	11
12	29. 9	93. 6	57. 8	22. 5	87. 7	53. 3	19. 6	86. 4	53. 8	21. 8	12
13	30. 9	94. 7	58. 9	23. 6	88. 8	54. 4	20. 7	87. 5	54. 9	23. 0	13
14	32. 0	95. 8	60. 0	24. 7	89. 8	55. 5	21. 8	88. 6	56. 0	24. 1	14
15	1233. 1	1296. 8	1361. 1	1425. 8	1[illegible]. 9	1556. 6	1622. 9	1689. 7	1757. 2	1825. 2	15
16	34. 1	97. 9	62. 1	26. 8	92. 0	57. 7	24. 0	90. 8	58. 3	26. 4	16
17	35. 2	1299. 0	63. 2	27. 9	93. 1	58. 8	25. 1	91. 9	59. 4	27. 5	17
18	36. 2	1300. 0	64. 3	29. 0	94. 2	59. 9	26. 2	93. 1	60. 5	28. 7	18
19	37. 3	01. 1	65. 4	30. 1	95. 3	61. 0	27. 3	94. 2	61. 7	29. 8	19
20	1238. 4	1302. 2	1366. 4	1431. 2	1496. 4	1562. 1	1628. 4	1695. 3	1762. 8	1830. 9	20
21	39. 4	03. 2	67. 5	32. 2	97. 5	63. 2	29. 5	96. 4	63. 9	32. 1	21
22	40. 5	04. 3	68. 6	33. 3	98. 6	64. 3	30. 6	97. 5	65. 1	33. 2	22
23	41. 5	05. 4	69. 7	34. 4	1499. 7	65. 4	31. 8	98. 7	66. 2	34. 4	23
24	42. 6	06. 4	70. 7	35. 5	1500. 8	66. 5	32. 9	1699. 8	67. 3	35. 5	24
25	1243. 7	1307. 5	1371. 8	1436. 6	1501. 8	1567. 6	1634. 0	1700. 9	1768. 5	1836. 6	25
26	44. 7	08. 6	72. 9	37. 7	02. 9	68. 7	35. 1	02. 0	69. 6	37. 8	26
27	45. 8	09. 6	74. 0	38. 7	04. 0	69. 8	36. 2	03. 1	70. 7	38. 9	27
28	46. 8	10. 7	75. 0	39. 8	05. 1	70. 9	37. 3	04. 3	71. 8	40. 1	28
29	47. 9	11. 8	76. 1	40. 9	06. 2	72. 0	38. 4	05. 4	73. 0	41. 2	29
30	1249. 0	1312. 9	1377. 2	1442. 0	1507. 3	1573. 1	1639. 5	1706. 5	1774. 1	1842. 4	30
31	50. 0	13. 9	78. 3	43. 1	08. 4	74. 2	40. 6	07. 6	75. 2	43. 5	31
32	51. 1	15. 0	79. 3	44. 2	09. 5	75. 3	41. 8	08. 8	76. 4	44. 6	32
33	52. 1	16. 1	80. 4	45. 3	10. 6	76. 4	42. 9	09. 9	77. 5	45. 8	33
34	53. 2	17. 1	81. 5	46. 3	11. 7	77. 6	44. 0	11. 0	78. 6	46. 9	34
35	1254. 3	1318. 2	1382. 6	1447. 4	1512. 8	1578. 7	1645. 1	1712. 1	1779. 8	1848. 1	35
36	55. 3	19. 3	83. 7	48. 5	13. 9	79. 8	46. 2	13. 2	80. 9	49. 2	36
37	56. 4	20. 3	84. 7	49. 6	15. 0	80. 9	47. 3	14. 4	82. 0	50. 4	37
38	57. 5	21. 4	85. 8	50. 7	16. 1	82. 0	48. 4	15. 5	83. 2	51. 5	38
39	58. 5	22. 5	86. 9	51. 8	17. 1	83. 1	49. 5	16. 6	84. 3	52. 7	39
40	1259. 6	1323. 5	1388. 0	1452. 8	1518. 2	1584. 2	1650. 7	1717. 7	1785. 4	1853. 8	40
41	60. 6	24. 6	89. 0	53. 9	19. 3	85. 3	51. 8	18. 9	86. 6	54. 9	41
42	61. 7	25. 7	90. 1	55. 0	20. 4	86. 4	52. 9	20. 0	87. 7	56. 1	42
43	62. 8	26. 8	91. 2	56. 1	21. 5	87. 5	54. 0	21. 1	88. 8	57. 2	43
44	63. 8	27. 8	92. 3	57. 2	22. 6	88. 6	55. 1	22. 2	90. 0	58. 4	44
45	1264. 9	1328. 9	1393. 3	1458. 3	1523. 7	1589. 7	1656. 2	1723. 4	1791. 1	1859. 5	45
46	66. 0	30. 0	94. 4	59. 4	24. 8	90. 8	57. 3	24. 5	92. 2	60. 7	46
47	67. 0	31. 0	95. 5	60. 5	25. 9	91. 9	58. 5	25. 6	93. 4	61. 8	47
48	68. 1	32. 1	96. 6	61. 5	27. 0	93. 0	59. 6	26. 7	94. 5	63. 0	48
49	69. 1	33. 2	97. 7	62. 6	28. 1	94. 1	60. 7	27. 9	95. 6	64. 1	49
50	1270. 2	1334. 2	1398. 7	1463. 7	1529. 2	1595. 2	1661. 8	1729. 0	1796. 8	1865. 3	50
51	71. 3	35. 3	1399. 8	64. 8	30. 3	96. 3	62. 9	30. 1	97. 9	66. 4	51
52	72. 3	36. 4	1400. 9	65. 9	31. 4	97. 4	64. 0	31. 2	1799. 1	67. 5	52
53	73. 4	37. 5	02. 0	67. 0	32. 5	98. 5	65. 1	32. 4	1800. 2	68. 7	53
54	74. 5	38. 5	03. 1	68. 1	33. 6	1599. 6	66. 3	33. 5	01. 3	69. 8	54
55	1275. 5	1339. 6	1404. 1	1469. 1	1534. 7	1600. 7	1667. 4	1734. 6	1802. 5	1871. 0	55
56	76. 6	40. 7	05. 2	70. 2	35. 8	01. 8	68. 5	35. 7	03. 6	72. 1	56
57	77. 7	41. 7	06. 3	71. 3	36. 9	02. 9	69. 6	36. 9	04. 7	73. 3	57
58	78. 7	42. 8	07. 4	72. 4	38. 0	04. 1	70. 7	38. 0	05. 9	74. 4	58
59	79. 8	43. 9	08. 5	73. 5	39. 1	05. 2	71. 8	39. 1	07. 0	75. 6	59
60	1280. 9	1345. 0	1409. 5	1474. 6	1540. 2	1606. 3	1672. 9	1740. 2	1808. 1	1876. 7	60
Lat.	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	Lat.

(23)

Meridional Parts

Lat.	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	Lat.
′											′
0	1876. 7	1946. 0	2016. 0	2086. 8	2158. 5	2230. 9	2304. 3	2378. 6	2453. 9	2530. 3	0
1	77. 9	47. 2	17. 2	88. 0	59. 7	32. 1	05. 5	79. 9	55. 2	31. 6	1
2	79. 0	48. 3	18. 4	89. 2	60. 9	33. 4	06. 8	81. 1	56. 5	32. 8	2
3	80. 2	49. 5	19. 6	90. 4	62. 1	34. 6	08. 0	82. 4	57. 7	34. 1	3
4	81. 3	50. 7	20. 7	91. 6	63. 3	35. 8	09. 2	83. 6	59. 0	35. 4	4
5	1882. 5	1951. 8	2021. 9	2092. 8	2164. 5	2237. 0	2310. 5	2384. 9	2460. 2	2536. 7	5
6	83. 6	53. 0	23. 1	94. 0	65. 7	38. 2	11. 7	86. 1	61. 5	38. 0	6
7	84. 8	54. 2	24. 3	95. 2	66. 9	39. 4	12. 9	87. 3	62. 8	39. 3	7
8	85. 9	55. 3	25. 4	96. 3	68. 1	40. 7	14. 2	88. 6	64. 0	40. 5	8
9	87. 1	56. 5	26. 6	97. 5	69. 3	41. 9	15. 4	89. 8	65. 3	41. 8	9
10	1888. 2	1957. 6	2027. 8	2098. 7	2170. 5	2243. 1	2316. 6	2391. 1	2466. 6	2543. 1	10
11	89. 4	58. 8	29. 0	2099. 9	71. 7	44. 3	17. 9	92. 3	67. 8	44. 4	11
12	90. 5	60. 0	30. 1	2101. 1	72. 9	45. 5	19. 1	93. 6	69. 1	45. 7	12
13	91. 7	61. 1	31. 3	02. 3	74. 1	46. 7	20. 3	94. 8	70. 4	47. 0	13
14	92. 8	62. 3	32. 5	03. 5	75. 3	48. 0	21. 6	96. 1	71. 6	48. 2	14
15	1894. 0	1963. 5	2033. 7	2104. 7	2176. 5	2249. 2	2322. 8	2397. 3	2472. 9	2549. 5	15
16	95. 1	64. 6	34. 8	05. 9	77. 7	50. 4	24. 0	98. 6	74. 2	50. 8	16
17	96. 3	65. 8	36. 0	07. 1	78. 9	51. 6	25. 3	2399. 8	75. 4	52. 1	17
18	97. 4	66. 9	37. 2	08. 2	80. 1	52. 8	26. 5	2401. 1	76. 7	53. 4	18
19	98. 6	68. 1	38. 4	09. 4	81. 3	54. 1	27. 7	02. 4	78. 0	54. 7	19
20	1899. 8	1969. 3	2039. 6	2110. 6	2182. 5	2255. 3	2329. 0	2403. 6	2479. 3	2556. 0	20
21	1900. 9	70. 4	40. 7	11. 8	83. 7	56. 5	30. 2	04. 9	80. 5	57. 3	21
22	02. 1	71. 6	41. 9	13. 0	84. 9	57. 7	31. 4	06. 1	81. 8	58. 5	22
23	03. 2	72. 8	43. 1	14. 2	86. 1	58. 9	32. 7	07. 4	83. 1	59. 8	23
24	04. 4	73. 9	44. 3	15. 4	87. 3	60.	33. 9	08. 6	84. 3	61. 1	24
25	1905. 5	1975. 1	2045. 4	2116. 6	2188. 5	2261.	2335. 1	2409. 9	2485. 6	2562. 4	25
26	06. 7	76. 3	46. 6	17. 8	89. 8	62. 6	36. 4	11. 1	86. 9	63. 7	26
27	07. 8	77. 4	47. 8	19. 0	91. 0	63. 8	37. 6	12. 4	88. 1	65. 0	27
28	09. 0	78. 6	49. 0	20. 2	92. 2	65. 1	38. 9	13. 6	89. 4	66. 3	28
29	10. 1	79. 8	50. 2	21. 4	93. 4	66. 3	40. 1	14. 9	90. 7	67. 6	29
30	1911. 3	1980. 9	2051. 3	2122. 5	2194. 6	2267. 5	2341. 3	2416. 1	2492. 0	2568. 9	30
31	12. 4	82. 1	52. 5	23. 7	95. 8	68. 7	42. 6	17. 4	93. 2	70. 1	31
32	13. 6	83. 3	53. 7	24. 9	97. 0	69. 9	43. 8	18. 7	94. 5	71. 4	32
33	14. 8	84. 4	54. 9	26. 1	98. 2	71. 2	45. 1	19. 9	95. 8	72. 7	33
34	15. 9	85. 6	56. 1	27. 3	2199. 4	72. 4	46. 3	21. 2	97. 1	74. 0	34
35	1917. 1	1986. 8	2057. 2	2128. 5	2200. 6	2273. 6	2347. 5	2422. 4	2498. 3	2575. 3	35
36	18. 2	87. 9	58. 4	29. 7	01. 8	74. 8	48. 8	23. 7	2499. 6	76. 6	36
37	19. 4	89. 1	59. 6	30. 9	03. 0	76. 1	50. 0	24. 9	2500. 9	77. 9	37
38	20. 5	90. 3	60. 8	32. 1	04. 3	77. 3	51. 3	26. 2	02. 2	79. 2	38
39	21. 7	91. 5	62. 0	33. 3	05. 5	78. 5	52. 5	27. 4	03. 4	80. 5	39
40	1922. 8	1992. 6	2063. 2	2134. 5	2206. 7	2279. 7	2353. 7	2428. 7	2504. 7	2581. 8	40
41	24. 0	93. 8	64. 3	35. 7	07. 9	81. 0	55. 0	30. 0	06. 0	83. 1	41
42	25. 2	95. 0	65. 5	36. 9	09. 1	82. 2	56. 2	31. 2	07. 3	84. 4	42
43	26. 3	96. 1	66. 7	38. 1	10. 3	83. 4	57. 5	32. 5	08. 5	85. 7	43
44	27. 5	97. 3	67. 9	39. 3	11. 5	84. 6	58. 7	33. 7	09. 8	87. 0	44
45	1928. 6	1998. 5	2069. 1	2140. 5	2212. 7	2285. 9	2359. 9	2435. 0	2511. 1	2588. 3	45
46	29. 8	1999. 6	70. 3	41. 7	13. 9	87. 1	61. 2	36. 3	12. 4	89. 5	46
47	30. 9	2000. 8	71. 4	42. 9	15. 2	88. 3	62. 4	37. 5	13. 6	90. 8	47
48	32. 1	02. 0	72. 6	44. 1	16. 4	89. 6	63. 7	38. 8	14. 9	92. 1	48
49	33. 3	03. 2	73. 8	45. 3	17. 6	90. 8	64. 9	40. 0	16. 2	93. 4	49
50	1934. 4	2004. 3	2075. 0	2146. 5	2218. 8	2292. 0	2366. 2	2441. 3	2517. 5	2594. 7	50
51	35. 6	05. 5	76. 2	47. 7	20. 0	93. 2	67. 4	42. 6	18. 8	96. 0	51
52	36. 7	06. 7	77. 4	48. 9	21. 2	94. 5	68. 7	43. 8	20. 0	97. 3	52
53	37. 9	07. 8	78. 5	50. 1	22. 4	95. 7	69. 9	45. 1	21. 3	98. 6	53
54	39. 1	09. 0	79. 7	51. 3	23. 6	96. 9	71. 1	46. 3	22. 6	2599. 9	54
55	1940. 2	2010. 2	2080. 9	2152. 5	2224. 9	2298. 2	2372. 4	2447. 6	2523. 9	2601. 2	55
56	41. 4	11. 4	82. 1	53. 7	26. 1	2299. 4	73. 6	48. 9	25. 1	02. 5	56
57	42. 5	12. 5	83. 3	54. 9	27. 3	2300. 6	74. 9	50. 1	26. 4	03. 8	57
58	43. 7	13. 7	84. 5	56. 1	28. 5	01. 8	76. 1	51. 4	27. 7	05. 1	58
59	44. 9	14. 9	85. 7	57. 3	29. 7	03. 1	77. 4	52. 7	29. 0	06. 4	59
60	1946. 0	2016. 0	2086. 8	2158. 5	2230. 9	2304. 3	2378. 6	2453. 9	2530. 3	2607. 7	60
Lat.	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	Lat.

Meridional Parts

Lat.	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	Lat.
′											′
0	2607. 7	2686. 3	2766. 1	2847. 2	2929. 6	3013. 5	3098. 8	3185. 7	3274. 2	3364. 5	0
1	09. 0	87. 6	67. 5	48. 6	31. 0	14. 9	3100. 2	87. 1	75. 7	66. 0	1
2	10. 3	89. 0	68. 8	49. 9	32. 4	16. 3	01. 7	88. 6	77. 2	67. 5	2
3	11. 6	90. 3	70. 1	51. 3	33. 8	17. 7	03. 1	90. 1	78. 7	69. 1	3
4	12. 9	91. 6	71. 5	52. 7	35. 2	19. 1	04. 5	91. 5	80. 2	70. 6	4
5	2614. 2	2692. 9	2772. 8	2854. 0	2936. 6	3020. 5	3106. 0	3193. 0	3281. 7	3372. 1	5
6	15. 5	94. 2	74. 2	55. 4	38. 0	21. 9	07. 4	94. 5	83. 2	73. 6	6
7	16. 8	95. 6	75. 5	56. 8	39. 3	23. 3	08. 8	95. 9	84. 7	75. 1	7
8	18. 1	96. 9	76. 9	58. 1	40. 7	24. 8	10. 3	97. 4	86. 1	76. 7	8
9	19. 4	98. 2	78. 2	59. 5	42. 1	26. 2	11. 7	3198. 8	87. 6	78. 2	9
10	2620. 7	2699. 5	2779. 5	2860. 9	2943. 5	3027. 6	3113. 2	3200. 3	3289. 1	3379. 7	10
11	22. 0	2700. 9	80. 9	62. 2	44. 9	29. 0	14. 6	01. 8	90. 6	81. 2	11
12	23. 3	02. 2	82. 2	63. 6	46. 3	30. 4	16. 0	03. 2	92. 1	82. 8	12
13	24. 6	03. 5	83. 6	65. 0	47. 7	31. 8	17. 5	04. 7	93. 6	84. 3	13
14	26. 0	04. 8	84. 9	66. 3	49. 1	33. 2	18. 9	06. 2	95. 1	85. 8	14
15	2627. 3	2706. 2	2786. 3	2867. 7	2950. 5	3034. 7	3120. 4	3207. 7	3296. 6	3387. 4	15
16	28. 6	07. 5	87. 6	69. 1	51. 8	36. 1	21. 8	09. 1	98. 1	88. 9	16
17	29. 9	08. 8	89. 0	70. 4	53. 2	37. 5	23. 2	10. 6	3299. 6	90. 4	17
18	31. 2	10. 1	90. 3	71. 8	54. 6	38. 9	24. 7	12. 1	3301. 1	91. 9	18
19	32. 5	11. 5	91. 7	73. 2	56. 0	40. 3	26. 1	13. 5	02. 6	93. 5	19
20	2633. 8	2712. 8	2793. 0	2874. 5	2957. 4	3041. 7	3127. 6	3215. 0	3304. 1	3395. 0	20
21	35. 1	14. 1	94. 4	75. 9	58. 8	43. 2	29. 0	16. 5	05. 6	96. 5	21
22	36. 4	15. 4	95. 7	77. 3	60. 2	44. 6	30. 5	17. 9	07. 1	98. 1	22
23	37. 7	16. 8	97. 1	78. 6	61. 6	46. 0	31. 9	19. 4	08. 6	3399. 6	23
24	39. 0	18. 1	98. 4	80. 0	63. 0	47. 4	33. 4	20. 9	10. 1	3401. 1	24
25	2640. 3	2719. 4	2799. 8	2881. 4	2964. 4	3048. 8	3134. 8	3222. 4	3311. 6	3402. 7	25
26	41. 6	20. 7	2801. 1	82. 8	65. 8	50. 3	36. 2	23. 8	13. 1	04. 2	26
27	42. 9	22. 1	02. 5	84. 1	67. 2	51. 7	37. 7	25. 3	14. 6	05. 7	27
28	44. 3	23. 4	03. 8	85. 5	68. 6	53. 1	39. 1	26. 8	16. 1	07. 3	28
29	45. 6	24. 7	05. 2	86. 9	70. 0	54. 5	40. 6	28. 3	17. 6	08. 8	29
30	2646. 9	2726. 1	2806. 5	2888. 2	2971. 4	3055. 9	3142. 0	3229. 7	3319. 1	3410. 3	30
31	48. 2	27. 4	07. 9	89. 6	72. 8	57. 4	43. 5	31. 2	20. 6	11. 9	31
32	49. 5	28. 7	09. 2	91. 0	74. 2	58. 8	44. 9	32. 7	22. 1	13. 4	32
33	50. 8	30. 1	10. 6	92. 4	75. 6	60. 2	46. 4	34. 2	23. 6	14. 9	33
34	52. 1	31. 4	11. 9	93. 7	77. 0	61. 6	47. 8	35. 6	25. 2	16. 5	34
35	2653. 4	2732. 7	2813. 3	2895. 1	2978. 4	3063. 1	3149. 3	3237. 1	3326. 7	3418. 0	35
36	54. 7	34. 1	14. 6	96. 5	79. 8	64. 5	50. 7	38. 6	28. 2	19. 5	36
37	56. 0	35. 4	16. 0	97. 9	81. 2	65. 9	52. 2	40. 1	29. 7	21. 1	37
38	57. 4	36. 7	17. 3	2899. 3	82. 6	67. 3	53. 6	41. 6	31. 2	22. 6	38
39	58. 7	38. 1	18. 7	2900. 6	84. 0	68. 8	55. 1	43. 0	32. 7	24. 2	39
40	2660. 0	2739. 4	2820. 0	2902. 0	2985. 4	3070. 2	3156. 5	3244. 5	3334. 2	3425. 7	40
41	61. 3	40. 7	21. 4	03. 4	86. 8	71. 6	58. 0	46. 0	35. 7	27. 2	41
42	62. 6	42. 1	22. 7	04. 8	88. 2	73. 0	59. 4	47. 5	37. 2	28. 8	42
43	63. 9	43. 4	24. 1	06. 1	89. 6	74. 5	60. 9	49. 0	38. 7	30. 3	43
44	65. 2	44. 7	25. 5	07. 5	91. 0	75. 9	62. 3	50. 4	40. 2	31. 9	44
45	2666. 6	2746. 1	2826. 8	2908. 9	2992. 4	3077. 3	3163. 8	3251. 9	3341. 8	3433. 4	45
46	67. 9	47. 4	28. 2	10. 3	93. 8	78. 7	65. 3	53. 4	43. 3	35. 0	46
47	69. 2	48. 7	29. 5	11. 7	95. 2	80. 2	66. 7	54. 9	44. 8	36. 5	47
48	70. 5	50. 1	30. 9	13. 0	96. 6	81. 6	68. 2	56. 4	46. 3	38. 0	48
49	71. 8	51. 4	32. 2	14. 4	98. 0	83. 0	69. 6	57. 9	47. 8	39. 6	49
50	2673. 1	2752. 7	2833. 6	2915. 8	2999. 4	3084. 5	3171. 1	3259. 3	3349. 3	3441. 1	50
51	74. 5	54. 1	35. 0	17. 2	3000. 8	85. 9	72. 5	60. 8	50. 8	42. 7	51
52	75. 8	55. 4	36. 3	18. 6	02. 2	87. 3	74. 0	62. 3	52. 4	44. 2	52
53	77. 1	56. 8	37. 7	19. 9	03. 6	88. 8	75. 5	63. 8	53. 9	45. 8	53
54	78. 4	58. 1	39. 0	21. 3	05. 0	90. 2	76. 9	65. 3	55. 4	47. 3	54
55	2679. 7	2759. 4	2840. 4	2922. 7	3006. 4	3091. 6	3178. 4	3266. 8	3356. 9	3448. 9	55
56	81. 0	60. 8	41. 8	24. 1	07. 8	93. 1	79. 8	68. 3	58. 4	50. 4	56
57	82. 4	62. 1	43. 1	25. 5	09. 2	94. 5	81. 3	69. 7	59. 9	52. 0	57
58	83. 7	63. 4	44. 5	26. 9	10. 6	95. 9	82. 8	71. 2	61. 5	53. 5	58
59	85. 0	64. 8	45. 8	28. 2	12. 1	97. 4	84. 2	72. 7	63. 0	55. 1	59
60	2686. 3	2766. 1	2847. 2	2929. 6	3013. 5	3098. 8	3185. 7	3274. 2	3364. 5	3456. 6	60
Lat.	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	Lat.

(23)

Meridional Parts

Lat.	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	Lat.
′											′
0	3456. 6	3550. 7	3646. 8	3745. 2	3845. 8	3948. 9	4054. 6	4163. 1	4274. 5	4389. 2	0
1	58. 2	52. 3	48. 5	46. 8	47. 5	50. 6	56. 4	64. 9	76. 4	91. 1	1
2	59. 7	53. 9	50. 1	48. 5	49. 2	52. 4	58. 2	66. 7	78. 3	93. 0	2
3	61. 3	55. 5	51. 7	50. 1	50. 9	54. 1	59. 9	68. 6	80. 2	95. 0	3
4	62. 8	57. 0	53. 3	51. 8	52. 6	55. 8	61. 7	70. 4	82. 1	96. 9	4
5	3464. 4	3558. 6	3654. 9	3753. 4	3854. 3	3957. 6	4063. 5	4172. 2	4284. 0	4398. 9	5
6	65. 9	60. 2	56. 6	55. 1	56. 0	59. 3	65. 3	74. 1	85. 8	4400. 8	6
7	67. 5	61. 8	58. 2	56. 8	57. 7	61. 1	67. 1	75. 9	87. 7	02. 8	7
8	69. 1	63. 4	59. 8	58. 4	59. 4	62. 8	68. 9	77. 8	89. 6	04. 7	8
9	70. 6	65. 0	61. 4	60. 1	61. 1	64. 6	70. 7	79. 6	91. 5	06. 6	9
10	3472. 2	3566. 6	3663. 1	3761. 8	3862. 8	3966. 3	4072. 5	4181. 4	4293. 4	4408. 6	10
11	73. 7	68. 2	64. 7	63. 4	64. 5	68. 1	74. 3	83. 3	95. 3	10. 5	11
12	75. 3	69. 8	66. 3	65. 1	66. 2	69. 8	76. 1	85. 1	97. 2	12. 5	12
13	76. 8	71. 3	67. 9	66. 8	67. 9	71. 6	77. 8	87. 0	4299. 1	14. 4	13
14	78. 4	72. 9	69. 6	68. 4	69. 6	73. 3	79. 6	88. 8	4301. 0	16. 4	14
15	3480. 0	3574. 5	3671. 2	3770. 1	3871. 3	3975. 1	4081. 4	4190. 7	4302. 9	4418. 3	15
16	81. 5	76. 1	72. 8	71. 8	73. 0	76. 8	83. 2	92. 5	04. 8	20. 3	16
17	83. 1	77. 7	74. 5	73. 4	74. 7	78. 6	85. 0	94. 3	06. 7	22. 2	17
18	84. 6	79. 3	76. 1	75. 1	76. 4	80. 3	86. 8	96. 2	08. 6	24. 2	18
19	86. 2	80. 9	77. 7	76. 8	78. 2	82. 1	88. 6	98. 0	10. 5	26. 2	19
20	3487. 8	3582. 5	3679. 4	3778. 4	3879. 9	3983. 8	4090. 4	4199. 9	4312. 4	4428. 1	20
21	89. 3	84. 1	81. 0	80. 1	81. 6	85. 6	92. 2	4201. 7	14. 3	30. 1	21
22	90. 9	85. 7	82. 6	81. 8	83. 3	87. 3	94. 0	03. 6	16. 2	32. 0	22
23	92. 4	87. 3	84. 3	83. 4	85. 0	89. 1	95. 8	05. 4	18. 1	34. 0	23
24	94. 0	88. 9	85. 9	85. 1	86. 7	90. 8	97. 6	07. 3	20. 0	35. 9	24
25	3495. 6	3590. 5	3687. 5	3786. 8	3888. 4	3992. 6	4099. 4	4209. 1	4321. 9	4437. 9	25
26	97. 1	92. 1	89. 2	88. 5	90. 1	94. 4	4101. 2	11. 0	23. 8	39. 9	26
27	3498. 7	93. 7	90. 8	90. 1	91. 9	96. 1	03. 0	12. 9	25. 7	41. 8	27
28	3500. 3	95. 3	92. 4	91. 8	93. 6	97. 9	04. 9	14. 7	27. 6	43. 8	28
29	01. 8	96. 9	94. 1	93. 5	95. 3	3999. 6	06. 7	16. 6	29. 5	45. 8	29
30	3503. 4	3598. 5	3695. 7	3795. 2	3897. 0	4001. 4	4108. 5	4218. 4	4331. 4	4447. 7	30
31	05. 0	3600. 1	97. 3	96. 8	3898. 7	03. 2	10. 3	20. 3	33. 3	49. 7	31
32	06. 5	01. 7	3699. 0	3798. 5	3900. 5	04. 9	12. 1	22. 1	35. 3	51. 7	32
33	08. 1	03. 3	3700. 6	3800. 2	02. 2	06. 7	13. 9	24. 0	37. 2	53. 6	33
34	09. 7	04. 9	02. 3	01. 9	03. 9	08. 4	15. 7	25. 9	39. 1	55. 6	34
35	3511. 3	3606. 5	3703. 9	3803. 6	3905. 6	4010. 2	4117. 5	4227. 7	4341. 0	4457. 6	35
36	12. 8	08. 1	05. 6	05. 2	07. 3	12. 0	19. 3	29. 6	42. 9	59. 6	36
37	14. 4	09. 7	07. 2	06. 9	09. 1	13. 7	21. 1	31. 4	44. 8	61. 5	37
38	16. 0	11. 3	08. 8	08. 6	10. 8	15. 5	23. 0	33. 3	46. 7	63. 5	38
39	17. 5	12. 9	10. 5	10. 3	12. 5	17. 3	24. 8	35. 2	48. 7	65. 5	39
40	3519. 1	3614. 6	3712. 1	3812. 0	3914. 2	4019. 0	4126. 6	4237. 0	4350. 6	4467. 5	40
41	20. 7	16. 2	13. 8	13. 7	16. 0	20. 8	28. 4	38. 9	52. 5	69. 4	41
42	22. 3	17. 8	15. 4	15. 3	17. 7	22. 6	30. 2	40. 8	54. 4	71. 4	42
43	23. 8	19. 4	17. 1	17. 0	19. 4	24. 4	32. 0	42. 6	56. 3	73. 4	43
44	25. 4	21. 0	18. 7	18. 7	21. 1	26. 1	33. 9	44. 5	58. 3	75. 4	44
45	3527. 0	3622. 6	3720. 4	3820. 4	3922. 9	4027. 9	4135. 7	4246. 4	4360. 2	4477. 3	45
46	28. 6	24. 2	22. 0	22. 1	24. 6	29. 7	37. 5	48. 2	62. 1	79. 3	46
47	30. 1	25. 8	23. 7	23. 8	26. 3	31. 5	39. 3	50. 1	64. 0	81. 3	47
48	31. 7	27. 4	25. 3	25. 5	28. 1	33. 2	41. 1	52. 0	66. 0	83. 3	48
49	33. 3	29. 0	27. 0	27. 2	29. 8	35. 0	43. 0	53. 9	67. 9	85. 3	49
50	3534. 9	3630. 7	3728. 6	3828. 8	3931. 5	4036. 8	4144. 8	4255. 7	4369. 8	4487. 3	50
51	36. 5	32. 3	30. 3	30. 5	33. 2	38. 6	46. 6	57. 6	71. 8	89. 3	51
52	38. 0	33. 9	31. 9	32. 2	35. 0	40. 3	48. 4	59. 5	73. 7	91. 2	52
53	39. 6	35. 5	33. 6	33. 9	36. 7	42. 1	50. 3	61. 4	75. 6	93. 2	53
54	41. 2	37. 1	35. 2	35. 6	38. 5	43. 9	52. 1	63. 2	77. 5	95. 2	54
55	3542. 8	3638. 7	3736. 9	3837. 3	3940. 2	4045. 7	4153. 9	4265. 1	4379. 5	4497. 2	55
56	44. 4	40. 4	38. 5	39. 0	41. 9	47. 5	55. 8	67. 0	81. 4	4499. 2	56
57	45. 9	42. 0	40. 2	40. 7	43. 7	49. 2	57. 6	68. 9	83. 4	4501. 2	57
58	47. 5	43. 6	41. 8	42. 4	45. 4	51. 0	59. 4	70. 8	85. 3	03. 2	58
59	49. 1	45. 2	43. 5	44. 1	47. 1	52. 8	61. 2	72. 6	87. 2	05. 2	59
60	3550. 7	3646. 8	3745. 2	3845. 8	3948. 9	4054. 6	4163. 1	4274. 5	4389. 2	4507. 2	60
Lat.	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	Lat.

Meridional Parts

Lat.	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	Lat.
′											′
0	4507. 2	4628. 8	4754. 4	4884. 2	5018. 5	5157. 7	5302. 2	5452. 5	5609. 2	5772. 8	0
1	09. 2	30. 9	56. 5	86. 4	20. 7	60. 0	04. 7	55. 1	11. 9	75. 6	1
2	11. 2	33. 0	58. 7	88. 6	23. 0	62. 4	07. 1	57. 7	14. 5	78. 4	2
3	13. 2	35. 0	60. 8	90. 8	25. 3	64. 8	09. 6	60. 2	17. 2	81. 2	3
4	15. 2	37. 1	62. 9	93. 0	27. 6	67. 1	12. 1	62. 8	19. 9	84. 0	4
5	4517. 2	4639. 1	4765. 0	4895. 2	5029. 9	5169. 5	5314. 5	5465. 4	5622. 6	5786. 8	5
6	19. 2	41. 2	67. 2	97. 4	32. 2	71. 9	17. 0	67. 9	25. 2	89. 6	6
7	21. 2	43. 3	69. 3	4899. 6	34. 5	74. 3	19. 4	70. 5	27. 9	92. 4	7
8	23. 2	45. 3	71. 5	4901. 8	36. 7	76. 6	21. 9	73. 1	30. 6	95. 2	8
9	25. 2	47. 4	73. 6	04. 0	39. 0	79. 0	24. 4	75. 6	33. 3	5798. 0	9
10	4527. 2	4649. 5	4775. 7	4906. 2	5041. 3	5181. 4	5326. 9	5478. 2	5636. 0	5800. 8	10
11	29. 2	51. 6	77. 9	08. 4	43. 6	83. 8	29. 3	80. 8	38. 7	03. 6	11
12	31. 2	53. 6	80. 0	10. 7	45. 9	86. 1	31. 8	83. 4	41. 3	06. 4	12
13	33. 2	55. 7	82. 1	12. 9	48. 2	88. 5	34. 3	85. 9	44. 0	09. 2	13
14	35. 2	57. 8	84. 3	15. 1	50. 5	90. 9	36. 8	88. 5	46. 7	12. 0	14
15	4537. 2	4659. 9	4786. 4	4917. 3	5052. 8	5193. 3	5339. 2	5491. 1	5649. 4	5814. 9	15
16	39. 3	61. 9	88. 6	19. 5	55. 1	95. 7	41. 7	93. 7	52. 1	17. 7	16
17	41. 3	64. 0	90. 7	21. 7	57. 4	5198. 1	44. 2	96. 3	54. 8	20. 5	17
18	43. 3	66. 1	92. 9	24. 0	59. 7	5200. 5	46. 7	5498. 9	57. 5	23. 3	18
19	45. 3	68. 2	95. 0	26. 2	62. 0	02. 9	49. 2	5501. 4	60. 2	26. 1	19
20	4547. 3	4670. 2	4797. 2	4928. 4	5064. 3	5205. 2	5351. 7	5504. 0	5662. 9	5829. 0	20
21	49. 3	72. 3	4799. 3	30. 6	66. 6	07. 6	54. 1	06. 6	65. 6	31. 8	21
22	51. 4	74. 4	4801. 5	32. 9	68. 9	10. 0	56. 6	09. 2	68. 3	34. 6	22
23	53. 4	76. 5	03. 6	35. 1	71. 2	12. 4	59. 1	11. 8	71. 1	37. 5	23
24	55. 4	78. 6	05. 8	37. 3	73. 5	14. 8	61. 6	14. 4	73. 8	40. 3	24
25	4557. 4	4680. 7	4807. 9	4939. 6	5075. 9	5217. 2	5364. 1	5517. 0	5676. 5	5843. 2	25
26	59. 4	82. 8	10. 1	41. 8	78. 2	19. 6	66. 6	19. 6	79. 2	46. 0	26
27	61. 5	84. 8	12. 3	44. 0	80. 5	22. 0	69. 1	22. 2	81. 9	48. 8	27
28	63. 5	86. 9	14. 4	46. 3	82. 8	24. 4	71. 6	24. 8	84. 6	51. 7	28
29	65. 5	89. 0	16. 6	48. 5	85. 1	26. 8	74. 1	27. 4	87. 4	54. 5	29
30	4567. 5	4691. 1	4818. 7	4950. 7	5087. 4	5229. 3	5376. 6	5530. 0	5690. 1	5857. 4	30
31	69. 6	93. 2	20. 9	53. 0	89. 8	31. 7	79. 1	32. 7	92. 8	60. 3	31
32	71. 6	95. 3	23. 1	55. 2	92. 1	34. 1	81. 6	35. 3	95. 5	63. 1	32
33	73. 6	97. 4	25. 2	57. 4	94. 4	36. 5	84. 1	37. 9	5698. 3	66. 0	33
34	75. 7	4699. 5	27. 4	59. 7	96. 7	38. 9	86. 7	40. 5	5701. 0	68. 8	34
35	4577. 7	4701. 6	4829. 6	4961. 9	5099. 1	5241. 3	5389. 2	5543. 1	5703. 7	5871. 7	35
36	79. 7	03. 7	31. 7	64. 2	5101. 4	43. 7	91. 7	45. 7	06. 5	74. 6	36
37	81. 8	05. 8	33. 9	66. 4	03. 7	46. 2	94. 2	48. 4	09. 2	77. 4	37
38	83. 8	07. 9	36. 1	68. 7	06. 0	48. 6	96. 7	51. 0	12. 0	80. 3	38
39	85. 8	10. 0	38. 3	70. 9	08. 4	51. 0	5399. 2	53. 6	14. 7	83. 2	39
40	4587. 9	4712. 1	4840. 4	4973. 2	5110. 7	5253. 4	5401. 8	5556. 2	5717. 5	5886. 0	40
41	89. 9	14. 2	42. 6	75. 4	13. 0	55. 8	04. 3	58. 9	20. 2	88. 9	41
42	91. 9	16. 3	44. 8	77. 7	15. 4	58. 3	06. 8	61. 5	22. 9	91. 8	42
43	94. 0	18. 4	47. 0	79. 9	17. 7	60. 7	09. 3	64. 1	25. 7	94. 7	43
44	96. 0	20. 5	49. 1	82. 2	20. 1	63. 1	11. 9	66. 8	28. 5	5897. 6	44
45	4598. 1	4722. 6	4851. 3	4984. 4	5122. 4	5265. 6	5414. 4	5569. 4	5731. 2	5900. 4	45
46	4600. 1	24. 7	53. 5	86. 7	24. 7	68. 0	16. 9	72. 1	34. 0	03. 3	46
47	02. 2	26. 8	55. 7	89. 0	27. 1	70. 4	19. 5	74. 7	36. 7	06. 2	47
48	04. 2	29. 0	57. 9	91. 2	29. 4	72. 9	22. 0	77. 3	39. 5	09. 1	48
49	06. 3	31. 1	60. 0	93. 5	31. 8	75. 3	24. 5	80. 0	42. 3	12. 0	49
50	4608. 3	4733. 2	4862. 2	4995. 8	5134. 1	5277. 7	5427. 1	5582. 6	5745. 0	5914. 9	50
51	10. 3	35. 3	64. 4	4998. 0	36. 5	80. 2	29. 6	85. 3	47. 8	17. 8	51
52	12. 4	37. 4	66. 6	5000. 3	38. 8	82. 6	32. 1	87. 9	50. 6	20. 7	52
53	14. 4	39. 5	68. 8	02. 6	41. 2	85. 1	34. 7	90. 6	53. 3	23. 6	53
54	16. 5	41. 7	71. 0	04. 8	43. 5	87. 5	37. 2	93. 2	56. 1	26. 5	54
55	4618. 6	4743. 8	4873. 2	5007. 1	5145. 9	5290. 0	5439. 8	5595. 9	5758. 9	5929. 4	55
56	20. 6	45. 9	75. 4	09. 4	48. 2	92. 4	42. 3	5598. 5	61. 7	32. 3	56
57	22. 7	48. 0	77. 6	11. 6	50. 6	94. 9	44. 9	5601. 2	64. 4	35. 3	57
58	24. 7	50. 1	79. 8	13. 9	53. 0	97. 3	47. 4	03. 9	67. 2	38. 2	58
59	26. 8	52. 3	82. 0	16. 2	55. 3	5299. 8	50. 0	06. 5	70. 0	41. 1	59
60	4628. 8	4754. 4	4884. 2	5018. 5	5157. 7	5302. 2	5452. 5	5609. 2	5772. 8	5944. 0	60
Lat.	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	Lat.

(23)

Meridional Parts

Lat.	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	Lat.
′											′
0	5944. 0	6123. 7	6312. 7	6512. 1	6723. 3	6947. 8	7187. 4	7444. 5	7721. 8	8022. 8	0
1	46. 9	26. 7	15. 9	15. 5	27. 0	51. 7	91. 6	48. 9	26. 6	28. 1	1
2	49. 9	29. 8	19. 1	19. 0	30. 6	55. 5	95. 7	53. 4	31. 4	33. 3	2
3	52. 8	32. 9	22. 4	22. 4	34. 2	59. 4	7199. 9	57. 8	36. 2	38. 6	3
4	55. 7	36. 0	25. 6	25. 8	37. 9	63. 3	7204. 0	62. 3	41. 0	43. 8	4
5	5958. 6	6139. 0	6328. 9	6529. 3	6741. 5	6967. 2	7208. 2	7466. 8	7745. 9	8049. 1	5
6	61. 6	42. 1	32. 1	32. 7	45. 2	71. 1	12. 3	71. 2	50. 7	54. 4	6
7	64. 5	45. 2	35. 4	36. 1	48. 8	75. 0	16. 5	75. 7	55. 6	59. 7	7
8	67. 5	48. 3	38. 6	39. 6	52. 5	78. 8	20. 7	80. 2	60. 4	65. 0	8
9	70. 4	51. 4	41. 9	43. 0	56. 1	82. 7	24. 8	84. 7	65. 3	70. 3	9
10	5973. 3	6154. 5	6345. 1	6546. 5	6759. 8	6986. 6	7229. 0	7489. 2	7770. 2	8075. 6	10
11	76. 3	57. 6	48. 4	49. 9	63. 4	90. 6	33. 2	93. 7	75. 0	80. 9	11
12	79. 2	60. 7	51. 7	53. 4	67. 1	94. 5	37. 4	7498. 2	79. 9	86. 3	12
13	82. 2	63. 8	55. 0	56. 8	70. 8	6998. 4	41. 6	7502. 7	84. 8	91. 6	13
14	85. 1	66. 9	58. 2	60. 3	74. 5	7002. 3	45. 8	07. 3	89. 7	8096. 9	14
15	5988. 1	6170. 0	6361. 5	6563. 8	6778. 1	7006. 2	7250. 0	7511. 8	7794. 6	8102. 3	15
16	91. 1	78. 1	64. 8	67. 2	81. 8	10. 2	54. 2	16. 3	7799. 5	07. 7	16
17	94. 0	76. 2	68. 1	70. 7	85. 5	14. 1	58. 4	20. 9	7804. 5	13. 0	17
18	97. 0	79. 3	71. 4	74. 2	89. 2	18. 0	62. 6	25. 4	09. 4	18. 4	18
19	5999. 9	82. 4	74. 6	77. 7	92. 9	22. 0	66. 8	29. 9	14. 3	23. 8	19
20	6002. 9	6185. 6	6377. 9	6581. 2	6796. 6	7025. 9	7271. 1	7534. 5	7819. 3	8129. 2	20
21	05. 9	88. 7	81. 2	84. 6	6800. 3	29. 9	75. 3	39. 1	24. 2	34. 6	21
22	08. 9	91. 8	84. 5	88. 1	04. 0	33. 8	79. 5	43. 6	29. 2	40. 0	22
23	11. 8	94. 9	87. 8	91. 6	07. 7	37. 8	83. 8	48. 2	34. 1	45. 4	23
24	14. 8	6198. 1	91. 1	95. 1	11. 4	41. 7	88. 0	52. 8	39. 1	50. 9	24
25	6017. 8	6201. 2	6394. 4	6598. 6	6815. 2	7045. 7	7292. 3	7557. 4	7844. 1	8156. 3	25
26	20. 8	04. 3	6397. 7	6602. 1	18. 9	49. 7	7296. 5	62. 0	49. 1	61. 8	26
27	23. 8	07. 5	6401. 1	05. 6	22. 6	53. 6	7300. 8	66. 6	54. 0	67. 2	27
28	26. 7	10. 6	04. 4	09. 1	26. 3	57. 6	05. 1	71. 2	59. 0	72. 7	28
29	29. 7	13. 8	07. 7	12. 7	30. 1	61. 6	09. 3	75. 8	64. 0	78. 2	29
30	6032. 7	6216. 9	6411. 0	6616. 2	6833. 8	7065. 6	7313. 6	7580. 4	7869. 1	8183. 6	30
31	35. 7	20. 1	14. 3	19. 7	37. 5	69. 6	17. 9	85. 0	74. 1	89. 1	31
32	38. 7	23. 2	17. 7	23. 2	41. 3	73. 6	22. 2	89. 6	79. 1	8194. 6	32
33	41. 7	26. 4	21. 0	26. 7	45. 0	77. 6	26. 5	94. 3	84. 1	8200. 1	33
34	44. 7	29. 5	24. 3	30. 3	48. 8	81. 6	30. 8	7598. 9	89. 2	05. 7	34
35	6047. 7	6232. 7	6427. 7	6633. 8	6852. 6	7085. 6	7335. 1	7603. 6	7894. 2	8211. 2	35
36	50. 7	35. 9	31. 0	37. 3	56. 3	89. 6	39. 4	08. 2	7899. 3	16. 7	36
37	53. 7	39. 0	34. 4	40. 9	60. 1	93. 7	43. 7	12. 9	7904. 3	22. 3	37
38	56. 8	42. 2	37. 7	44. 4	63. 9	7097. 7	48. 0	17. 5	09. 4	27. 8	38
39	59. 8	45. 4	41. 0	48. 0	67. 6	7101. 7	52. 4	22. 2	14. 5	33. 4	39
40	6062. 8	6248. 6	6444. 4	6651. 5	6871. 4	7105. 8	7356. 7	7626. 9	7919. 6	8238. 9	40
41	65. 8	51. 7	47. 8	55. 1	75. 2	09. 8	61. 0	31. 6	24. 7	44. 5	41
42	68. 8	54. 9	51. 1	58. 6	79. 0	13. 8	65. 4	36. 3	29. 7	50. 1	42
43	71. 8	58. 1	54. 5	62. 2	82. 8	17. 9	69. 7	41. 0	34. 9	55. 7	43
44	74. 9	61. 3	57. 8	65. 8	86. 6	21. 9	74. 1	45. 7	40. 0	61. 3	44
45	6077. 9	6264. 5	6461. 2	6669. 3	6890. 4	7126. 0	7378. 4	7650. 4	7945. 1	8266. 9	45
46	80. 9	67. 7	64. 6	72. 9	94. 2	30. 1	82. 8	55. 1	50. 2	72. 5	46
47	84. 0	70. 9	68. 0	76. 5	6898. 0	34. 1	87. 2	59. 8	55. 4	78. 2	47
48	87. 0	74. 1	71. 3	80. 1	6901. 8	38. 2	91. 6	64. 5	60. 5	83. 8	48
49	90. 0	77. 3	74. 7	83. 7	05. 6	42. 3	7395. 9	69. 3	65. 6	89. 5	49
50	6093. 1	6280. 5	6478. 1	6687. 3	6909. 4	7146. 4	7400. 3	7674. 0	7970. 8	8295. 1	50
51	96. 1	83. 7	81. 5	90. 8	13. 2	50. 4	04. 7	78. 7	76. 0	8300. 8	51
52	6099. 2	86. 9	84. 9	94. 4	17. 1	54. 5	09. 1	83. 5	81. 1	06. 5	52
53	6102. 2	90. 1	88. 3	6698. 0	20. 9	58. 6	13. 5	88. 3	86. 3	12. 2	53
54	05. 3	93. 3	91. 7	6701. 6	24. 7	62. 7	17. 9	93. 0	91. 5	17. 9	54
55	6108. 3	6296. 5	6495. 1	6705. 2	6928. 6	7166. 8	7422. 3	7697. 8	7996. 7	8323. 6	55
56	11. 4	6299. 8	6498. 5	08. 9	32. 4	71. 0	26. 8	7702. 6	8001. 9	29. 3	56
57	14. 5	6303. 0	6501. 9	12. 5	36. 2	75. 1	31. 2	07. 4	07. 1	35. 0	57
58	17. 5	06. 2	05. 3	16. 1	40. 1	79. 2	35. 6	12. 2	12. 4	40. 7	58
59	20. 6	09. 4	08. 7	19. 7	44. 0	83. 3	40. 0	17. 0	17. 6	46. 5	59
60	6128. 7	6312. 7	6512. 1	6723. 3	6947. 8	7187. 4	7444. 5	7721. 8	8022. 8	8352. 2	60
Lat.	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	Lat.

TRUE AMPLITUDES

Lat.	Declination n														
	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
2	1·0	2·0	3·0	4·0	5·0	6·0	7·0	8·0	9·0	10·0	11·0	12·0	13·0	14·0	15·0
4	1·0	2·0	3·0	4·0	5·0	6·0	7·0	8·0	9·0	10·0	11·0	12·0	13·0	14·0	15·0
6	1·0	2·0	3·0	4·0	5·0	6·0	7·1	8·1	9·1	10·1	11·1	12·1	13·1	14·1	15·1
8	1·0	2·0	3·0	4·1	5·1	6·1	7·1	8·1	9·1	10·1	11·1	12·1	13·1	14·1	15·2
10	1·0	2·0	3·1	4·1	5·1	6·1	7·1	8·1	9·2	10·2	11·2	12·2	13·2	14·2	15·3
12	1·0	2·1	3·1	4·1	5·1	6·1	7·2	8·2	9·2	10·2	11·3	12·3	13·3	14·3	15·4
14	1·0	2·1	3·1	4·1	5·2	6·2	7·2	8·3	9·3	10·3	11·3	12·4	13·4	14·4	15·5
16	1·1	2·1	3·1	4·2	5·2	6·2	7·3	8·3	9·4	10·4	11·5	12·5	13·5	14·6	15·6
18	1·1	2·1	3·2	4·2	5·3	6·3	7·4	8·4	9·5	10·5	11·6	12·6	13·7	14·7	15·8
20	1·1	2·1	3·2	4·3	5·3	6·4	7·5	8·5	9·6	10·7	11·7	12·8	13·9	14·9	15·9
22	1·1	2·2	3·2	4·3	5·4	6·5	7·6	8·6	9·7	10·8	11·9	13·0	14·1	15·1	16·2
24	1·1	2·2	3·3	4·4	5·5	6·6	7·7	8·8	9·9	11·0	12·1	13·2	14·3	15·4	16·5
26	1·1	2·2	3·4	4·5	5·6	6·7	7·8	8·9	10·0	11·2	12·3	13·4	14·5	15·6	16·8
28	1·1	2·3	3·4	4·5	5·7	6·8	7·9	9·1	10·2	11·4	12·5	13·6	14·8	15·9	17·1
30	1·2	2·3	3·5	4·6	5·8	6·9	8·1	9·3	10·4	11·6	12·7	13·9	15·1	16·2	17·4
31	1·2	2·3	3·5	4·7	5·8	7·0	8·2	9·4	10·5	11·7	12·9	14·0	15·2	16·4	17·6
32	1·2	2·4	3·6	4·7	5·9	7·1	8·3	9·5	10·6	11·8	13·0	14·2	15·4	16·6	17·8
33	1·2	2·4	3·6	4·8	6·0	7·2	8·4	9·6	10·8	12·0	13·2	14·4	15·6	16·8	18·0
34	1·2	2·4	3·6	4·8	6·0	7·3	8·5	9·7	10·9	12·1	13·3	14·5	15·8	17·0	18·2
35	1·2	2·5	3·7	4·9	6·1	7·3	8·6	9·8	11·0	12·2	13·5	14·7	16·0	17·2	18·4
36	1·2	2·5	3·7	5·0	6·2	7·4	8·7	9·9	11·2	12·4	13·7	14·9	16·2	17·4	18·7
37	1·3	2·5	3·8	5·0	6·3	7·5	8·8	10·0	11·3	12·6	13·8	15·1	16·4	17·6	18·9
38	1·3	2·5	3·8	5·1	6·4	7·6	8·9	10·2	11·4	12·7	14·0	15·3	16·6	17·9	19·2
39	1·3	2·6	3·9	5·2	6·4	7·7	9·0	10·3	11·6	12·9	14·2	15·5	16·8	18·1	19·5
40	1·3	2·6	3·9	5·2	6·5	7·9	9·2	10·5	11·8	13·1	14·4	15·8	17·1	18·4	19·8
41	1·3	2·7	4·0	5·3	6·6	8·0	9·3	10·6	12·0	13·3	14·7	16·0	17·4	18·7	20·1
42	1·4	2·7	4·0	5·4	6·7	8·1	9·4	10·8	12·2	13·5	14·9	16·3	17·6	19·0	20·4
43	1·4	2·7	4·1	5·5	6·9	8·2	9·6	11·0	12·4	13·7	15·1	16·5	17·9	19·3	20·7
44	1·4	2·8	4·2	5·6	7·0	8·4	9·8	11·2	12·6	14·0	15·4	16·8	18·2	19·7	21·1
45	1·4	2·8	4·3	5·7	7·1	8·5	9·9	11·4	12·8	14·2	15·7	17·1	18·6	20·0	21·5
46	1·4	2·9	4·3	5·8	7·2	8·7	10·1	11·6	13·0	14·5	16·0	17·4	18·9	20·4	21·9
47	1·5	2·9	4·4	5·9	7·4	8·8	10·3	11·8	13·3	14·8	16·3	17·8	19·3	20·8	22·3
48	1·5	3·0	4·5	6·0	7·5	9·0	10·5	12·0	13·5	15·1	16·6	18·1	19·7	21·2	22·8
49	1·5	3·1	4·6	6·1	7·6	9·2	10·7	12·3	13·8	15·4	18·9	18·5	20·1	21·6	23·2
50	1·6	3·1	4·7	6·2	7·8	9·4	10·9	12·5	14·1	15·7	17·3	18·9	20·5	22·1	23·8
50½	1·6	3·1	4·7	6·3	7·9	9·5	11·0	12·6	14·2	15·8	17·5	19·1	20·7	22·4	24·0
51	1·6	3·1	4·8	6·4	8·0	9·6	11·2	12·8	14·4	16·0	17·7	19·3	21·0	22·6	24·3
51½	1·6	3·2	4·8	6·4	8·0	9·7	11·3	12·9	14·6	16·2	17·8	19·5	21·2	22·9	24·6
52	1·6	3·3	4·9	6·5	8·1	9·8	11·4	13·1	14·7	16·4	18·1	19·7	21·4	23·2	24·9
52½	1·6	3·3	4·9	6·6	8·2	9·9	11·5	13·2	14·9	16·6	18·3	20·0	21·7	23·4	25·2
53	1·7	3·3	5·0	6·7	8·3	10·0	11·7	13·4	15·1	16·8	18·5	20·2	22·0	23·7	25·5
53½	1·7	3·4	5·0	6·7	8·4	10·1	11·8	13·5	15·2	17·0	18·7	20·5	22·2	24·0	25·8
54	1·7	3·4	5·1	6·8	8·5	10·3	12·0	13·7	15·4	17·2	19·0	20·7	22·5	24·3	26·1
54½	1·7	3·4	5·2	6·9	8·6	10·4	12·2	13·9	15·6	17·4	19·2	21·0	22·8	24·6	26·5
55	1·8	3·5	5·2	7·0	8·7	10·5	12·3	14·1	15·8	17·6	19·4	21·3	23·1	25·0	26·8
55½	1·8	3·5	5·3	7·1	8·9	10·6	12·4	14·2	16·0	17·9	19·7	21·5	23·4	25·3	27·2
56	1·8	3·6	5·4	7·2	9·0	10·8	12·6	14·4	16·3	18·1	20·0	21·8	23·7	25·6	27·6
56½	1·8	3·6	5·4	7·3	9·1	10·9	12·8	14·6	16·5	18·3	20·2	22·1	24·1	26·0	28·0
57	1·8	3·7	5·5	7·4	9·2	11·1	12·9	14·8	16·7	18·6	20·5	22·4	24·4	26·4	28·4
57½	1·9	3·7	5·6	7·5	9·3	11·2	13·1	15·0	16·9	18·9	20·8	22·8	24·8	26·8	28·9
58	1·9	3·8	5·7	7·6	9·5	11·4	13·3	15·2	17·2	19·1	21·1	23·1	25·1	27·2	29·2
58½	1·9	3·8	5·7	7·7	9·6	11·5	13·5	15·4	17·4	19·4	21·4	23·4	25·5	27·6	29·7
59	2·0	3·9	5·8	7·8	9·8	11·7	13·7	15·7	17·7	19·7	21·8	23·8	25·9	28·0	30·2
59½	2·0	3·9	5·9	7·9	9·9	11·9	13·9	15·9	18·0	20·0	22·1	24·2	26·3	28·5	30·7
60	2·0	4·0	6·0	8·0	10·0	12·1	14·1	16·2	18·2	20·3	22·4	24·6	28·7	28·9	31·2
60½	2·0	4·1	6·1	8·1	10·2	12·3	14·3	16·4	18·5	20·6	22·8	25·0	27·2	29·4	31·7
61	2·1	4·1	6·2	8·3	10·4	12·5	14·6	16·7	18·8	21·0	23·2	25·4	27·7	29·9	32·3
61½	2·1	4·2	6·3	8·4	10·5	12·7	14·8	17·0	19·1	21·3	23·6	25·8	28·1	30·5	32·8
62	2·1	4·3	6·4	8·6	10·7	12·9	15·1	17·3	19·5	21·7	24·0	26·3	28·6	31·0	33·5
62½	2·2	4·3	6·5	8·7	10·9	13·1	15·3	17·5	19·8	22·1	24·4	26·8	29·2	31·6	34·1

TRUE AMPLITUDES

Lat.	Declination														
	16°	17°	18°	19°	20°	20½°	21°	21½°	22°	22½°	23°	23½°	24°	24½°	25°
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
2	16·0	17·0	18·0	19·0	20·0	20·5	21·0	21·5	22·0	22·5	23·0	23·5	24·0	24·5	25·0
4	16·0	17·1	18·1	19·1	20·1	20·6	21·1	21·6	22·1	22·6	23·1	23·6	24·1	24·6	25·1
6	16·1	17·1	18·1	19·1	20·1	20·6	21·1	21·6	22·1	22·6	23·1	23·6	24·1	24·6	25·1
8	16·2	17·2	18·2	19·2	20·2	20·7	21·2	21·7	22·2	22·7	23·2	23·7	24·3	24·8	25·3
10	16·3	17·3	18·3	19·3	20·3	20·8	21·4	21·8	22·4	22·9	23·4	23·9	24·4	24·9	25·4
12	16·4	17·4	18·4	19·4	20·5	21·0	21·5	22·0	22·5	23·0	23·6	24·1	24·6	25·1	25·6
14	16·5	17·5	18·6	19·6	20·6	21·2	21·7	22·2	22·7	23·2	23·8	24·3	24·8	25·3	25·8
16	16·7	17·7	18·8	19·8	20·9	21·4	21·9	22·4	22·9	23·5	24·0	24·5	25·0	25·6	26·1
18	16·9	17·9	19·0	20·0	21·1	21·6	22·1	22·7	23·2	23·7	24·3	24·8	25·3	25·9	26·4
20	17·1	18·1	19·2	20·3	21·4	21·9	22·4	23·0	23·5	24·0	24·6	25·1	25·7	26·2	26·7
22	17·3	18·4	19·5	20·6	21·7	22·2	22·7	23·3	23·8	24·4	24·9	25·5	26·0	26·6	27·1
24	17·6	18·7	19·8	20·9	22·0	22·5	23·1	23·7	24·2	24·8	25·3	25·9	26·4	27·0	27·6
26	17·9	19·0	20·1	21·2	22·4	22·9	23·5	24·1	24·6	25·2	25·8	26·3	26·9	27·5	28·0
28	18·2	19·3	20·5	21·6	22·8	23·4	24·0	24·5	25·1	25·7	26·3	26·8	27·4	28·0	28·6
30	18·6	19·7	20·9	22·1	23·3	23·9	24·5	25·0	25·6	26·2	26·8	27·4	28·0	28·6	29·2
31	18·8	20·0	21·1	22·3	23·5	24·1	24·7	25·3	25·9	26·5	27·1	27·7	28·3	28·9	29·5
32	19·0	20·2	21·4	22·6	23·8	24·4	25·0	25·6	26·2	26·8	27·4	28·0	28·7	29·3	29·9
33	19·2	20·4	21·6	22·9	24·1	24·7	25·3	25·9	26·5	27·1	27·8	28·4	29·0	29·6	30·3
34	19·4	20·6	21·9	23·1	24·4	25·0	25·6	26·2	26·9	27·5	28·1	28·7	29·4	29·9	30·7
35	19·7	20·9	22·2	23·4	24·7	25·3	26·0	26·6	27·2	27·9	28·5	29·1	29·3	30·4	31·1
36	19·9	21·2	22·5	23·7	25·0	25·7	26·3	26·9	27·6	28·2	28·9	29·5	30·2	30·8	31·5
37	20·2	21·5	22·8	24·1	25·4	26·0	26·7	27·3	28·0	28·6	29·3	30·0	30·6	31·3	31·9
38	20·5	21·8	23·1	24·4	25·7	26·4	27·1	27·7	28·4	29·1	29·7	30·4	31·1	31·8	32·4
39	20·8	22·1	23·4	24·8	26·1	26·8	27·5	28·1	28·8	29·5	30·2	30·9	31·6	32·3	32·9
40	21·1	22·4	23·8	25·2	26·5	27·2	27·9	28·6	29·3	30·0	30·7	31·4	32·1	32·8	33·5
41	21·4	22·8	24·2	25·6	27·0	27·6	28·4	29·1	29·8	30·5	31·2	31·9	32·6	33·3	34·1
42	21·8	23·2	24·6	26·0	27·4	28·1	28·8	29·6	30·3	31·0	31·7	32·5	33·2	33·9	34·7
43	22·1	23·6	25·0	26·4	27·9	28·6	29·3	30·1	30·8	31·6	32·3	33·0	33·8	34·5	35·3
44	22·5	24·0	25·4	26·9	28·4	29·1	29·9	30·6	31·4	32·1	32·9	33·7	34·4	35·2	36·0
45	23·0	24·4	25·9	27·4	28·9	29·7	30·5	31·3	32·0	32·8	33·6	34·3	35·1	35·9	36·7
46	23·4	24·9	26·4	28·0	29·5	30·3	31·1	31·8	32·6	33·4	34·2	35·0	35·8	36·7	37·5
47	23·8	25·4	27·0	28·5	30·1	30·9	31·7	32·5	33·3	34·1	35·0	35·8	36·6	37·5	38·3
48	24·3	25·9	27·5	29·1	30·7	31·6	32·4	33·2	34·1	34·9	35·7	36·6	37·4	38·3	39·2
49	24·9	26·5	28·1	29·8	31·4	32·3	33·1	34·0	34·8	35·7	36·6	37·4	38·3	39·2	40·1
50	25·4	27·1	28·7	30·4	32·2	33·0	33·9	34·8	35·6	36·5	37·4	38·3	39·3	40·2	41·1
50½	25·7	27·4	29·1	30·8	32·5	33·4	34·3	35·2	36·1	37·0	37·9	38·8	39·8	40·7	41·6
51	26·0	27·7	29·4	31·2	32·9	33·8	34·7	35·6	36·5	37·5	38·4	39·3	40·3	41·2	42·2
51½	26·3	28·0	29·8	31·5	33·3	34·2	35·1	36·1	37·0	37·9	38·9	39·8	40·8	41·8	42·8
52	26·6	28·4	30·1	31·9	33·8	34·7	35·6	36·5	37·5	38·4	39·4	40·4	41·4	42·3	43·4
52½	26·9	28·7	30·5	32·3	34·2	35·1	36·1	37·0	38·0	38·9	39·9	40·9	41·9	42·9	44·0
53	27·3	29·1	30·9	32·8	34·6	35·6	36·6	37·5	38·5	39·5	40·5	41·5	42·5	43·6	44·6
53½	27·6	29·4	31·3	33·2	35·1	36·1	37·0	38·0	39·0	40·0	41·1	42·1	43·1	44·2	45·3
54	28·0	29·8	31·7	33·6	35·6	36·6	37·6	38·6	39·6	40·6	41·7	42·7	43·8	44·9	46·0
54½	28·3	30·2	32·2	34·1	36·1	37·1	38·1	39·1	40·1	41·2	42·3	43·4	44·5	45·6	46·7
55	28·7	30·7	32·6	34·6	36·6	37·6	38·7	39·7	40·8	41·9	42·9	44·0	45·2	46·3	47·5
55½	29·1	31·1	33·1	35·1	37·1	38·2	39·3	40·3	41·4	42·5	43·6	44·7	45·9	46·9	48·3
56	29·5	31·5	33·6	35·6	37·7	38·8	39·9	41·0	42·1	43·2	44·3	45·5	46·7	47·9	49·1
56½	30·0	32·0	34·0	36·1	38·3	39·4	40·5	41·6	42·6	43·9	45·1	46·3	47·5	48·7	50·0
57	30·4	32·5	34·6	36·7	38·9	40·0	41·2	42·3	43·5	44·6	45·9	47·1	48·3	49·6	50·9
57½	30·9	33·0	35·1	37·3	39·5	40·7	41·8	43·0	44·2	45·4	46·7	47·9	49·2	50·5	51·9
58	31·3	33·5	35·7	37·9	40·2	41·4	42·6	43·8	45·0	46·2	47·5	48·8	50·1	51·5	52·9
58½	31·8	34·0	36·3	38·5	40·9	42·1	43·3	44·5	45·8	47·1	48·4	49·7	51·1	52·5	54·0
59	32·4	34·6	36·9	39·2	41·6	42·8	44·1	45·4	46·7	48·0	49·4	50·7	52·2	53·6	55·1
59½	32·9	35·2	37·5	39·9	42·4	43·6	44·9	46·2	47·6	48·9	50·3	51·8	53·3	54·8	56·4
60	33·5	35·8	38·2	40·6	43·2	44·5	45·8	47·1	48·5	49·9	51·4	52·9	54·4	56·0	57·7
60½	34·0	36·4	38·8	41·4	44·0	45·3	46·7	48·1	49·5	51·0	52·5	54·1	55·7	57·4	59·1
61	34·7	37·1	39·6	42·2	44·9	46·3	47·7	49·1	50·6	52·1	53·7	55·3	57·0	58·8	60·6
61½	35·3	37·8	40·4	43·0	45·8	47·2	48·7	50·2	51·7	53·3	55·0	56·7	58·5	60·4	62·3
62	36·0	38·5	41·2	43·9	46·8	48·2	49·8	51·3	52·9	54·6	56·3	58·1	60·0	62·0	64·2
62½	36·7	39·3	42·0	44·8	47·8	49·3	50·9	52·5	54·2	56·0	57·8	59·7	61·7	63·9	66·2

TRUE AMPLITUDES

Lat.	Declination							
	25½°	26°	26½°	27°	27½°	28°	28½°	29°
°	°	°	°	°	°	°	°	°
2	25·5	26·0	26·5	27·0	27·5	28·0	28·5	29·0
4	25·6	26·1	26·6	27·1	27·6	28·1	28·6	29·1
6	25·7	26·2	26·7	27·2	27·7	28·2	28·7	29·2
8	25·8	26·3	26·8	27·3	27·8	28·3	28·8	29·3
10	25·9	26·4	26·9	27·5	28·0	28·5	29·0	29·5
12	26·1	26·6	27·1	27·7	28·2	28·7	29·2	29·7
14	26·3	26·9	27·4	27·9	28·4	28·9	29·5	30·0
16	26·6	27·1	27·7	28·2	28·7	29·2	29·8	30·3
18	26·9	27·5	28·0	28·5	29·0	29·6	30·1	30·7
20	27·3	27·8	28·3	28·9	29·4	30·0	30·5	31·1
22	27·7	28·2	28·8	29·3	29·9	30·4	31·0	31·5
24	28·1	28·7	29·2	29·8	30·4	30·9	31·5	32·1
26	28·6	29·2	29·8	30·3	30·9	31·5	32·1	32·6
28	29·2	29·8	30·4	30·9	31·5	32·1	32·7	33·3
30	29·8	30·4	31·0	31·6	32·2	32·8	33·4	34·1
31	30·1	30·8	31·4	32·0	32·6	33·2	33·8	34·5
32	30·5	31·1	31·7	32·4	33·0	33·6	34·2	34·9
33	30·9	31·5	32·1	32·8	33·4	34·0	34·7	35·3
34	31·3	31·9	32·6	33·2	33·8	34·5	35·1	35·8
35	31·7	32·4	33·0	33·7	34·3	35·0	35·6	36·3
36	32·2	32·8	33·5	34·1	34·8	35·5	36·1	36·8
37	32·6	33·3	34·0	34·6	35·3	36·0	36·7	37·4
38	33·1	33·8	34·5	35·2	35·9	36·6	37·3	38·0
39	33·6	34·3	35·0	35·8	36·5	37·2	37·9	38·6
40	34·2	34·9	35·6	36·4	37·1	37·8	38·5	39·3
41	34·8	35·5	36·2	37·0	37·7	38·5	39·2	40·0
42	35·4	36·2	36·9	37·7	38·4	39·2	39·9	40·7
43	36·1	36·8	37·6	38·4	39·2	39·9	40·7	41·5
44	36·8	37·5	38·3	39·2	39·9	40·7	41·6	42·4
45	37·5	38·3	39·1	39·9	40·8	41·6	42·4	43·3
46	38·3	39·1	40·0	40·8	41·7	42·5	43·4	44·3
47	39·1	40·0	40·9	41·7	42·6	43·5	44·4	45·3
48	40·0	40·9	41·8	42·7	43·6	44·5	45·5	46·4
49	41·0	41·9	42·9	43·8	44·7	45·7	46·7	47·7
50	42·0	43·0	44·0	44·9	45·9	46·9	47·9	49·0
50½	42·6	43·6	44·5	45·5	46·5	47·6	48·6	49·7
51	43·2	44·2	45·2	46·2	47·2	48·2	49·3	50·4
51½	43·8	44·8	45·8	46·8	47·9	49·0	50·0	51·2
52	44·4	45·4	46·4	47·5	48·6	49·7	50·8	52·0
52½	45·0	46·0	47·1	48·2	49·3	50·5	51·6	52·8
53	45·7	46·7	47·9	49·0	50·1	51·3	52·5	53·7
53½	46·4	47·5	48·6	49·8	50·9	52·1	53·3	54·6
54	47·1	48·2	49·4	50·6	51·8	53·0	54·3	55·6
54½	47·8	49·0	50·2	51·4	52·7	53·9	55·3	56·6
55	48·6	49·8	51·1	52·3	53·6	54·9	56·3	57·7
55½	49·5	50·7	52·0	53·3	54·6	56·0	57·4	58·9
56	50·3	51·6	52·9	54·3	55·7	57·1	58·6	60·1
56½	51·3	52·6	53·9	55·4	56·8	58·3	59·8	61·4
57	52·2	53·6	55·0	56·5	58·0	59·6	61·2	62·9
57½	53·2	54·7	56·1	57·7	59·2	60·7	62·6	65·0
58	54·3	55·8	57·4	58·9	60·6	62·4	64·2	66·2
58½	55·5	57·0	58·6	60·3	62·1	64·0	66·0	68·1
59	56·7	58·3	60·0	61·8	63·7	65·7	67·9	70·3
59½	58·0	59·7	61·5	63·4	65·5	67·7	70·1	72·8
60	59·4	61·2	63·2	65·2	67·4	69·9	72·6	75·8
60½	61·0	62·9	65·0	67·2	69·7	72·4	75·7	79·9
61	62·6	64·7	67·0	69·4	72·3	75·5	79·8	90·0
61½	64·5	66·7	69·3	72·1	75·4	79·7	90·0	—
62	66·2	69·0	71·9	75·2	79·6	90·0	—	—
62½	68·8	71·7	75·1	79·5	90·0	—	—	—

Amplitude Corrections

Lat.	Declination					
	0°	5°	10°	15°	20°	25°
°	°	°	°	°	°	°
0	0·0	0·0	0·0	0·0	0·0	0·0
5	0·1	0·1	0·1	0·1	0·1	0·1
10	0·1	0·1	0·1	0·1	0·1	0·1
15	0·2	0·2	0·2	0·2	0·2	0·2
20	0·2	0·2	0·2	0·2	0·2	0·3
25	0·3	0·3	0·3	0·3	0·3	0·3
30	0·4	0·4	0·4	0·4	0·4	0·4
35	0·4	0·5	0·5	0·5	0·5	0·5
40	0·5	0·6	0·6	0·6	0·6	0·7
42	0·6	0·6	0·6	0·6	0·7	0·7
44	0·6	0·6	0·7	0·7	0·7	0·7
46	0·7	0·7	0·7	0·7	0·8	0·8
48	0·7	0·8	0·8	0·8	0·9	0·9
50	0·8	0·8	0·8	0·9	0·9	1·0
52	0·8	0·9	0·9	0·9	1·0	1·1
54	0·9	0·9	1·0	1·0	1·1	1·3
56	0·9	0·9	1·0	1·0	1·2	1·5
58	1·0	1·0	1·1	1·2	1·3	1·7
60	1·1	1·2	1·2	1·3	1·5	2·1
62	1·2	1·2	1·3	1·4	1·8	2·9

COMPASS ERROR BY AMPLITUDE

The true amplitudes given in the main table are calculated for the instant when the true altitude of the body is precisely 0° 00′. In the case of the sun (owing to the effects of dip, refraction and parallax) the lower limb at this instant will appear to be approximately half a diameter above the visible horizon. If the compass bearing is taken at that moment there will be no need to apply any correction.

However, should the bearing be observed when the sun's centre appears to be in the visible horizon, the correction obtained from the subsidiary table should be applied by being added to the observed azimuth reckoned from the elevated pole as shown in the example below. (Lat. 62° N., decl. 20° S.).

Obs'd. Azi.	S. 41°·5 E.
From elev. pole	N. 138°·5 E.
Corr'n.	+ 1°·8
Sum	N. 140°·3 E.
Corr'd. obs'd. Amp.	E. 50°·3 S.
T. Amp. from table	E. 46°·8 S.
Comp. Error	3°·5 W.

Observations of rising or setting stars and planets are seldom practicable but, if obtained, should be treated in the same way as those of the sun's centre.

In the case of the moon that body will be approximately one-third of a degree below the horizon at the moment when its true altitude is 0° 00′. If observed when its centre appears in the visible horizon, two-thirds of the correction from the subsidiary table should be subtracted from the observed azimuth reckoned from the elevated pole.

TABLE A HOUR ANGLE

Lat.	0° 15′	0° 30′	0° 45′	1° 00′	1° 15′	1° 30′	1° 45′	2° 00′	2° 15′	2° 30′	2° 45′	3° 00′	3° 15′	3° 30′	3° 45′	Lat.
°	359° 45′	359° 30′	359° 15′	359° 00′	358° 45′	358° 30′	358° 15′	358° 00′	357° 45′	357° 30′	357° 15′	357° 00′	356° 45′	356° 30′	356° 15′	°
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	4·00	2·00	1·33	1·00	·80	·67	·57	·50	·44	·40	·36	·33	·31	·29	·27	1
2	8·00	4·00	2·67	2·00	1·60	1·33	1·14	1·00	·89	·80	·73	·67	·61	·57	·53	2
3	12·0	6·01	4·00	3·00	2·40	2·00	1·72	1·50	1·33	1·20	1·09	1·00	·92	·86	·80	3
4	16·0	8·01	5·34	4·01	3·21	2·67	2·29	2·00	1·78	1·60	1·46	1·33	1·23	1·14	1·07	4
5	20·1	10·0	6·68	5·01	4·01	3·34	2·86	2·51	2·23	2·00	1·82	1·67	1·54	1·43	1·33	5
6	24·1	12·0	8·03	6·02	4·82	4·01	3·44	3·01	2·68	2·41	2·19	2·01	1·85	1·72	1·60	6
7	28·1	14·1	9·38	7·03	5·63	4·69	4·02	3·52	3·13	2·81	2·56	2·34	2·16	2·01	1·87	7
8	32·2	16·1	10·7	8·05	6·44	5·37	4·60	4·02	3·58	3·22	2·93	2·68	2·48	2·30	2·14	8
9	36·3	18·1	12·1	9·07	7·26	6·05	5·18	4·54	4·03	3·63	3·30	3·02	2·79	2·59	2·42	9
10	40·4	20·2	13·5	10·1	8·08	6·73	5·77	5·05	4·49	4·04	3·67	3·36	3·10	2·88	2·69	10
11	44·5	22·3	14·9	11·1	8·91	7·42	6·36	5·57	4·95	4·45	4·05	3·71	3·42	3·18	2·97	11
12	48·7	24·4	16·2	12·2	9·74	8·12	6·96	6·09	5·41	4·87	4·43	4·06	3·74	3·48	3·24	12
13	52·9	26·5	17·6	13·2	10·6	8·82	7·56	6·61	5·88	5·29	4·81	4·41	4·07	3·78	3·52	13
14	57·1	28·6	19·1	14·3	11·4	9·52	8·16	7·14	6·35	5·71	5·19	4·76	4·39	4·08	3·80	14
15	61·4	30·7	20·5	15·4	12·3	10·2	8·77	7·67	6·82	6·14	5·58	5·11	4·72	4·38	4·09	15
16	65·7	32·9	21·9	16·4	13·1	11·0	9·39	8·21	7·30	6·57	5·97	5·47	5·05	4·69	4·37	16
17	70·1	35·0	23·4	17·5	14·0	11·7	10·0	8·75	7·78	7·00	6·36	5·83	5·38	5·00	4·66	17
18	74·5	37·2	24·8	18·6	14·9	12·4	10·6	9·30	8·27	7·44	6·76	6·20	5·72	5·31	4·96	18
19	78·9	39·5	26·3	19·7	15·8	13·1	11·3	9·86	8·76	7·89	7·17	6·57	6·06	5·63	5·25	19
20	83·4	41·7	27·8	20·9	16·7	13·9	11·9	10·4	9·26	8·34	7·58	6·94	6·41	5·95	5·55	20
21	88·0	44·0	29·3	22·0	17·6	14·7	12·6	11·0	9·77	8·79	7·99	7·32	6·76	6·28	5·86	21
22	92·6	46·3	30·9	23·1	18·5	15·4	13·2	11·6	10·3	9·25	8·41	7·71	7·12	6·61	6·16	22
23	97·3	48·6	32·4	24·3	19·5	16·2	13·9	12·2	10·8	9·72	8·84	8·10	7·48	6·94	6·48	23
24	102	51·0	34·0	25·5	20·4	17·0	14·6	12·7	11·3	10·2	9·27	8·50	7·84	7·28	6·79	24
25	107	53·4	35·6	26·7	21·4	17·8	15·3	13·4	11·9	10·7	9·71	8·90	8·21	7·62	7·11	25
26	112	55·9	37·3	27·9	22·4	18·6	16·0	14·0	12·4	11·2	10·2	9·31	8·59	7·97	7·44	26
27	117	58·4	38·9	29·2	23·4	19·5	16·7	14·6	13·0	11·7	10·6	9·72	8·97	8·33	7·77	27
28	122	60·9	40·6	30·5	24·4	20·3	17·4	15·2	13·5	12·2	11·1	10·1	9·36	8·69	8·11	28
29	127	63·5	42·3	31·8	25·4	21·2	18·1	15·9	14·1	12·7	11·5	10·6	9·76	9·06	8·46	29
30	132	66·2	44·1	33·1	26·5	22·0	18·9	16·5	14·7	13·2	12·0	11·0	10·2	9·44	8·81	30
31	138	68·9	45·9	34·4	27·5	22·9	19·7	17·2	15·3	13·8	12·5	11·5	10·6	9·82	9·17	31
32	143	71·6	47·7	35·8	28·6	23·9	20·5	17·9	15·9	14·3	13·0	11·9	11·0	10·2	9·53	32
33	149	74·4	49·6	37·2	29·8	24·8	21·3	18·6	16·5	14·9	13·5	12·4	11·4	10·6	9·91	33
34	155	77·3	51·5	38·6	30·9	25·8	22·1	19·3	17·2	15·4	14·0	12·9	11·9	11·0	10·3	34
35	160	80·2	53·5	40·1	32·1	26·7	22·9	20·1	17·8	16·0	14·6	13·4	12·3	11·4	10·7	35
36	167	83·3	55·5	41·6	33·3	27·7	23·8	20·8	18·5	16·6	15·1	13·9	12·8	11·9	11·1	36
37	173	86·3	57·6	43·2	34·5	28·8	24·7	21·6	19·2	17·3	15·7	14·4	13·3	12·3	11·5	37
38	179	89·5	59·7	44·8	35·8	29·8	25·6	22·4	19·9	17·9	16·3	14·9	13·8	12·8	11·9	38
39	186	92·8	61·9	46·4	37·1	30·9	26·5	23·2	20·6	18·6	16·9	15·5	14·3	13·2	12·4	39
40	192	96·2	64·1	48·1	38·5	32·0	27·5	24·0	21·4	19·2	17·5	16·0	14·8	13·7	12·8	40
41	199	99·6	66·4	49·8	39·8	33·2	28·5	24·9	22·1	19·9	18·1	16·6	15·3	14·2	13·3	41
42	206	103	68·8	51·6	41·3	34·4	29·5	25·8	22·9	20·6	18·8	17·2	15·9	14·7	13·7	42
43	214	107	71·2	53·4	42·7	35·6	30·5	26·7	23·7	21·4	19·4	17·8	16·4	15·2	14·2	43
44	221	111	73·8	55·3	44·3	36·9	31·6	27·7	24·6	22·1	20·1	18·4	17·0	15·8	14·7	44
45	229	115	76·4	57·3	45·8	38·2	32·7	28·6	25·5	22·9	20·8	19·1	17·6	16·4	15·3	45
46	237	119	79·1	59·3	47·5	39·6	33·9	29·7	26·4	23·7	21·6	19·8	18·2	16·9	15·8	46
47	246	123	31·9	61·4	49·2	41·0	35·1	30·7	27·3	24·6	22·3	20·5	18·9	17·5	16·4	47
48	255	127	84·8	63·6	50·9	42·4	36·4	31·8	28·3	25·4	23·1	21·2	19·6	18·2	16·9	48
49	264	132	87·9	65·9	52·7	43·9	37·7	32·9	29·3	26·4	24·0	22·0	20·3	18·8	17·6	49
50	273	137	91·0	68·3	54·6	45·5	39·0	34·1	30·3	27·3	24·8	22·7	21·0	19·5	18·2	50
51	283	142	94·3	70·8	56·6	47·2	40·4	35·4	31·4	28·3	25·7	23·6	21·8	20·2	18·8	51
52	293	147	97·8	73·3	58·7	48·9	41·9	36·7	32·6	29·3	26·7	24·4	22·5	20·9	19·5	52
53	304	152	101	76·0	60·8	50·7	43·4	38·0	33·8	30·4	27·6	25·3	23·4	21·7	20·3	53
54	315	158	105	78·9	63·1	52·6	45·1	39·4	35·0	31·5	28·7	26·3	24·2	22·5	21·0	54
55	327	164	109	81·8	65·5	54·5	46·7	40·9	36·4	32·7	29·7	27·3	25·2	23·4	21·8	55
56	340	170	113	84·9	67·9	56·6	48·5	42·5	37·7	34·0	30·9	28·3	26·1	24·2	22·6	56
57	353	176	118	88·2	70·6	58·8	50·4	44·1	39·2	35·3	32·1	29·4	27·1	25·2	23·5	57
58	367	183	122	91·7	73·3	61·1	52·4	45·8	40·7	36·7	33·3	30·5	28·2	26·2	24·4	58
59	381	191	127	95·4	76·3	63·6	54·5	47·7	42·4	38·1	34·7	31·8	29·3	27·2	25·4	59
60	397	198	132	99·2	79·4	66·1	56·7	49·6	44·1	39·7	36·1	33·0	30·5	28·3	26·4	60
Lat.	179° 45′	179° 30′	179° 15′	179° 00′	178° 45′	178° 30′	178° 15′	178° 00′	177° 45′	177° 30′	177° 15′	177° 00′	176° 45′	176° 30′	176° 15′	Lat.
	180° 15′	180° 30′	180° 45′	181° 00′	181° 15′	181° 30′	181° 45′	182° 00′	182° 15′	182° 30′	182° 45′	183° 00′	183° 15′	183° 30′	183° 45′	

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A

HOUR ANGLE

TABLE B HOUR ANGLE

Dec °	0° 15′	0° 30′	0° 45′	1° 00′	1° 15′	1° 30′	1° 45′	2° 00′	2° 15′	2° 30′	2° 45′	3° 00′	3° 15′	3° 30′	3° 45′	Dec °
	359° 45′	359° 30′	359° 15′	359° 00′	358° 45′	358° 30′	358° 15′	358° 00′	357° 45′	357° 30′	357° 15′	357° 00′	356° 45′	356° 30′	356° 15′	
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	4·00	2·00	1·33	1·00	·80	·67	·57	·50	·45	·40	·36	·33	·31	·29	·27	1
2	8·00	4·00	2·67	2·00	1·60	1·33	1·14	1·00	·89	·80	·73	·67	·62	·57	·53	2
3	12·0	6·01	4·00	3·00	2·40	2·00	1·72	1·50	1·34	1·20	1·09	1·00	·92	·86	·80	3
4	16·0	8·01	5·34	4·01	3·21	2·67	2·29	2·00	1·78	1·60	1·46	1·34	1·23	1·15	1·07	4
5	20·1	10·0	6·68	5·01	4·01	3·34	2·87	2·51	2·23	2·01	1·82	1·67	1·54	1·43	1·34	5
6	24·1	12·0	8·03	6·02	4·82	4·02	3·44	3·01	2·68	2·41	2·19	2·01	1·85	1·72	1·61	6
7	28·1	14·1	9·38	7·04	5·63	4·69	4·02	3·52	3·13	2·81	2·56	2·35	2·17	2·01	1·88	7
8	32·2	16·1	10·7	8·05	6·44	5·37	4·60	4·03	3·58	3·22	2·93	2·69	2·48	2·30	2·15	8
9	36·3	18·1	12·1	9·08	7·26	6·05	5·19	4·54	4·03	3·63	3·30	3·03	2·79	2·59	2·42	9
10	40·4	20·2	13·5	10·1	8·08	6·74	5·77	5·05	4·49	4·04	3·68	3·37	3·11	2·89	2·70	10
11	44·5	22·3	14·9	11·1	8·91	7·43	6·37	5·57	4·95	4·46	4·05	3·71	3·43	3·18	2·97	11
12	48·7	24·4	16·2	12·2	9·74	8·12	6·96	6·09	5·41	4·87	4·43	4·06	3·75	3·48	3·25	12
13	52·9	26·5	17·6	13·2	10·6	8·82	7·56	6·62	5·88	5·29	4·81	4·41	4·07	3·78	3·53	13
14	57·1	28·6	19·1	14·3	11·4	9·53	8·16	7·14	6·35	5·72	5·20	4·76	4·40	4·08	3·81	14
15	61·4	30·7	20·5	15·4	12·3	10·2	8·77	7·68	6·83	6·14	5·58	5·12	4·73	4·39	4·10	15
16	65·7	32·9	21·9	16·4	13·1	11·0	9·39	8·22	7·30	6·57	5·98	5·48	5·06	4·70	4·38	16
17	70·1	35·0	23·4	17·5	14·0	11·7	10·0	8·76	7·79	7·01	6·37	5·84	5·39	5·01	4·67	17
18	74·5	37·2	24·8	18·6	14·9	12·4	10·6	9·31	8·28	7·45	6·77	6·21	5·73	5·32	4·97	18
19	78·9	39·5	26·3	19·7	15·8	13·2	11·3	9·87	8·77	7·89	7·18	6·58	6·07	5·64	5·26	19
20	83·4	41·7	27·8	20·9	16·7	13·9	11·9	10·4	9·27	8·34	7·59	6·95	6·42	5·96	5·57	20
21	88·0	44·0	29·3	22·0	17·6	14·7	12·6	11·0	9·78	8·80	8·00	7·33	6·77	6·29	5·87	21
22	92·6	46·3	30·9	23·2	18·5	15·4	13·2	11·6	10·3	9·26	8·42	7·72	7·13	6·62	6·18	22
23	97·3	48·6	32·4	24·3	19·5	16·2	13·9	12·2	10·8	9·73	8·85	8·11	7·49	6·95	6·49	23
24	102	51·0	34·0	25·5	20·4	17·0	14·6	12·8	11·3	10·2	9·28	8·51	7·85	7·29	6·81	24
25	107	53·4	35·6	26·7	21·4	17·8	15·3	13·4	11·9	10·7	9·72	8·91	8·23	7·64	7·13	25
26	112	55·9	37·3	27·9	22·4	18·6	16·0	14·0	12·4	11·2	10·2	9·32	8·60	7·99	7·46	26
27	117	58·4	38·9	29·2	23·4	19·5	16·7	14·6	13·0	11·7	10·6	9·74	8·99	8·35	7·79	27
28	122	60·9	40·6	30·5	24·4	20·3	17·4	15·2	13·5	12·2	11·1	10·2	9·38	8·71	8·13	28
29	127	63·5	42·4	31·8	25·4	21·2	18·2	15·9	14·1	12·7	11·6	10·6	9·78	9·08	8·48	29
30	132	66·2	44·1	33·1	26·5	22·1	18·9	16·5	14·7	13·2	12·0	11·0	10·2	9·46	8·83	30
31	138	68·9	45·9	34·4	27·5	23·0	19·7	17·2	15·3	13·8	12·5	11·5	10·6	9·84	9·19	31
32	143	71·6	47·7	35·8	28·6	23·9	20·5	17·9	15·9	14·3	13·0	11·9	11·0	10·2	9·55	32
33	149	74·4	49·6	37·2	29·8	24·8	21·3	18·6	16·5	14·9	13·5	12·4	11·5	10·6	9·93	33
34	155	77·3	51·5	38·6	30·9	25·8	22·1	19·3	17·2	15·5	14·1	12·9	11·9	11·0	10·3	34
35	160	80·2	53·5	40·1	32·1	26·7	22·9	20·1	17·8	16·1	14·6	13·4	12·4	11·5	10·7	35
36	167	83·3	55·5	41·6	33·3	27·8	23·8	20·8	18·5	16·7	15·1	13·9	12·8	11·9	11·1	36
37	173	86·4	57·6	43·2	34·5	28·8	24·7	21·6	19·2	17·3	15·7	14·4	13·3	12·3	11·5	37
38	179	89·5	59·7	44·8	35·8	29·8	25·6	22·4	19·9	17·9	16·3	14·9	13·8	12·8	12·0	38
39	186	92·8	61·9	46·4	37·1	30·9	26·5	23·2	20·6	18·6	16·9	15·5	14·3	13·3	12·4	39
40	192	96·2	64·1	48·1	38·5	32·1	27·5	24·0	21·4	19·2	17·5	16·0	14·8	13·7	12·8	40
41	199	99·6	66·4	49·8	39·9	33·2	28·5	24·9	22·1	19·9	18·1	16·6	15·3	14·2	13·3	41
42	206	103	68·8	51·6	41·3	34·4	29·5	25·8	22·9	20·6	18·8	17·2	15·9	14·7	13·8	42
43	214	107	71·2	53·4	42·8	35·6	30·5	26·7	23·8	21·4	19·4	17·8	16·5	15·3	14·3	43
44	221	111	73·8	55·3	44·3	36·9	31·6	27·7	24·6	22·1	20·1	18·5	17·0	15·8	14·8	44
45	229	115	76·4	57·3	45·8	38·2	32·8	28·7	25·5	22·9	20·8	19·1	17·6	16·4	15·3	45
46	237	119	79·1	59·3	47·5	39·6	33·9	29·7	26·4	23·7	21·6	19·8	18·3	17·0	15·8	46
47	246	123	81·9	61·4	49·2	41·0	35·1	30·7	27·3	24·6	22·4	20·5	18·9	17·6	16·4	47
48	255	127	84·9	63·6	50·9	42·4	36·4	31·8	28·3	25·5	23·2	21·2	19·6	18·2	17·0	48
49	264	132	87·9	65·9	52·7	43·9	37·7	33·0	29·3	26·4	24·0	22·0	20·3	18·8	17·6	49
50	273	137	91·1	68·3	54·6	45·5	39·0	34·1	30·4	27·3	24·8	22·8	21·0	19·5	18·2	50
51	283	142	94·3	70·8	56·6	47·2	40·4	35·4	31·5	28·3	25·7	23·6	21·8	20·2	18·9	51
52	293	147	97·8	73·3	58·7	48·9	41·9	36·7	32·6	29·3	26·7	24·5	22·6	21·0	19·6	52
53	304	152	101	76·0	60·8	50·7	43·5	38·0	33·8	30·4	27·7	25·4	23·4	21·7	20·3	53
54	315	158	105	78·9	63·1	52·6	45·1	39·4	35·1	31·6	28·7	26·3	24·3	22·5	21·0	54
55	327	164	109	81·8	65·5	54·6	46·8	40·9	36·4	32·7	29·8	27·3	25·2	23·4	21·8	55
56	340	170	113	84·9	68·0	56·6	48·6	42·5	37·8	34·0	30·9	28·3	26·2	24·3	22·7	56
57	353	176	118	88·2	70·6	58·8	50·4	44·1	39·2	35·3	32·1	29·4	27·2	25·2	23·5	57
58	367	183	122	91·7	73·4	61·1	52·4	45·9	40·8	36·7	33·4	30·6	28·2	26·2	24·5	58
59	381	191	127	95·4	76·3	63·6	54·5	47·7	42·4	38·2	34·7	31·8	29·4	27·3	25·5	59
60	397	198	132	99·2	79·4	66·2	56·7	49·6	44·1	39·7	36·1	33·1	30·6	28·4	26·5	60
Dec	179° 45′	179° 30′	179° 15′	179° 00′	178° 45′	178° 30′	178° 15′	178° 00′	177° 45′	177° 30′	177° 15′	177° 00′	176° 45′	176° 30′	176° 15′	Dec.
	180° 15′	180° 30′	180° 45′	181° 00′	181° 15′	181° 30′	181° 45′	182° 00′	182° 15′	182° 30′	182° 45′	183° 00′	183° 15′	183° 30′	183° 45′	

HOUR ANGLE

B - Always named the **same** as Declination

B - Always named the **same** as Declination

B

TABLE A HOUR ANGLE

Lat.	3° 45′ 356° 15′	4° 00′ 356° 00′	4° 15′ 355° 45′	4° 30′ 355° 30′	4° 45′ 355° 15′	5° 00′ 355° 00′	5° 15′ 354° 45′	5° 30′ 354° 30′	5° 45′ 354° 15′	6° 00′ 354° 00′	6° 15′ 353° 45′	6° 30′ 353° 30′	6° 45′ 353° 15′	7° 00′ 353° 00′	7° 15′ 352° 45′	7° 30′ 352° 30′	Lat.
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·27	·25	·23	·22	·21	·20	·19	·18	·17	·17	·16	·15	·15	·14	·14	·13	1
2	·53	·50	·47	·44	·42	·40	·38	·36	·35	·33	·32	·31	·30	·28	·27	·27	2
3	·80	·75	·71	·67	·63	·60	·57	·54	·52	·50	·48	·46	·44	·43	·41	40	3
4	1·07	1·00	·94	·89	·84	·80	·76	·73	·69	·67	·64	·61	·59	·57	·55	·53	4
5	1·33	1·25	1·18	1·11	1·05	1·00	·95	·91	·87	·83	·80	·77	·74	·71	·69	66	5
6	1·60	1·50	1·41	1·34	1·26	1·20	1·14	1·09	1·04	1·00	·96	·92	·89	·86	·83	·80	6
7	1·87	1·76	1·65	1·56	1·48	1·40	1·34	1·28	1·22	1·17	1·12	1·08	1·04	1·00	·97	·93	7
8	2·14	2·01	1·89	1·79	1·69	1·61	1·53	1·46	1·40	1·34	1·28	1·23	1·19	1·14	1·10	1·07	8
9	2·42	2·27	2·13	2·01	1·91	1·81	1·72	1·65	1·57	1·51	1·45	1·39	1·34	1·29	1·25	1·20	9
10	2·69	2·52	2·37	2·24	2·12	2·02	1·92	1·83	1·75	1·68	1·61	1·55	1·49	1·44	1·39	1·34	10
11	2·97	2·78	2·62	2·47	2·34	2·22	2·12	2·02	1·93	1·85	1·77	1·71	1·64	1·58	1·53	1·48	11
12	3·24	3·04	2·86	2·70	2·56	2·43	2·31	2·21	2·11	2·02	1·94	1·87	1·80	1·73	1·67	1·61	12
13	3·52	3·30	3·11	2·93	2·78	2·64	2·51	2·40	2·29	2·20	2·11	2·03	1·95	1·88	1·81	1·75	13
14	3·80	3·57	3·35	3·17	3·00	2·85	2·71	2·59	2·48	2·37	2·28	2·19	2·11	2·03	1·96	1·89	14
15	4·09	3·83	3·61	3·40	3·22	3·06	2·92	2·78	2·66	2·55	2·45	2·35	2·26	2·18	2·11	2·04	15
16	4·37	4·10	3·86	3·64	3·45	3·28	3·12	2·98	2·85	2·73	2·62	2·52	2·42	2·34	2·25	2·18	16
17	4·66	4·37	4·11	3·88	3·68	3·49	3·33	3·18	3·04	2·91	2·79	2·68	2·58	2·49	2·40	2·32	17
18	4·96	4·65	4·37	4·13	3·91	3·71	3·54	3·38	3·23	3·09	2·97	2·85	2·75	2·65	2·55	2·47	18
19	5·25	4·92	4·63	4·38	4·14	3·94	3·75	3·58	3·42	3·28	3·14	3·02	2·91	2·80	2·71	2·62	19
20	5·55	5·21	4·90	4·62	4·38	4·16	3·96	3·78	3·61	3·46	3·32	3·19	3·08	2·96	2·86	2·76	20
21	5·86	5·49	5·17	4·88	4·62	4·39	4·18	3·99	3·81	3·65	3·51	3·37	3·24	3·13	3·02	2·92	21
22	6·16	5·78	5·44	5·13	4·86	4·62	4·40	4·20	4·01	3·84	3·69	3·55	3·41	3·29	3·18	3·07	22
23	6·48	6·07	5·71	5·39	5·11	4·85	4·62	4·41	4·22	4·04	3·88	3·73	3·59	3·46	3·34	3·22	23
24	6·79	6·37	5·99	5·66	5·36	5·09	4·85	4·62	4·42	4·24	4·07	3·91	3·76	3·63	3·50	3·38	24
25	7·11	6·67	6·27	5·92	5·61	5·33	5·08	4·84	4·63	4·44	4·26	4·09	3·94	3·80	3·67	3·54	25
26	7·44	6·98	6·56	6·20	5·87	5·57	5·31	5·07	4·84	4·64	4·45	4·28	4·12	3·97	3·83	3·70	26
27	7·77	7·29	6·86	6·47	6·13	5·82	5·55	5·29	5·06	4·85	4·65	4·47	4·30	4·15	4·01	3·87	27
28	8·11	7·60	7·15	6·76	6·40	6·08	5·79	5·52	5·28	5·06	4·85	4·67	4·49	4·33	4·18	4·04	28
29	8·46	7·93	7·46	7·04	6·67	6·34	6·03	5·76	5·50	5·27	5·06	4·87	4·68	4·52	4·36	4·21	29
30	8·81	8·26	7·77	7·34	6·95	6·60	6·28	6·00	5·73	5·49	5·27	5·07	4·88	4·70	4·54	4·39	30
31	9·17	8·59	8·09	7·63	7·23	6·87	6·54	6·24	5·97	5·72	5·49	5·27	5·08	4·89	4·72	4·56	31
32	9·53	8·94	8·41	7·94	7·52	7·14	6·80	6·49	6·21	5·95	5·71	5·48	5·28	5·09	4·91	4·75	32
33	9·91	9·29	8·74	8·25	7·82	7·42	7·07	6·74	6·45	6·18	5·93	5·70	5·49	5·29	5·10	4·93	33
34	10·3	9·65	9·08	8·57	8·12	7·71	7·34	7·01	6·70	6·42	6·16	5·92	5·70	5·49	5·30	5·12	34
35	10·7	10·0	9·42	8·90	8·43	8·00	7·62	7·27	6·95	6·66	6·39	6·15	5·92	5·70	5·50	5·32	35
36	11·1	10·4	9·78	9·23	8·74	8·30	7·91	7·55	7·22	6·91	6·63	6·38	6·14	5·92	5·71	5·52	36
37	11·5	10·8	10·1	9·57	9·07	8·61	8·20	7·83	7·48	7·17	6·88	6·61	6·37	6·14	5·92	5·72	37
38	11·9	11·2	10·5	9·93	9·40	8·93	8·50	8·11	7·76	7·43	7·13	6·86	6·60	6·36	6·14	5·93	38
39	12·4	11·6	10·9	10·3	9·75	9·26	8·81	8·41	8·04	7·70	7·39	7·11	6·84	6·60	6·37	6·15	39
40	12·8	12·0	11·3	10·7	10·1	9·59	9·13	8·71	8·33	7·98	7·66	7·36	7·09	6·83	6·60	6·37	40
41	13·3	12·4	11·7	11·0	10·5	9·94	9·46	9·03	8·63	8·27	7·94	7·63	7·34	7·08	6·83	6·60	41
42	13·7	12·9	12·1	11·4	10·8	10·3	9·80	9·35	8·94	8·57	8·22	7·90	7·61	7·33	7·08	6·84	42
43	14·2	13·3	12·5	11·8	11·2	10·7	10·1	9·68	9·26	8·87	8·51	8·18	7·88	7·59	7·33	7·08	43
44	14·7	13·8	13·0	12·3	11·6	11·0	10·5	10·0	9·59	9·19	8·82	8·48	8·16	7·86	7·59	7·34	44
45	15·3	14·3	13·5	12·7	12·0	11·4	10·9	10·4	9·93	9·51	9·13	8·78	8·45	8·14	7·86	7·60	45
46	15·8	14·8	13·9	13·2	12·5	11·8	11·3	10·8	10·3	9·85	9·46	9·09	8·75	8·43	8·14	7·87	46
47	16·4	15·3	14·4	13·6	12·9	12·3	11·7	11·1	10·6	10·2	9·79	9·41	9·06	8·73	8·43	8·15	47
48	16·9	15·9	14·9	14·1	13·4	12·7	12·1	11·5	11·0	10·6	10·1	9·75	9·38	9·05	8·73	8·44	48
49	17·6	16·5	15·5	14·6	13·8	13·1	12·5	11·9	11·4	10·9	10·5	10·1	9·72	9·37	9·04	8·74	49
50	18·2	17·0	16·0	15·1	14·3	13·6	13·0	12·4	11·8	11·3	10·9	10·5	10·1	9·71	9·37	9·05	50
51	18·8	17·7	16·6	15·7	14·9	14·1	13·4	12·8	12·3	11·7	11·3	10·8	10·4	10·1	9·71	9·38	51
52	19·5	18·3	17·2	16·3	15·4	14·6	13·9	13·3	12·7	12·2	11·7	11·2	10·8	10·4	10·1	9·72	52
53	20·2	19·0	17·9	16·9	16·0	15·2	14·4	13·8	13·2	12·6	12·1	11·6	11·2	10·8	10·4	10·1	53
54	21·0	19·7	18·5	17·5	16·6	15·7	15·0	14·3	13·7	13·1	12·6	12·1	11·6	11·2	10·8	10·5	54
55	21·8	20·4	19·2	18·1	17·2	16·3	15·5	14·8	14·2	13·6	13·0	12·5	12·1	11·6	11·2	10·8	55
56	22·6	21·2	20·0	18·8	17·8	16·9	16·1	15·4	14·7	14·1	13·5	13·0	12·5	12·1	11·7	11·3	56
57	23·5	22·0	20·7	19·6	18·5	17·6	16·8	16·0	15·3	14·7	14·1	13·5	13·0	12·5	12·1	11·7	57
58	24·4	22·9	21·5	20·3	19·3	18·3	17·4	16·6	15·9	15·2	14·6	14·0	13·5	13·0	12·6	12·2	58
59	25·4	23·8	22·4	21·1	20·0	19·0	18·1	17·3	16·5	15·8	15·2	14·6	14·1	13·6	13·1	12·6	59
60	26·4	24·8	23·3	22·0	20·8	19·8	18·8	18·0	17·2	16·5	15·8	15·2	14·6	14·1	13·6	13·2	60
Lat.	176° 15′ 183° 45′	176° 00′ 184° 00′	175° 45′ 184° 15′	175° 30′ 184° 30′	175° 15′ 184° 45′	175° 00′ 185° 00′	174° 45′ 185° 15′	174° 30′ 185° 30′	174° 15′ 185° 45′	174° 00′ 186° 00′	173° 45′ 186° 15′	173° 30′ 186° 30′	173° 15′ 186° 45′	173° 00′ 187° 00′	172° 45′ 187° 15′	172° 30′ 187° 30′	Lat.

HOUR ANGLE

A

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

TABLE B HOUR ANGLE

Dec °	3° 45′ 356° 15′	4° 00′ 356° 00′	4° 15′ 355° 45′	4° 30′ 355° 30′	4° 45′ 355° 15′	5° 00′ 355° 00′	5° 15′ 354° 45′	5° 30′ 354° 30′	5° 45′ 354° 15′	6° 00′ 354° 00′	6° 15′ 353° 45′	6° 30′ 353° 30′	6° 45′ 353° 15′	7° 00′ 353° 00′	7° 15′ 352° 45′	7° 30 352° 30′	Dec °
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·27	·25	·24	·22	·21	·20	·19	·18	·17	·17	·16	·15	·15	·14	·14	·13	1
2	·53	·50	·47	·45	·42	·40	·38	·36	·35	·33	·32	·31	·30	·29	·28	·27	2
3	·80	·75	·71	·67	·63	·60	·57	·55	·52	·50	·48	·46	·45	·43	·42	·40	3
4	1·07	1·00	·94	·89	·84	·80	·76	·73	·70	·67	·64	·62	·60	·57	·55	·54	4
5	1·34	1·25	1·18	1·12	1·06	1·00	·96	·91	·87	·84	·80	·77	·74	·72	·69	·67	5
6	1·61	1·51	1·42	1·34	1·27	1·21	1·15	1·10	1·05	1·01	·97	·93	·89	·86	·83	·81	6
7	1·88	1·76	1·66	1·56	1·48	1·41	1·34	1·28	1·23	1·17	1·13	1·08	1·04	1·01	·97	·94	7
8	2·15	2·01	1·90	1·79	1·70	1·61	1·54	1·47	1·40	1·34	1·29	1·24	1·20	1·15	1·11	1·08	8
9	2·42	2·27	2·14	2·02	1·91	1·82	1·73	1·65	1·58	1·52	1·45	1·40	1·35	1·30	1·26	1·21	9
10	2·70	2·53	2·38	2·25	2·13	2·02	1·93	1·84	1·76	1·69	1·62	1·56	1·50	1·45	1·40	1·35	10
11	2·97	2·79	2·62	2·48	2·35	2·23	2·12	2·03	1·94	1·86	1·79	1·72	1·65	1·59	1·54	1·49	11
12	3·25	3·05	2·87	2·71	2·57	2·44	2·32	2·22	2·12	2·03	1·95	1·88	1·81	1·74	1·68	1·63	12
13	3·53	3·31	3·12	2·94	2·79	2·65	2·52	2·41	2·30	2·21	2·12	2·04	1·96	1·89	1·83	1·77	13
14	3·81	3·57	3·36	3·18	3·01	2·86	2·72	2·60	2·49	2·39	2·29	2·20	2·12	2·05	1·98	1·91	14
15	4·10	3·84	3·62	3·41	3·24	3·07	2·93	2·80	2·67	2·56	2·46	2·37	2·28	2·20	2·12	2·05	15
16	4·38	4·11	3·87	3·65	3·46	3·29	3·13	2·99	2·86	2·74	2·63	2·53	2·44	2·35	2·27	2·20	16
17	4·67	4·38	4·13	3·90	3·69	3·51	3·34	3·19	3·05	2·92	2·81	2·70	2·60	2·51	2·42	2·34	17
18	4·97	4·66	4·38	4·14	3·92	3·73	3·55	3·39	3·24	3·11	2·98	2·87	2·76	2·67	2·57	2·49	18
19	5·26	4·94	4·65	4·39	4·16	3·95	3·76	3·59	3·44	3·29	3·16	3·04	2·93	2·83	2·73	2·64	19
20	5·57	5·22	4·91	4·64	4·40	4·18	3·98	3·80	3·63	3·48	3·34	3·22	3·10	2·99	2·88	2·79	20
21	5·87	5·50	5·18	4·89	4·64	4·40	4·20	4·01	3·83	3·67	3·53	3·39	3·27	3·15	3·04	2·94	21
22	6·18	5·79	5·45	5·15	4·88	4·64	4·42	4·22	4·03	3·87	3·71	3·57	3·44	3·32	3·20	3·10	22
23	6·49	6·09	5·73	5·41	5·13	4·87	4·64	4·43	4·24	4·06	3·90	3·75	3·61	3·48	3·36	3·25	23
24	6·81	6·38	6·01	5·67	5·38	5·11	4·87	4·65	4·44	4·26	4·09	3·93	3·79	3·65	3·53	3·41	24
25	7·13	6·68	6·29	5·94	5·63	5·35	5·10	4·87	4·65	4·46	4·28	4·12	3·97	3·83	3·70	3·57	25
26	7·46	6·99	6·58	6·22	5·89	5·60	5·33	5·09	4·87	4·67	4·48	4·31	4·15	4·00	3·86	3·74	26
27	7·79	7·30	6·88	6·49	6·15	5·85	5·57	5·32	5·09	4·87	4·68	4·50	4·34	4·18	4·04	3·90	27
28	8·13	7·62	7·17	6·78	6·42	6·10	5·81	5·55	5·31	5·09	4·88	4·70	4·52	4·36	4·21	4·07	28
29	8·48	7·95	7·48	7·06	6·69	6·36	6·06	5·78	5·53	5·30	5·09	4·90	4·72	4·55	4·39	4·25	29
30	8·83	8·28	7·79	7·36	6·97	6·62	6·31	6·02	5·76	5·52	5·30	5·10	4·91	4·74	4·57	4·42	30
31	9·19	8·61	8·11	7·66	7·26	6·89	6·57	6·27	6·00	5·75	5·52	5·31	5·11	4·93	4·76	4·60	31
32	9·55	8·96	8·43	7·96	7·55	7·17	6·83	6·52	6·24	5·98	5·74	5·52	5·32	5·13	4·95	4·79	32
33	9·93	9·31	8·76	8·28	7·84	7·45	7·10	6·78	6·48	6·21	5·97	5·74	5·53	5·33	5·15	4·98	33
34	10·3	9·67	9·10	8·60	8·15	7·74	7·37	7·04	6·73	6·45	6·20	5·96	5·74	5·54	5·34	5·17	34
35	10·7	10·0	9·45	8·92	8·46	8·03	7·65	7·31	6·99	6·70	6·43	6·19	5·96	5·75	5·55	5·36	35
36	11·1	10·4	9·80	9·26	8·77	8·34	7·94	7·58	7·25	6·95	6·67	6·42	6·18	5·96	5·76	5·57	36
37	11·5	10·8	10·2	9·60	9·10	8·65	8·24	7·86	7·52	7·21	6·92	6·66	6·41	6·18	5·97	5·77	37
38	11·9	11·2	10·5	9·96	9·43	8·96	8·54	8·15	7·80	7·47	7·18	6·90	6·65	6·41	6·19	5·99	38
39	12·4	11·6	10·9	10·3	9·78	9·29	8·85	8·45	8·08	7·75	7·44	7·15	6·89	6·65	6·42	6·20	39
40	12·8	12·0	11·3	10·7	10·1	9·63	9·17	8·75	8·38	8·03	7·71	7·41	7·14	6·89	6·65	6·43	40
41	13·3	12·5	11·7	11·1	10·5	9·97	9·50	9·07	8·68	8·32	7·98	7·68	7·40	7·13	6·89	6·66	41
42	13·8	12·9	12·1	11·5	10·9	10·3	9·84	9·39	8·99	8·61	8·27	7·95	7·66	7·39	7·13	6·90	42
43	14·3	13·4	12·6	11·9	11·3	10·7	10·2	9·73	9·31	8·92	8·57	8·24	7·93	7·65	7·39	7·14	43
44	14·8	13·8	13·0	12·3	11·7	11·1	10·6	10·1	9·64	9·24	8·87	8·53	8·22	7·92	7·65	7·40	44
45	15·3	14·3	13·5	12·7	12·1	11·5	10·9	10·4	9·98	9·57	9·19	8·83	8·51	8·21	7·92	7·66	45
46	15·8	14·8	14·0	13·2	12·5	11·9	11·3	10·8	10·3	9·91	9·51	9·15	8·81	8·50	8·21	7·93	46
47	16·4	15·4	14·5	13·7	13·0	12·3	11·7	11·2	10·7	10·3	9·85	9·47	9·12	8·80	8·50	8·22	47
48	17·0	15·9	15·0	14·2	13·4	12·7	12·1	11·6	11·1	10·6	10·2	9·81	9·45	9·11	8·80	8·51	48
49	17·6	16·5	15·5	14·7	13·9	13·2	12·6	12·0	11·5	11·0	10·6	10·2	9·79	9·44	9·12	8·81	49
50	18·2	17·1	16·1	15·2	14·4	13·7	13·0	12·4	11·9	11·4	10·9	10·5	10·1	9·78	9·44	9·13	50
51	18·9	17·7	16·7	15·7	14·9	14·2	13·5	12·9	12·3	11·8	11·3	10·9	10·5	10·1	9·79	9·46	51
52	19·6	18·3	17·3	16·3	15·5	14·7	14·0	13·4	12·8	12·2	11·8	11·3	10·9	10·5	10·1	9·81	52
53	20·3	19·0	17·9	16·9	16·0	15·2	14·5	13·8	13·2	12·7	12·2	11·7	11·3	10·9	10·5	10·2	53
54	21·0	19·7	18·6	17·5	16·6	15·8	15·0	14·4	13·7	13·2	12·6	12·2	11·7	11·3	10·9	10·5	54
55	21·8	20·5	19·3	18·2	17·2	16·4	15·6	14·9	14·3	13·7	13·1	12·6	12·2	11·7	11·3	10·9	55
56	22·7	21·3	20·0	18·9	17·9	17·0	16·2	15·5	14·8	14·2	13·6	13·1	12·6	12·2	11·7	11·4	56
57	23·5	22·1	20·8	19·6	18·6	17·7	16·8	16·1	15·4	14·7	14·1	13·6	13·1	12·6	12·2	11·8	57
58	24·5	22·9	21·6	20·4	19·3	18·4	17·5	16·7	16·0	15·3	14·7	14·1	13·6	13·1	12·7	12·3	58
59	25·4	23·9	22·5	21·2	20·1	19·1	18·2	17·4	16·6	15·9	15·3	14·7	14·2	13·7	13·2	12·8	59
60	26·5	24·8	23·4	22·1	20·9	19·9	18·9	18·1	17·3	16·6	15·9	15·3	14·7	14·2	13·7	13·3	60
Dec.	176° 15′ 183° 45′	176° 00′ 184° 00′	175° 45′ 184° 15′	175° 30′ 184° 30′	175° 15′ 184° 45′	175° 00′ 185° 00′	174° 45′ 185° 15′	174° 30′ 185° 30′	174° 15′ 185° 45′	174° 00′ 186° 00′	173° 45′ 186° 15′	173° 30′ 186° 30′	173° 15′ 186° 45′	173° 00′ 187° 00′	172° 45′ 187° 15′	172° 30′ 187° 30′	Dec.

HOUR ANGLE

B - Always named the **same** as Declination

B - Always named the **same** as Declination

B

TABLE A HOUR ANGLE

Lat °	7° 30′	7° 45′	8° 00′	8° 15′	8° 30′	8° 45′	9° 00′	9° 15′	9° 30′	9° 45′	10° 00′	10° 15′	10° 30′	10° 45′	11° 00′	11° 15′	Lat °
	352° 30′	352° 15′	352° 00′	351° 45′	351° 30′	351° 15′	351° 00′	350° 45′	350° 30′	350° 15′	350° 00′	349° 45′	349° 30′	349° 15′	349° 00′	348° 45′	
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·13	·13	·12	·12	·12	·11	·11	·11	·10	·10	·10	·10	·09	·09	·09	·09	1
2	·27	·26	·25	·24	·23	·23	·22	·21	·21	·20	·20	·19	·19	·18	·18	·18	2
3	·40	·39	·37	·36	·35	·34	·33	·32	·31	·30	·30	·29	·28	·28	·27	·26	3
4	·53	·51	·50	·48	·47	·45	·44	·43	·42	·41	·40	·39	·38	·37	·36	·35	4
5	·66	·64	·62	·60	·59	·57	55	·54	·52	·51	·50	·48	·47	·46	·45	·44	5
6	·80	·77	·75	·72	·70	·68	·66	·65	·63	·61	·60	·58	·57	·55	·54	·53	6
7	·93	·90	·87	·85	·82	·80	·78	·75	·73	·72	·70	·68	·66	·65	·63	·62	7
8	1·07	1·03	1·00	·97	·94	·91	·89	·86	·84	·82	·80	·78	·76	·74	·72	·71	8
9	1·20	1·16	1·13	1·09	1·06	1·03	1·00	·97	·95	·92	·90	·88	·85	·83	·81	·80	9
10	1·34	1·30	1·25	1·22	1·18	1·15	1·11	1·08	1·05	1·03	1·00	·98	·95	·93	·91	·89	10
11	1·48	1·43	1·38	1·34	1·30	1·26	1·23	1·19	1·16	1·13	1·10	1·07	1·05	1·02	1·00	·98	11
12	1·61	1·56	1·51	1·47	1·42	1·38	1·34	1·31	1·27	1·24	1·21	1·18	1·15	1·12	1·09	1·07	12
13	1·75	1·70	1·64	1·59	1·54	1·50	1·46	1·42	1·38	1·34	1·31	1·28	1·25	1·22	1·19	1·16	13
14	1·89	1·83	1·77	1·72	1·67	1·62	1·57	1·53	1·49	1·45	1·41	1·38	1·35	1·31	1·28	1·25	14
15	2·04	1·97	1·91	1·85	1·79	1·74	1·69	1·64	1·60	1·56	1·52	1·48	1·45	1·41	1·38	1·35	15
16	2·18	2·11	2·04	1·98	1·92	1·86	1·81	1·76	1·71	1·67	1·63	1·59	1·55	1·51	1·48	1·44	16
17	2·32	2·25	2·18	2·11	2·05	1·99	1·93	1·88	1·83	1·78	1·73	1·69	1·65	1·61	1·57	1·54	17
18	2·47	2·39	2·31	2·24	2·17	2·11	2·05	2·00	1·94	1·89	1·84	1·80	1·75	1·71	1·67	1·63	18
19	2·62	2·53	2·45	2·37	2·30	2·24	2·17	2·11	2·06	2·00	1·95	1·90	1·86	1·81	1·77	1·73	19
20	2·76	2·67	2·59	2·51	2·44	2·36	2·30	2·23	2·18	2·12	2·06	2·01	1·96	1·92	1·87	1·83	20
21	2·92	2·82	2·73	2·65	2·57	2·49	2·42	2·36	2·29	2·23	2·18	2·12	2·07	2·02	1·97	1·93	21
22	3·07	2·97	2·87	2·79	2·70	2·63	2·55	2·48	2·41	2·35	2·29	2·23	2·18	2·13	2·08	2·03	22
23	3·22	3·12	3·02	2·93	2·84	2·76	2·68	2·61	2·54	2·47	2·41	2·35	2·29	2·24	2·18	2·13	23
24	3·38	3·27	3·17	3·07	2·98	2·89	2·81	2·73	2·66	2·59	2·53	2·46	2·40	2·35	2·29	2·24	24
25	3·54	3·43	3·32	3·22	3·12	3·03	2·94	2·86	2·79	2·71	2·64	2·58	2·52	2·46	2·40	2·34	25
26	3·70	3·58	3·47	3·36	3·26	3·17	3·08	2·99	2·91	2·84	2·77	2·70	2·63	2·57	2·51	2·45	26
27	3·87	3·74	3·63	3·51	3·41	3·31	3·22	3·13	3·04	2·97	2·89	2·82	2·75	2·68	2·62	2·56	27
28	4·04	3·91	3·78	3·67	3·56	3·45	3·36	3·26	3·18	3·09	3·02	2·94	2·87	2·80	2·74	2·67	28
29	4·21	4·07	3·94	3·82	3·71	3·60	3·50	3·40	3·31	3·23	3·14	3·07	2·99	2·92	2·85	2·79	29
30	4·39	4·24	4·11	3·98	3·86	3·75	3·65	3·55	3·45	3·36	3·27	3·19	3·12	3·04	2·97	2·90	30
31	4·56	4·42	4·28	4·14	4·02	3·90	3·79	3·69	3·59	3·50	3·41	3·32	3·24	3·16	3·09	3·02	31
32	4·75	4·59	4·45	4·31	4·18	4·06	3·95	3·84	3·73	3·64	3·54	3·46	3·37	3·29	3·21	3·14	32
33	4·93	4·77	4·62	4·48	4·35	4·22	4·10	3·99	3·88	3·78	3·68	3·59	3·50	3·42	3·34	3·26	33
34	5·12	4·96	4·80	4·65	4·51	4·38	4·26	4·14	4·03	3·93	3·83	3·73	3·64	3·55	3·47	3·39	34
35	5·32	5·15	4·98	4·83	4·69	4·55	4·42	4·30	4·18	4·08	3·97	3·87	3·78	3·69	3·60	3·52	35
36	5·52	5·34	5·17	5·01	4·86	4·72	4·59	4·46	4·34	4·23	4·12	4·02	3·92	3·83	3·74	3·65	36
37	5·72	5·54	5·36	5·20	5·04	4·90	4·76	4·63	4·50	4·39	4·27	4·17	4·07	3·97	3·88	3·79	37
38	5·93	5·74	5·56	5·39	5·23	5·08	4·93	4·80	4·67	4·55	4·43	4·32	4·22	4·12	4·02	3·93	38
39	6·15	5·95	5·76	5·58	5·42	5·26	5·11	4·97	4·84	4·71	4·59	4·48	4·37	4·27	4·17	4·07	39
40	6·37	6·17	5·97	5·79	5·61	5·45	5·30	5·15	5·01	4·88	4·76	4·64	4·53	4·42	4·32	4·22	40
41	6·60	6·39	6·19	6·00	5·82	5·65	5·49	5·34	5·19	5·06	4·93	4·81	4·69	4·58	4·47	4·37	41
42	6·84	6·62	6·41	6·21	6·02	5·85	5·69	5·53	5·38	5·24	5·11	4·98	4·86	4·74	4·63	4·53	42
43	7·08	6·85	6·64	6·43	6·24	6·06	5·89	5·73	5·57	5·43	5·29	5·16	5·03	4·91	4·80	4·69	43
44	7·34	7·10	6·87	6·66	6·46	6·27	6·10	5·93	5·77	5·62	5·48	5·34	5·21	5·09	4·97	4·85	44
45	7·60	7·35	7·12	6·90	6·69	6·50	6·31	6·14	5·98	5·82	5·67	5·53	5·40	5·27	5·15	5·03	45
46	7·87	7·61	7·37	7·14	6·93	6·73	6·54	6·36	6·19	6·03	5·87	5·73	5·59	5·46	5·33	5·21	46
47	8·15	7·88	7·63	7·40	7·18	6·97	6·77	6·59	6·41	6·24	6·08	5·93	5·79	5·65	5·52	5·39	47
48	8·44	8·16	7·90	7·66	7·43	7·22	7·01	6·82	6·64	6·46	6·30	6·14	5·99	5·85	5·71	5·58	48
49	8·74	8·45	8·19	7·93	7·70	7·47	7·26	7·06	6·87	6·69	6·52	6·36	6·21	6·06	5·92	5·78	49
50	9·05	8·76	8·48	8·22	7·97	7·74	7·52	7·32	7·12	6·94	6·76	6·59	6·43	6·28	6·13	5·99	50
51	9·38	9·07	8·79	8·52	8·26	8·02	7·80	7·58	7·38	7·19	7·00	6·83	6·66	6·50	6·35	6·21	51
52	9·72	9·40	9·11	8·83	8·56	8·32	8·08	7·86	7·65	7·45	7·26	7·08	6·91	6·74	6·58	6·43	52
53	10·1	9·75	9·44	9·15	8·88	8·62	8·38	8·15	7·93	7·72	7·53	7·34	7·16	6·99	6·83	6·67	53
54	10·5	10·1	9·79	9·49	9·21	8·94	8·69	8·45	8·23	8·01	7·81	7·61	7·43	7·25	7·08	6·92	54
55	10·8	10·5	10·2	9·85	9·56	9·28	9·02	8·77	8·53	8·31	8·10	7·90	7·71	7·52	7·35	7·18	55
56	11·3	10·9	10·5	10·2	9·92	9·63	9·36	9·10	8·86	8·63	8·41	8·20	8·00	7·81	7·63	7·45	56
57	11·7	11·3	11·0	10·6	10·3	10·0	9·72	9·46	9·20	8·96	8·73	8·52	8·31	8·11	7·92	7·74	57
58	12·2	11·8	11·4	11·0	10·7	10·4	10·1	9·83	9·56	9·31	9·08	8·85	8·64	8·43	8·23	8·05	58
59	12·6	12·2	11·8	11·5	11·1	10·8	10·5	10·2	9·95	9·69	9·44	9·20	8·98	8·77	8·56	8·37	59
60	13·2	12·7	12·3	11·9	11·6	11·3	10·9	10·6	10·4	10·1	9·82	9·58	9·35	9·12	8·91	8·71	60
Lat	172° 30′	172° 15′	172° 00′	171° 45′	171° 30′	171° 15′	171° 00′	170° 45′	170° 30′	170° 15′	170° 00′	169° 45′	169° 30′	169° 15′	169° 00′	168° 45′	Lat
	187° 30′	187° 45′	188° 00′	188° 15′	183° 30′	188° 45′	189° 00′	189° 15′	189° 30′	189° 45′	190° 00′	190° 15′	190° 30′	190° 45′	191° 00′	191° 15′	

HOUR ANGLE

A = Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A = Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A

TABLE B HOUR ANGLE

Dec °	7° 30′	7° 45′	8° 00′	8° 15′	8° 30′	8° 45′	9° 00′	9° 15′	9° 30′	9° 45′	10° 00′	10° 15′	10° 30′	10° 45′	11° 00′	11° 15′	Dec °
	352° 30′	352° 15′	352° 00′	351° 45′	351° 30′	351° 15′	351° 00′	350° 45′	350° 30′	350° 15′	350° 00′	349° 45′	349° 30′	349° 15′	349° 00′	348° 45′	
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·13	·13	·13	·12	·12	·12	·11	·11	·11	·10	·10	·10	·10	·09	·09	·09	1
2	·27	·26	·25	·24	·24	·23	·22	·22	·21	·21	·20	·20	·19	·19	·18	·18	2
3	·40	·39	·38	·37	·36	·35	·34	·33	·32	·31	·30	·30	·29	·28	·27	·27	3
4	·54	·52	·50	·49	·47	·46	·45	·44	·42	·41	·40	·39	·38	·38	·37	·36	4
5	·67	·65	·63	·61	·59	·58	·56	·54	·53	·52	·50	·49	·48	·47	·46	·45	5
6	·81	·78	·76	·73	·71	·69	·67	·65	·64	·62	·61	·59	·58	·56	·55	·54	6
7	·94	·91	·88	·86	·83	·81	·79	·76	·74	·73	·71	·69	·67	·66	·64	·63	7
8	1·08	1·04	1·01	·98	·95	·92	·90	·87	·85	·83	·81	·79	·77	·75	·74	·72	8
9	1·21	1·17	1·14	1·10	1·07	1·04	1·01	·99	·96	·94	·91	·89	·87	·85	·83	·81	9
10	1·35	1·31	1·27	1·23	1·19	1·16	1·13	1·10	1·07	1·04	1·02	·99	·97	·95	·92	·90	10
11	1·49	1·44	1·40	1·35	1·32	1·28	1·24	1·21	1·18	1·15	1·12	1·09	1·07	1·04	1·02	1·00	11
12	1·63	1·58	1·53	1·48	1·44	1·40	1·36	1·32	1·29	1·26	1·22	1·19	1·17	1·14	1·11	1·09	12
13	1·77	1·71	1·66	1·61	1·56	1·52	1·48	1·44	1·40	1·36	1·33	1·30	1·27	1·24	1·21	1·18	13
14	1·91	1·85	1·79	1·74	1·69	1·64	1·59	1·55	1·51	1·47	1·44	1·40	1·37	1·34	1·31	1·28	14
15	2·05	1·99	1·93	1·87	1·81	1·76	1·71	1·67	1·62	1·58	1·54	1·51	1·47	1·44	1·40	1·37	15
16	2·20	2·13	2·06	2·00	1·94	1·88	1·83	1·78	1·74	1·69	1·65	1·61	1·57	1·54	1·50	1·47	16
17	2·34	2·27	2·20	2·13	2·07	2·01	1·95	1·90	1·85	1·80	1·76	1·72	1·68	1·64	1·60	1·57	17
18	2·49	2·41	2·33	2·26	2·20	2·14	2·08	2·02	1·97	1·92	1·87	1·83	1·78	1·74	1·70	1·67	18
19	2·64	2·55	2·47	2·40	2·33	2·26	2·20	2·14	2·09	2·03	1·98	1·94	1·89	1·85	1·80	1·76	19
20	2·79	2·70	2·62	2·54	2·46	2·39	2·33	2·26	2·21	2·15	2·10	2·05	2·00	1·95	1·91	1·87	20
21	2·94	2·85	2·76	2·68	2·60	2·52	2·45	2·39	2·33	2·27	2·21	2·16	2·11	2·06	2·01	1·97	21
22	3·10	3·00	2·90	2·82	2·73	2·66	2·58	2·51	2·45	2·39	2·33	2·27	2·22	2·17	2·12	2·07	22
23	3·25	3·15	3·05	2·96	2·87	2·79	2·71	2·64	2·57	2·51	2·44	2·39	2·33	2·28	2·22	2·18	23
24	3·41	3·30	3·20	3·10	3·01	2·93	2·85	2·77	2·70	2·63	2·56	2·50	2·44	2·39	2·33	2·28	24
25	3·57	3·46	3·35	3·25	3·15	3·07	2·98	2·90	2·83	2·75	2·69	2·62	2·56	2·50	2·44	2·39	25
26	3·74	3·62	3·50	3·40	3·30	3·21	3·12	3·03	2·96	2·88	2·81	2·74	2·68	2·61	2·56	2·50	26
27	3·90	3·78	3·66	3·55	3·45	3·35	3·26	3·17	3·09	3·01	2·93	2·86	2·80	2·73	2·67	2·61	27
28	4·07	3·94	3·82	3·71	3·60	3·50	3·40	3·31	3·22	3·14	3·06	2·99	2·92	2·85	2·79	2·73	28
29	4·25	4·11	3·98	3·86	3·75	3·64	3·54	3·45	3·36	3·27	3·19	3·12	3·04	2·97	2·91	2·84	29
30	4·42	4·28	4·15	4·02	3·91	3·80	3·69	3·59	3·50	3·41	3·32	3·24	3·17	3·10	3·03	2·96	30
31	4·60	4·46	4·32	4·19	4·07	3·95	3·84	3·74	3·64	3·55	3·46	3·38	3·30	3·22	3·15	3·08	31
32	4·79	4·63	4·49	4·35	4·23	4·11	3·99	3·89	3·79	3·69	3·60	3·51	3·43	3·35	3·27	3·20	32
33	4·98	4·82	4·67	4·53	4·39	4·27	4·15	4·04	3·93	3·83	3·74	3·65	3·56	3·48	3·40	3·33	33
34	5·17	5·00	4·85	4·70	4·56	4·43	4·31	4·20	4·09	3·98	3·88	3·79	3·70	3·62	3·53	3·46	34
35	5·36	5·19	5·03	4·88	4·74	4·60	4·48	4·36	4·24	4·13	4·03	3·93	3·84	3·75	3·67	3·59	35
36	5·57	5·39	5·22	5·06	4·92	4·78	4·64	4·52	4·40	4·29	4·18	4·08	3·99	3·90	3·81	3·72	36
37	5·77	5·59	5·41	5·25	5·10	4·95	4·82	4·69	4·57	4·45	4·34	4·23	4·14	4·04	3·95	3·86	37
38	5·99	5·79	5·61	5·44	5·29	5·14	5·00	4·86	4·73	4·61	4·50	4·39	4·29	4·19	4·09	4·00	38
39	6·20	6·01	5·82	5·64	5·48	5·32	5·18	5·04	4·91	4·78	4·66	4·55	4·44	4·34	4·24	4·15	39
40	6·43	6·22	6·03	5·85	5·68	5·52	5·36	5·22	5·08	4·95	4·83	4·72	4·60	4·50	4·40	4·30	40
41	6·66	6·45	6·25	6·06	5·88	5·71	5·56	5·41	5·27	5·13	5·01	4·89	4·77	4·66	4·56	4·46	41
42	6·90	6·68	6·47	6·27	6·09	5·92	5·76	5·60	5·46	5·32	5·19	5·06	4·94	4·83	4·72	4·62	42
43	7·14	6·92	6·70	6·50	6·31	6·13	5·96	5·80	5·65	5·51	5·37	5·24	5·12	5·00	4·89	4·78	43
44	7·40	7·16	6·94	6·73	6·53	6·35	6·17	6·01	5·85	5·70	5·56	5·43	5·30	5·18	5·06	4·95	44
45	7·66	7·42	7·19	6·97	6·77	6·57	6·39	6·22	6·06	5·90	5·76	5·62	5·49	5·36	5·24	5·13	45
46	7·93	7·68	7·44	7·22	7·01	6·81	6·62	6·44	6·27	6·11	5·96	5·82	5·68	5·55	5·43	5·31	46
47	8·22	7·95	7·71	7·47	7·26	7·05	6·86	6·67	6·50	6·33	6·18	6·03	5·88	5·75	5·62	5·50	47
48	8·51	8·24	7·98	7·74	7·51	7·30	7·10	6·91	6·73	6·56	6·40	6·24	6·09	5·95	5·82	5·69	48
49	8·81	8·53	8·27	8·02	7·78	7·56	7·35	7·16	6·97	6·79	6·62	6·46	6·31	6·17	6·03	5·90	49
50	9·13	8·84	8·56	8·31	8·06	7·83	7·62	7·41	7·22	7·04	6·86	6·70	6·54	6·39	6·25	6·11	50
51	9·46	9·16	8·87	8·61	8·35	8·12	7·89	7·68	7·48	7·29	7·11	6·94	6·78	6·62	6·47	6·33	51
52	9·81	9·49	9·20	8·92	8·66	8·41	8·18	7·96	7·75	7·56	7·37	7·19	7·02	6·86	6·71	6·56	52
53	10·2	9·84	9·54	9·25	8·98	8·72	8·48	8·26	8·04	7·84	7·64	7·46	7·28	7·11	6·95	6·80	53
54	10·5	10·2	9·89	9·59	9·31	9·05	8·80	8·56	8·34	8·13	7·93	7·73	7·55	7·38	7·21	7·06	54
55	10·9	10·6	10·3	9·95	9·66	9·39	9·13	8·88	8·65	8·43	8·22	8·03	7·84	7·66	7·48	7·32	55
56	11·4	11·0	10·7	10·3	10·0	9·75	9·48	9·22	8·98	8·75	8·54	8·33	8·14	7·95	7·77	7·60	56
57	11·8	11·4	11·1	10·7	10·4	10·1	9·84	9·58	9·33	9·09	8·87	8·65	8·45	8·26	8·07	7·89	57
58	12·3	11·9	11·5	11·2	10·8	10·5	10·2	9·96	9·70	9·45	9·22	8·99	8·78	8·58	8·39	8·20	58
59	12·8	12·3	12·0	11·6	11·3	10·9	10·6	10·4	10·1	9·83	9·58	9·35	9·13	8·92	8·72	8·53	59
60	13·3	12·8	12·4	12·1	11·7	11·4	11·1	10·8	10·5	10·2	9·97	9·73	9·50	9·29	9·08	8·88	60
Dec	172° 30′	172° 15′	172° 00′	171° 45′	171° 30′	171° 15′	171° 00′	170° 45′	170° 30′	170° 15′	170° 00′	169° 45′	169° 30′	169° 15′	169° 00′	168° 45′	Dec.
	187° 30′	187° 45′	188° 00′	188° 15′	188° 30′	188° 45′	189° 00′	189° 15′	189° 30′	189° 45′	190° 00′	190° 15′	190° 30′	190° 45′	191° 00′	191° 15′	

HOUR ANGLE

B - Always named the **same** as Declination

B - Always named the **same** as Declination

TABLE A HOUR ANGLE

Lat. °	11° 15′	11° 30′	11° 45′	12° 00′	12° 15′	12° 30′	12° 45′	13° 00′	13° 15′	13° 30′	13° 45′	14° 00′	14° 15′	14° 30′	14° 45′	15° 00′	Lat. °
	348° 45′	348° 30′	348° 15′	348° 00′	347° 45′	347° 30′	347° 15′	347° 00′	346° 45′	346° 30′	346° 15′	346° 00′	345° 45′	345° 30′	345° 15′	345° 00′	
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·09	·09	·08	·08	·08	·08	·08	·08	·07	·07	·07	·07	·07	·07	·07	·07	1
2	·18	·17	·17	·16	·16	·16	·15	·15	·15	·15	·14	·14	·14	·14	·13	·13	2
3	·26	·26	·25	·25	·24	·24	·23	·23	·22	·22	·21	·21	·21	·20	·20	·20	3
4	·35	·34	·34	·33	·32	·32	·31	·30	·30	·29	·29	·28	·28	·27	·27	·26	4
5	·44	·43	·42	·41	·40	·39	·39	·38	·37	·36	·36	·35	·34	·34	·33	·33	5
6	·53	·52	·51	·49	·48	·47	·46	·46	·45	·44	·43	·42	·41	·41	·40	·39	6
7	·62	·60	·59	·58	·57	·55	·54	·53	·52	·51	·50	·49	·48	·47	·47	·46	7
8	·71	·69	·68	·66	·65	·63	·62	·61	·60	·59	·57	·56	·55	·54	·53	·52	8
9	·80	·78	·76	·75	·73	·71	·70	·69	·67	·66	·65	·64	·62	·61	·60	·59	9
10	·89	·87	·85	·83	·81	·80	·78	·76	·75	·73	·72	·71	·69	·68	·67	·66	10
11	·98	·96	·94	·91	·90	·88	·86	·84	·83	·81	·79	·78	·77	·75	·74	·73	11
12	1·07	1·04	1·02	1·00	·98	·96	·94	·92	·90	·89	·87	·85	·84	·82	·81	·79	12
13	1·16	1·13	1·11	1·09	1·06	1·04	1·02	1·00	·98	·96	·94	·93	·91	·89	·88	·86	13
14	1·25	1·23	1·20	1·17	1·15	1·12	1·10	1·08	1·06	1·04	1·02	1·00	·98	·96	·95	·93	14
15	1·35	1·32	1·29	1·26	1·23	1·21	1·18	1·16	1·14	1·12	1·10	1·07	1·06	1·04	1·02	1·00	15
16	1·44	1·41	1·38	1·35	1·32	1·29	1·27	1·24	1·22	1·19	1·17	1·15	1·13	1·11	1·09	1·07	16
17	1·54	1·50	1·47	1·44	1·41	1·38	1·35	1·32	1·30	1·27	1·25	1·23	1·20	1·18	1·16	1·14	17
18	1·63	1·60	1·56	1·53	1·50	1·47	1·44	1·41	1·38	1·35	1·33	1·30	1·28	1·26	1·23	1·21	18
19	1·73	1·69	1·66	1·62	1·59	1·55	1·52	1·49	1·46	1·43	1·41	1·38	1·36	1·33	1·31	1·29	19
20	1·83	1·79	1·75	1·71	1·68	1·64	1·61	1·58	1·55	1·52	1·49	1·46	1·43	1·41	1·38	1·36	20
21	1·93	1·89	1·85	1·81	1·77	1·73	1·70	1·66	1·63	1·60	1·57	1·54	1·51	1·48	1·46	1·43	21
22	2·03	1·99	1·94	1·90	1·86	1·82	1·79	1·75	1·72	1·68	1·65	1·62	1·59	1·56	1·53	1·51	22
23	2 13	2·09	2·04	2·00	1·96	1·91	1·88	1·84	1·80	1·77	1·73	1·70	1·67	1·64	1·61	1·58	23
24	2·24	2·19	2·14	2·09	2·05	2·01	1·97	1·93	1·89	1·85	1·82	1·79	1·75	1·72	1·69	1·66	24
25	2·34	2·29	2·24	2·19	2·15	2·10	2 06	2·02	1·98	1·94	1·91	1·87	1·84	1·80	1·77	1·74	25
26	2·45	2·40	2·34	2·29	2·25	2·20	2·16	2·11	2·07	2·03	1·99	1·96	1·92	1·89	1·85	1·82	26
27	2·56	2·50	2·45	2·40	2·35	2·30	2·25	2·21	2·16	2·12	2·08	2·04	2·01	1·97	1·94	1·90	27
28	2·67	2·61	2·56	2·50	2·45	2·40	2·35	2·30	2·26	2·21	2·17	2·13	2·09	2·06	2·02	1·98	28
29	2·79	2·73	2·66	2·61	2·55	2·50	2·45	2·40	2·35	2·31	2·27	2·22	2·18	2·14	2·11	2·07	29
30	2·90	2·84	2·78	2·72	2·66	2·60	2·55	2·50	2·45	2·40	2·36	2·32	2·27	2·23	2·19	2·15	30
31	3·02	2·95	2·89	2·83	2·77	2·71	2·66	2·60	2·55	2·50	2·46	2·41	2·37	2·32	2·28	2·24	31
32	3·14	3·07	3·00	2·94	2·88	2·82	2·76	2·71	2·65	2·60	2·55	2·51	2·46	2·42	2·37	2·33	32
33	3·26	3·19	3·12	3·06	2·99	2·93	2·87	2·81	2·76	2·71	2·66	2·61	2·56	2·51	2·47	2·42	33
34	3·39	3·32	3·24	3·17	3·11	3·04	2·98	2·92	2·86	2·81	2·76	2·71	2·66	2·61	2·56	2·52	34
35	3·52	3·44	3·37	3·29	3·22	3·16	3·09	3·03	2·97	2·92	2·86	2·81	2·76	2·71	2·66	2·61	35
36	3·65	3·57	3·49	3·42	3·35	3·28	3·21	3·15	3·09	3·03	2·97	2·91	2·86	2·81	2·76	2·71	36
37	3·79	3·70	3·62	3·55	3·47	3·40	3·33	3·26	3·20	3·14	3·08	3·02	2·97	2·91	2·86	2·81	37
38	3·93	3·84	3·76	3·68	3·60	3·52	3·45	3·38	3·32	3·25	3·19	3·13	3·08	3·02	2·97	2·92	38
39	4·07	3·98	3·89	3·81	3·73	3·65	3·58	3·51	3·44	3·37	3·31	3·25	3·19	3·13	3·08	3·02	39
40	4·22	4·12	4 03	3·95	3·86	3·78	3·71	3·63	3·56	3·50	3·43	3·37	3·30	3·24	3·19	3·13	40
41	4·37	4·27	4·18	4·09	4·00	3·92	3·84	3·77	3·69	3·62	3·55	3·49	3·42	3·36	3·30	3·24	41
42	4·53	4·43	4·33	4·24	4·15	4·06	3·98	3·90	3·82	3·75	3·68	3·61	3·55	3·48	3·42	3·36	42
43	4·69	4·58	4·48	4·39	4·30	4·21	4·12	4·04	3·96	3·88	3·81	3·74	3·67	3·61	3·54	3·48	43
44	4·85	4·75	4·64	4·54	4·45	4·36	4·27	4·18	4·10	4·02	3·95	3·87	3·80	3·73	3·67	3·60	44
45	5·03	4·92	4·81	4·70	4·61	4·51	4·42	4·33	4·25	4·17	4·09	4·01	3·94	3·87	3·80	3·73	45
46	5·21	5·09	4·98	4·87	4·77	4·67	4·58	4·49	4·40	4·31	4·23	4·15	4·08	4·00	3·93	3·86	46
47	5·39	5·27	5·16	5·05	4·94	4·84	4·74	4·65	4·56	4·47	4·38	4·30	4·22	4·15	4·07	4·00	47
48	5·58	5·46	5·34	5·23	5·12	5·01	4·91	4·81	4·72	4·63	4·54	4·45	4·37	4·29	4·22	4·14	48
49	5·78	5·65	5·53	5·41	5·30	5·19	5·08	4·98	4·89	4·79	4·70	4·61	4·53	4·45	4·37	4·29	49
50	5·99	5·86	5·73	5·61	5·49	5·38	5·27	5·16	5·06	4·96	4·87	4·78	4·69	4·61	4·53	4·45	50
51	6·21	6·07	5·94	5·81	5·69	5·57	5·46	5·35	5·24	5·14	5·05	4·95	4·86	4·77	4·69	4·61	51
52	6·43	6·29	6·15	6·02	5·90	5·77	5·66	5·55	5·44	5·33	5·23	5·13	5·04	4·95	4·86	4·78	52
53	6·67	6·52	6·38	6·24	6·11	5·99	5·86	5·75	5·64	5·53	5·42	5·32	5·23	5·13	5·04	4·95	53
54	6·92	6·77	6·62	6·48	6·34	6·21	6·08	5·96	5·85	5·73	5·62	5·52	5·42	5·32	5·23	5·14	54
55	7·18	7·02	6·87	6·72	6·58	6·44	6·31	6·19	6·07	5·95	5·84	5·73	5·62	5·52	5·42	5·33	55
56	7·45	7·29	7·13	6·97	6·83	6·69	6·55	6·42	6·30	6·18	6·06	5·95	5·84	5·73	5·63	5·53	56
57	7·74	7·57	7·40	7·24	7·09	6·95	6·81	6·67	6·54	6·41	6·29	6·18	6·06	5·95	5·85	5·75	57
58	8·05	7·87	7·69	7·53	7·37	7·22	7·07	6·93	6·80	6·67	6·54	6·42	6·30	6·19	6·08	5·97	58
59	8·37	8·18	8·00	7·83	7·67	7·51	7·36	7·21	7·07	6·93	6·80	6·68	6·55	6·44	6·32	6·21	59
60	8·71	8·51	8·33	8·15	7·98	7·81	7·65	7·50	7·36	7·21	7·08	6·95	6·82	6·70	6·58	6·46	60
Lat.	168° 45′	168° 30′	168° 15′	168° 00′	167° 45′	167° 30′	167° 15′	167° 00′	166° 45′	166° 30′	166° 15′	166° 00′	165° 45′	165° 30′	165° 15′	165° 00′	Lat.
	191° 15′	191° 30′	191° 45′	192° 00′	192° 15′	192° 30′	192° 45′	193° 00′	193° 15′	193° 30′	193° 45′	194° 00′	194° 15′	194° 30′	194° 45′	195° 00′	

HOUR ANGLE

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A

TABLE B HOUR ANGLE

Dec °	11° 15′	11° 30′	11° 45′	12° 00′	12° 15′	12° 30′	12° 45′	13° 00′	13° 15′	13° 30′	13° 45′	14° 00′	14° 15′	14° 30′	14° 45′	15° 00′	Dec °
	348° 45′	348° 30′	348° 15′	348° 00′	347° 45′	347° 30′	347° 15′	347° 00′	346° 45′	346° 30′	346° 15′	346° 00′	345° 45′	345° 30′	345° 15′	345° 00′	
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·09	·09	·09	·08	·08	·08	·08	·08	·08	·08	·07	·07	·07	·07	·07	·07	1
2	·18	·18	·17	·17	·17	·16	·16	·16	·15	·15	·15	·14	·14	·14	·14	·13	2
3	·27	·26	·26	·25	·25	·24	·24	·23	·23	·22	·22	·22	·21	·21	·21	·20	3
4	·36	·35	·34	·34	·33	·32	·32	·31	·31	·30	·29	·29	·28	·28	·28	·27	4
5	·45	·44	·43	·42	·41	·40	·40	·39	·38	·38	·37	·36	·36	·35	·34	·34	5
6	·54	·53	·52	·51	·50	·49	·48	·47	·46	·45	·44	·43	·43	·42	·41	·41	6
7	·63	·62	·60	·59	·58	·57	·56	·55	·54	·53	·52	·51	·50	·49	·48	·47	7
8	·72	·71	·69	·68	·66	·65	·64	·62	·61	·60	·59	·58	·57	·56	·55	·54	8
9	·81	·79	·78	·76	·75	·73	·72	·70	·69	·68	·67	·65	·64	·63	·62	·61	9
10	·90	·88	·87	·85	·83	·82	·80	·78	·77	·76	·74	·73	·72	·70	·69	·68	10
11	1·00	·98	·96	·93	·92	·90	·88	·86	·85	·83	·82	·80	·79	·78	·76	·75	11
12	1·09	1·07	1·04	1·02	1·00	·98	·96	·94	·93	·91	·89	·88	·86	·85	·84	·82	12
13	1·18	1·16	1·13	1·11	1·09	1·07	1·05	1·03	1·01	·99	·97	·95	·94	·92	·91	·89	13
14	1·28	1·25	1·22	1·20	1·18	1·15	1·13	1·11	1·09	1·07	1·05	1·03	1·01	1·00	·98	·96	14
15	1·37	1·34	1·32	1·29	1·26	1·24	1·21	1·19	1·17	1·15	1·13	1·11	1·09	1·07	1·05	1·04	15
16	1·47	1·44	1·41	1·38	1·35	1·32	1·30	1·27	1·25	1·23	1·21	1·19	1·16	1·15	1·13	1·11	16
17	1·57	1·53	1·50	1·47	1·44	1·41	1·39	1·36	1·33	1·31	1·29	1·26	1·24	1·22	1·20	1·18	17
18	1·67	1·63	1·60	1·56	1·53	1·50	1·47	1·44	1·42	1·39	1·37	1·34	1·32	1·30	1·28	1·26	18
19	1·76	1·73	1·69	1·66	1·62	1·59	1·56	1·53	1·50	1·47	1·45	1·42	1·40	1·38	1·35	1·33	19
20	1·87	1·83	1·79	1·75	1·72	1·68	1·65	1·62	1·59	1·56	1·53	1·50	1·48	1·45	1·43	1·41	20
21	1·97	1·93	1·89	1·85	1·81	1·77	1·74	1·71	1·67	1·64	1·62	1·59	1·56	1·53	1·51	1·48	21
22	2·07	2·03	1·98	1·94	1·90	1·87	1·83	1·80	1·76	1·73	1·70	1·67	1·64	1·61	1·59	1·56	22
23	2·18	2·13	2·08	2·04	2·00	1·96	1·92	1·89	1·85	1·82	1·79	1·75	1·72	1·70	1·67	1·64	23
24	2·28	2·23	2·19	2·14	2·10	2·06	2·02	1·98	1·94	1·91	1·87	1·84	1·81	1·78	1·75	1·72	24
25	2·39	2·34	2·29	2·24	2·20	2·15	2·11	2·07	2·03	2·00	1·96	1·93	1·89	1·86	1·83	1·80	25
26	2·50	2·45	2·40	2·35	2·30	2·25	2·21	2·17	2·13	2·09	2·05	2·02	1·98	1·95	1·92	1·88	26
27	2·61	2·56	2·50	2·45	2·40	2·35	2·31	2·27	2·22	2·18	2·14	2·11	2·07	2·04	2·00	1·97	27
28	2·73	2·67	2·61	2·56	2·51	2·46	2·41	2·36	2·32	2·28	2·24	2·20	2·16	2·12	2·09	2·05	28
29	2·84	2·78	2·72	2·67	2·61	2·56	2·51	2·46	2·42	2·37	2·33	2·29	2·25	2·21	2·18	2·14	29
30	2·96	2·90	2·84	2·78	2·72	2·67	2·62	2·57	2·52	2·47	2·43	2·39	2·35	2·31	2·27	2·23	30
31	3·08	3·01	2·95	2·89	2·83	2·78	2·72	2·67	2·62	2·57	2·53	2·48	2·44	2·40	2·36	2·32	31
32	3·20	3·13	3·07	3·01	2·95	2·89	2·83	2·78	2·73	2·68	2·63	2·58	2·54	2·50	2·45	2·41	32
33	3·33	3·26	3·19	3·12	3·06	3·00	2·94	2·89	2·83	2·78	2·73	2·68	2·64	2·59	2·55	2·51	33
34	3·46	3·38	3·31	3·24	3·18	3·12	3·06	3·00	2·94	2·89	2·84	2·79	2·74	2·69	2·65	2·61	34
35	3·59	3·51	3·44	3·37	3·30	3·24	3·17	3·11	3·06	3·00	2·95	2·89	2·84	2·80	2·75	2·71	35
36	3·72	3·64	3·57	3·49	3·42	3·36	3·29	3·23	3·17	3·11	3·06	3·00	2·95	2·90	2·85	2·81	36
37	3·86	3·78	3·70	3·62	3·55	3·48	3·41	3·35	3·29	3·23	3·17	3·11	3·06	3·01	2·96	2·91	37
38	4·00	3·92	3·84	3·76	3·68	3·61	3·54	3·47	3·41	3·35	3·29	3·23	3·17	3·12	3·07	3·02	38
39	4·15	4·06	3·98	3·90	3·82	3·74	3·67	3·60	3·53	3·47	3·41	3·35	3·29	3·23	3·18	3·13	39
40	4·30	4·21	4·12	4·04	3·95	3·88	3·80	3·73	3·66	3·59	3·53	3·47	3·41	3·35	3·30	3·24	40
41	4·46	4·36	4·27	4·18	4·10	4·02	3·94	3·86	3·79	3·72	3·66	3·59	3·53	3·47	3·41	3·36	41
42	4·62	4·52	4·42	4·33	4·24	4·16	4·08	4·00	3·93	3·86	3·79	3·72	3·66	3·60	3·54	3·48	42
43	4·78	4·68	4·58	4·49	4·39	4·31	4·23	4·15	4·07	3·99	3·92	3·85	3·79	3·72	3·66	3·60	43
44	4·95	4·84	4·74	4·64	4·55	4·46	4·38	4·29	4·21	4·14	4·06	3·99	3·92	3·86	3·79	3·73	44
45	5·13	5·02	4·91	4·81	4·71	4·62	4·53	4·45	4·36	4·28	4·21	4·13	4·06	3·99	3·93	3·86	45
46	5·31	5·19	5·09	4·98	4·88	4·78	4·69	4·60	4·52	4·44	4·36	4·28	4·21	4·14	4·07	4·00	46
47	5·50	5·38	5·27	5·16	5·05	4·96	4·86	4·77	4·68	4·59	4·51	4·43	4·36	4·28	4·21	4·14	47
48	5·69	5·57	5·45	5·34	5·23	5·13	5·03	4·94	4·85	4·76	4·67	4·59	4·51	4·44	4·36	4·29	48
49	5·90	5·77	5·65	5·53	5·42	5·31	5·21	5·11	5·02	4·93	4·84	4·76	4·67	4·59	4·52	4·44	49
50	6·11	5·98	5·85	5·73	5·62	5·51	5·40	5·30	5·20	5·11	5·01	4·93	4·84	4·76	4·68	4·60	50
51	6·33	6·19	6·06	5·94	5·82	5·71	5·60	5·49	5·39	5·29	5·20	5·10	5·02	4·93	4·85	4·77	51
52	6·56	6·42	6·29	6·16	6·03	5·91	5·80	5·69	5·58	5·48	5·39	5·29	5·20	5·11	5·03	4·95	52
53	6·80	6·66	6·52	6·38	6·25	6·13	6·01	5·90	5·79	5·68	5·58	5·49	5·39	5·30	5·21	5·13	53
54	7·06	6·90	6·76	6·62	6·49	6·36	6·24	6·12	6·01	5·90	5·79	5·69	5·59	5·50	5·41	5·32	54
55	7·32	7·16	7·01	6·87	6·73	6·60	6·47	6·35	6·23	6·12	6·01	5·90	5·80	5·70	5·61	5·52	55
56	7·60	7·44	7·28	7·13	6·99	6·85	6·72	6·59	6·47	6·35	6·24	6·13	6·02	5·92	5·82	5·73	56
57	7·89	7·72	7·56	7·41	7·26	7·12	6·98	6·85	6·72	6·60	6·48	6·37	6·26	6·15	6·05	5·95	57
58	8·20	8·03	7·86	7·70	7·54	7·39	7·25	7·11	6·98	6·86	6·73	6·62	6·50	6·39	6·29	6·18	58
59	8·53	8·35	8·17	8·00	7·84	7·69	7·54	7·40	7·26	7·13	7·00	6·88	6·76	6·65	6·54	6·43	59
60	8·88	8·69	8·51	8·33	8·16	8·00	7·85	7·70	7·56	7·42	7·29	7·16	7·04	6·92	6·80	6·69	60
Dec	168° 45′	168° 30′	168° 15′	168° 00′	167° 45′	167° 30′	167° 15′	167° 00′	166° 45′	166° 30′	166° 15′	166° 00′	165° 45′	165° 30′	165° 15′	165° 00′	Dec.
	191° 15′	191° 30′	191° 45′	192° 00′	192° 15′	192° 30′	192° 45′	193° 00′	193° 15′	193° 30′	193° 45′	194° 00′	194° 15′	194° 30′	194° 45′	195° 00′	

HOUR ANGLE

B

B – Always named the **same** as Declination

B – Always named the **same** as Declination

TABLE A HOUR ANGLE

Lat.	15° 00′ 345° 00′	15° 30′ 344° 30′	16° 00′ 344° 00′	16° 30′ 343° 30′	17° 00′ 343° 00′	17° 30′ 342° 30′	18° 00′ 342° 00′	18° 30′ 341° 30′	19° 00′ 341° 00′	19° 30′ 340° 30′	20° 00′ 340° 00′	20° 30′ 339° 30′	21° 00′ 339° 00′	21° 30′ 338° 30′	22° 00′ 338° 00′	22° 30′ 337° 30′	Lat.
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·07	·06	·06	·06	·06	·06	·05	·05	·05	·05	·05	·05	·05	·04	·04	·04	1
2	·13	·13	·12	·12	·11	·11	·11	·10	·10	·10	·10	·09	·09	·09	·09	·08	2
3	·20	·19	·18	·18	·17	·17	·16	·16	·15	·15	·14	·14	·14	·13	·13	·13	3
4	·26	·25	·24	·24	·23	·22	·22	·21	·20	·20	·19	·19	·18	·18	·17	·17	4
5	·33	·32	·31	·30	·29	·28	·27	·26	·25	·25	·24	·23	·23	·22	·22	·21	5
6	·39	·38	·37	·35	·34	·33	·32	·31	·31	·30	·29	·28	·27	·27	·26	·25	6
7	·46	·44	·43	·41	·40	·39	·38	·37	·36	·35	·34	·33	·32	·31	·30	·30	7
8	·52	·51	·49	·47	·46	·45	·43	·42	·41	·40	·39	·38	·37	·36	·35	·34	8
9	·59	·57	·55	·53	·52	·50	·49	·47	·46	·45	·44	·42	·41	·40	·39	·38	9
10	·66	·64	·61	·60	·58	·56	·54	·53	·51	·50	·48	·47	·46	·45	·44	·43	10
11	·73	·70	·68	·66	·64	·62	·60	·58	·56	·55	·53	·52	·51	·49	·48	·47	11
12	·79	·77	·74	·72	·70	·67	·65	·64	·62	·60	·58	·57	·55	·54	·53	·51	12
13	·86	·83	·81	·78	·76	·73	·71	·69	·67	·65	·63	·62	·60	·59	·57	·56	13
14	·93	·90	·87	·84	·82	·79	·77	·75	·72	·70	·69	·67	·65	·63	·62	·60	14
15	1·00	·97	·93	·90	·88	·85	·82	·80	·78	·76	·74	·72	·70	·68	·66	·65	15
16	1·07	1·03	1·00	·97	·94	·91	·88	·86	·83	·81	·79	·77	·75	·73	·71	·69	16
17	1·14	1·10	1·07	1·03	1·00	·97	·94	·91	·89	·86	·84	·82	·80	·78	·76	·74	17
18	1·21	1·17	1·13	1·10	1·06	1·03	1·00	·97	·94	·92	·89	·87	·85	·82	·80	·78	18
19	1·29	1·24	1·20	1·16	1·13	1·09	1·06	1·03	1·00	·97	·95	·92	·90	·87	·85	·83	19
20	1·36	1·31	1·27	1·23	1·19	1·15	1·12	1·09	1·06	1·03	1·00	·97	·95	·92	·90	·88	20
21	1·43	1·38	1·34	1·30	1·26	1·22	1·18	1·15	1·11	1·08	1·05	1·03	1·00	·97	·95	·93	21
22	1·51	1·46	1·41	1·36	1·32	1·28	1·24	1·21	1·17	1·14	1·11	1·08	1·05	1·03	1·00	·97	22
23	1·58	1·53	1·48	1·43	1·39	1·35	1·31	1·27	1·23	1·20	1·17	1·14	1·11	1·08	1·05	1·02	23
24	1·66	1·61	1·55	1·50	1·46	1·41	1·37	1·33	1·29	1·26	1·22	1·19	1·16	1·13	1·10	1·07	24
25	1·74	1·68	1·63	1·57	1·53	1·48	1·44	1·39	1·35	1·32	1·28	1·25	1·21	1·18	1·15	1·13	25
26	1·82	1·76	1·70	1·65	1·60	1·55	1·50	1·46	1·42	1·38	1·34	1·30	1·27	1·24	1·21	1·18	26
27	1·90	1·84	1·78	1·72	1·67	1·62	1·57	1·52	1·48	1·44	1·40	1·36	1·33	1·29	1·26	1·23	27
28	1·98	1·92	1·85	1·79	1·74	1·69	1·64	1·59	1·54	1·50	1·46	1·42	1·39	1·35	1·32	1·28	28
29	2·07	2·00	1·93	1·87	1·81	1·76	1·71	1·66	1·61	1·57	1·52	1·48	1·44	1·41	1·37	1·34	29
30	2·15	2·08	2·01	1·95	1·89	1·83	1·78	1·73	1·68	1·63	1·59	1·54	1·50	1·47	1·43	1·39	30
31	2·24	2·17	2·10	2·03	1·97	1·91	1·85	1·80	1·75	1·70	1·65	1·61	1·57	1·53	1·49	1·45	31
32	2·33	2·25	2·18	2·11	2·04	1·98	1·92	1·87	1·81	1·76	1·72	1·67	1·63	1·59	1·55	1·51	32
33	2·42	2·34	2·26	2·19	2·12	2·06	2·00	1·94	1·89	1·83	1·78	1·74	1·69	1·65	1·61	1·57	33
34	2·52	2·43	2·35	2·28	2·21	2·14	2·08	2·02	1·96	1·90	1·85	1·80	1·76	1·71	1·67	1·63	34
35	2·61	2·52	2·44	2·36	2·29	2·22	2·16	2·09	2·03	1·98	1·92	1·87	1·82	1·78	1·73	1·69	35
36	2·71	2·62	2·53	2·45	2·38	2·30	2·24	2·17	2·11	2·05	2·00	1·94	1·89	1·84	1·80	1·75	36
37	2·81	2·72	2·63	2·54	2·46	2·39	2·32	2·25	2·19	2·13	2·07	2·02	1·96	1·91	1·87	1·82	37
38	2·92	2·82	2·72	2·64	2·56	2·48	2·40	2·34	2·27	2·21	2·15	2·09	2·04	1·98	1·93	1·89	38
39	3·02	2·92	2·82	2·73	2·65	2·57	2·49	2·42	2·35	2·29	2·23	2·17	2·11	2·06	2·00	1·95	39
40	3·13	3·03	2·93	2·83	2·74	2·66	2·58	2·51	2·44	2·37	2·31	2·25	2·19	2·13	2·08	2·03	40
41	3·24	3·13	3·03	2·93	2·84	2·76	2·68	2·60	2·52	2·45	2·39	2·33	2·27	2·21	2·15	2·10	41
42	3·36	3·25	3·14	3·04	2·95	2·86	2·77	2·69	2·61	2·54	2·47	2·41	2·35	2·29	2·23	2·17	42
43	3·48	3·36	3·25	3·15	3·05	2·96	2·87	2·79	2·71	2·63	2·56	2·49	2·43	2·37	2·31	2·25	43
44	3·60	3·48	3·37	3·26	3·16	3·06	2·97	2·89	2·80	2·73	2·65	2·58	2·52	2·45	2·39	2·33	44
45	3·73	3·61	3·49	3·38	3·27	3·17	3·08	2·99	2·90	2·82	2·75	2·67	2·61	2·54	2·48	2·41	45
46	3·86	3·73	3·61	3·50	3·39	3·28	3·19	3·09	3·01	2·92	2·85	2·77	2·70	2·63	2·56	2·50	46
47	4·00	3·87	3·74	3·62	3·51	3·40	3·30	3·21	3·11	3·03	2·95	2·87	2·79	2·72	2·65	2·59	47
48	4·14	4·00	3·87	3·75	3·63	3·52	3·42	3·32	3·23	3·14	3·05	2·97	2·89	2·82	2·75	2·68	48
49	4·29	4·15	4·01	3·88	3·76	3·65	3·54	3·44	3·34	3·25	3·16	3·08	3·00	2·92	2·85	2·78	49
50	4·45	4·30	4·16	4·02	3·90	3·78	3·67	3·56	3·46	3·37	3·27	3·19	3·10	3·03	2·95	2·88	50
51	4·61	4·45	4·31	4·17	4·04	3·92	3·80	3·69	3·59	3·49	3·39	3·30	3·22	3·14	3·06	2·98	51
52	4·78	4·62	4·46	4·32	4·19	4·06	3·94	3·83	3·72	3·62	3·52	3·42	3·33	3·25	3·17	3·09	52
53	4·95	4·79	4·63	4·48	4·34	4·21	4·08	3·97	3·86	3·75	3·65	3·55	3·46	3·37	3·28	3·20	53
54	5·14	4·96	4·80	4·65	4·50	4·37	4·24	4·11	4·00	3·89	3·78	3·68	3·59	3·49	3·41	3·32	54
55	5·33	5·15	4·98	4·82	4·67	4·53	4·40	4·27	4·15	4·03	3·92	3·82	3·72	3·63	3·53	3·45	55
56	5·53	5·35	5·17	5·01	4·85	4·70	4·56	4·43	4·31	4·19	4·07	3·97	3·86	3·76	3·67	3·58	56
57	5·75	5·55	5·37	5·20	5·04	4·88	4·74	4·60	4·47	4·35	4·23	4·12	4·01	3·91	3·81	3·72	57
58	5·97	5·77	5·58	5·40	5·23	5·08	4·93	4·78	4·65	4·52	4·40	4·28	4·17	4·06	3·96	3·86	58
59	6·21	6·00	5·80	5·62	5·44	5·28	5·12	4·97	4·83	4·70	4·57	4·45	4·34	4·23	4·12	4·02	59
60	6·46	6·25	6·04	5·85	5·67	5·49	5·33	5·18	5·03	4·89	4·76	4·63	4·51	4·40	4·29	4·18	60
Lat.	165° 00′ 195° 00′	164° 30′ 195° 30′	164° 00′ 196° 00′	163° 30′ 196° 30′	163° 00′ 197° 00′	162° 30′ 197° 30′	162° 00′ 198° 00′	161° 30′ 198° 30′	161° 00′ 199° 00′	160° 30′ 199° 30′	160° 00′ 200° 00′	159° 30′ 200° 30′	159° 00′ 201° 00′	158° 30′ 201° 30′	158° 00′ 202° 00′	157° 30′ 202° 30′	Lat.

HOUR ANGLE

A

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

TABLE B HOUR ANGLE

Dec °	15° 00′ 345° 00′	15° 30′ 344° 30′	16° 00′ 344° 00′	16° 30′ 343° 30′	17° 00′ 343° 00′	17° 30′ 342° 30′	18° 00′ 342° 00′	18° 30′ 341° 30′	19° 00′ 341° 00′	19° 30′ 340° 30′	20° 00′ 340° 00′	20° 30′ 339° 30′	21° 00′ 339° 00′	21° 30′ 338° 30′	22° 00′ 338° 00′	22° 30′ 337° 30′	Dec °
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·07	·07	·06	·06	·06	·06	·06	·06	·05	·05	·05	·05	·05	·05	·05	·05	1
2	·13	·13	·13	·12	·12	·12	·11	·11	·11	·10	·10	·10	·10	·10	·09	·09	2
3	·20	·20	·19	·19	·18	·17	·17	·17	·16	·16	·15	·15	·15	·14	·14	·14	3
4	·27	·26	·25	·25	·24	·23	·23	·22	·21	·21	·20	·20	·20	·19	·19	·18	4
5	·34	·33	·32	·31	·30	·29	·28	·28	·27	·26	·26	·25	·24	·24	·23	·23	5
6	·41	·39	·38	·37	·36	·35	·34	·33	·32	·31	·31	·30	·29	·29	·28	·27	6
7	·47	·46	·45	·43	·42	·41	·40	·39	·38	·37	·36	·35	·34	·34	·33	·32	7
8	·54	·53	·51	·49	·48	·47	·45	·44	·43	·42	·41	·40	·39	·38	·38	·37	8
9	·61	·59	·57	·56	·54	·53	·51	·50	·49	·47	·46	·45	·44	·43	·42	·41	9
10	·68	·66	·64	·62	·60	·59	·57	·56	·54	·53	·52	·50	·49	·48	·47	·46	10
11	·75	·73	·71	·68	·66	·65	·63	·61	·60	·58	·57	·55	·54	·53	·52	·51	11
12	·82	·80	·77	·75	·73	·71	·69	·67	·65	·64	·62	·61	·59	·58	·57	·56	12
13	·89	·86	·84	·81	·79	·77	·75	·73	·71	·69	·68	·66	·64	·63	·62	·60	13
14	·96	·93	·90	·88	·85	·83	·81	·79	·77	·75	·73	·71	·70	·68	·67	·65	14
15	1·04	1·00	·97	·94	·92	·89	·87	·84	·82	·80	·78	·77	·75	·73	·72	·70	15
16	1·11	1·07	1·04	1·01	·98	·95	·93	·90	·88	·86	·84	·82	·80	·78	·77	·75	16
17	1·18	1·14	1·11	1·08	1·05	1·02	·99	·96	·94	·92	·89	·87	·85	·83	·82	·80	17
18	1·26	1·22	1·18	1·14	1·11	1·08	1·05	1·02	1·00	·97	·95	·93	·91	·89	·87	·85	18
19	1·33	1·29	1·25	1·21	1·18	1·15	1·11	1·09	1·06	1·03	1·01	·98	·96	·94	·92	·90	19
20	1·41	1·36	1·32	1·28	1·24	1·21	1·18	1·15	1·12	1·09	1·06	1·04	1·02	·99	·97	·95	20
21	1·48	1·44	1·39	1·35	1·31	1·28	1·24	1·21	1·18	1·15	1·12	1·10	1·07	1·05	1·02	1·00	21
22	1·56	1·51	1·47	1·42	1·38	1·34	1·31	1·27	1·24	1·21	1·18	1·15	1·13	1·10	1·08	1·06	22
23	1·64	1·59	1·54	1·49	1·45	1·41	1·37	1·34	1·30	1·27	1·24	1·21	1·18	1·16	1·13	1·11	23
24	1·72	1·67	1·62	1·57	1·52	1·48	1·44	1·40	1·37	1·33	1·30	1·27	1·24	1·21	1·19	1·16	24
25	1·80	1·74	1·69	1·64	1·59	1·55	1·51	1·47	1·43	1·40	1·36	1·33	1·30	1·27	1·24	1·22	25
26	1·88	1·83	1·77	1·72	1·67	1·62	1·58	1·54	1·50	1·46	1·43	1·39	1·36	1·33	1·30	1·27	26
27	1·97	1·91	1·85	1·79	1·74	1·69	1·65	1·61	1·57	1·53	1·49	1·45	1·42	1·39	1·36	1·33	27
28	2·05	1·99	1·93	1·87	1·82	1·77	1·72	1·68	1·63	1·59	1·55	1·52	1·48	1·45	1·42	1·39	28
29	2·14	2·07	2·01	1·95	1·90	1·84	1·79	1·75	1·70	1·66	1·62	1·58	1·55	1·51	1·48	1·45	29
30	2·23	2·16	2·09	2·03	1·97	1·92	1·87	1·82	1·77	1·73	1·69	1·65	1·61	1·58	1·54	1·51	30
31	2·32	2·25	2·18	2·12	2·06	2·00	1·94	1·89	1·85	1·80	1·76	1·72	1·68	1·64	1·60	1·57	31
32	2·41	2·34	2·27	2·20	2·14	2·08	2·02	1·97	1·92	1·87	1·83	1·78	1·74	1·70	1·67	1·63	32
33	2·51	2·43	2·36	2·29	2·22	2·16	2·10	2·05	1·99	1·95	1·90	1·85	1·81	1·77	1·73	1·70	33
34	2·61	2·52	2·45	2·37	2·31	2·24	2·18	2·13	2·07	2·02	1·97	1·93	1·88	1·84	1·80	1·76	34
35	2·71	2·62	2·54	2·46	2·39	2·33	2·27	2·21	2·15	2·10	2·05	2·00	1·95	1·91	1·87	1·83	35
36	2·81	2·72	2·64	2·56	2·48	2·42	2·35	2·29	2·23	2·18	2·12	2·07	2·03	1·98	1·94	1·90	36
37	2·91	2·82	2·73	2·65	2·58	2·51	2·44	2·37	2·31	2·26	2·20	2·15	2·10	2·06	2·01	1·97	37
38	3·02	2·92	2·83	2·75	2·67	2·60	2·53	2·46	2·40	2·34	2·28	2·23	2·18	2·13	2·09	2·04	38
39	3·13	3·03	2·94	2·85	2·77	2·69	2·62	2·55	2·49	2·43	2·37	2·31	2·26	2·21	2·16	2·12	39
40	3·24	3·14	3·04	2·95	2·87	2·79	2·72	2·64	2·58	2·51	2·45	2·40	2·34	2·29	2·24	2·19	40
41	3·36	3·25	3·15	3·06	2·97	2·89	2·81	2·74	2·67	2·60	2·54	2·48	2·43	2·37	2·32	2·27	41
42	3·48	3·37	3·27	3·17	3·08	2·99	2·91	2·84	2·77	2·70	2·63	2·57	2·51	2·46	2·40	2·35	42
43	3·60	3·49	3·38	3·28	3·19	3·10	3·02	2·94	2·86	2·79	2·73	2·66	2·60	2·54	2·49	2·44	43
44	3·73	3·61	3·50	3·40	3·30	3·21	3·13	3·04	2·97	2·89	2·82	2·76	2·69	2·63	2·58	2·52	44
45	3·86	3·74	3·63	3·52	3·42	3·33	3·24	3·15	3·07	3·00	2·92	2·86	2·79	2·73	2·67	2·61	45
46	4·00	3·87	3·76	3·65	3·54	3·44	3·35	3·26	3·18	3·10	3·03	2·96	2·89	2·83	2·76	2·71	46
47	4·14	4·01	3·89	3·78	3·67	3·57	3·47	3·38	3·29	3·21	3·14	3·06	2·99	2·93	2·86	2·80	47
48	4·29	4·16	4·03	3·91	3·80	3·69	3·59	3·50	3·41	3·33	3·25	3·17	3·10	3·03	2·96	2·90	48
49	4·44	4·30	4·17	4·05	3·93	3·83	3·72	3·63	3·53	3·45	3·36	3·28	3·21	3·14	3·07	3·01	49
50	4·60	4·46	4·32	4·20	4·08	3·96	3·86	3·76	3·66	3·57	3·48	3·40	3·33	3·25	3·18	3·11	50
51	4·77	4·62	4·48	4·35	4·22	4·11	4·00	3·89	3·79	3·70	3·61	3·53	3·45	3·37	3·30	3·23	51
52	4·95	4·79	4·64	4·51	4·38	4·26	4·14	4·03	3·93	3·83	3·74	3·65	3·57	3·49	3·42	3·35	52
53	5·13	4·97	4·81	4·67	4·54	4·42	4·29	4·18	4·08	3·98	3·88	3·79	3·70	3·62	3·54	3·47	53
54	5·32	5·15	4·99	4·85	4·71	4·58	4·45	4·34	4·23	4·12	4·02	3·93	3·84	3·76	3·67	3·60	54
55	5·52	5·34	5·18	5·03	4·88	4·75	4·62	4·50	4·39	4·28	4·18	4·08	3·99	3·90	3·81	3·73	55
56	5·73	5·55	5·38	5·22	5·07	4·93	4·80	4·67	4·55	4·44	4·34	4·23	4·14	4·05	3·96	3·87	56
57	5·95	5·76	5·59	5·42	5·27	5·12	4·98	4·85	4·73	4·61	4·50	4·40	4·30	4·20	4·11	4·02	57
58	6·18	5·99	5·81	5·63	5·47	5·32	5·18	5·04	4·92	4·79	4·68	4·57	4·47	4·37	4·27	4·18	58
59	6·43	6·23	6·04	5·86	5·69	5·54	5·39	5·25	5·11	4·99	4·87	4·75	4·64	4·54	4·44	4·35	59
60	6·69	6·48	6·28	6·10	5·92	5·76	5·61	5·46	5·32	5·19	5·06	4·95	4·83	4·73	4·62	4·53	60
Dec.	165° 00′ 195° 00′	164° 30′ 195° 30′	164° 00′ 196° 00′	163° 30′ 196° 30′	163° 00′ 197° 00′	162° 30′ 197° 30′	162° 00′ 198° 00′	161° 30′ 198° 30′	161° 00′ 199° 00′	160° 30′ 199° 30′	160° 00′ 200° 00′	159° 30′ 200° 30′	159° 00′ 201° 00′	158° 30′ 201° 30′	158° 00′ 202° 00′	157° 30′ 202° 30′	Dec

HOUR ANGLE

B

B - Always named the **same** as Declination

B - Always named the **same** as Declination

TABLE A HOUR ANGLE

Lat °	22° 30′	23° 00′	23° 30′	24° 00′	24° 30′	25° 00′	25° 30′	26° 00′	26° 30′	27° 00′	27° 30′	28° 00′	28° 30′	29° 00′	29° 30′	30° 00′	Lat °
	337° 30′	337° 00′	336° 30′	336° 00′	335° 30′	335° 00′	334° 30′	334° 00′	333° 30′	333° 00′	332° 30′	332° 00′	331° 30′	331° 00′	330° 30′	330° 00′	
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·04	·04	·04	·04	·04	·04	·04	·04	·04	·03	·03	·03	·03	·03	·03	·03	1
2	·08	·08	·08	·08	·08	·08	·07	·07	·07	·07	·07	·07	·06	·06	·06	·06	2
3	·13	·12	·12	·12	·12	·11	·11	·11	·11	·10	·10	·10	·10	·09	·09	·09	3
4	·17	·16	·16	·16	·15	·15	·15	·14	·14	·14	·13	·13	·13	·13	·12	·12	4
5	·21	·21	·20	·20	·19	·19	·18	·18	·18	·17	·17	·16	·16	·16	·16	·15	5
6	·25	·25	·24	·24	·23	·23	·22	·22	·21	·21	·20	·20	·19	·19	·19	·18	6
7	·30	·29	·28	·28	·27	·26	·26	·25	·25	·24	·24	·23	·23	·22	·22	·21	7
8	·34	·33	·32	·32	·31	·30	·29	·29	·28	·28	·27	·26	·26	·25	·25	·24	8
9	·38	·37	·36	·36	·35	·34	·33	·32	·32	·31	·30	·30	·29	·29	·28	·27	9
10	·43	·42	·41	·40	·39	·38	·37	·36	·35	·35	·34	·33	·33	·32	·31	·31	10
11	·47	·46	·45	·44	·43	·42	·41	·40	·39	·38	·37	·37	·36	·35	·34	·34	11
12	·51	·50	·49	·48	·47	·46	·45	·44	·43	·42	·41	·40	·39	·38	·38	·37	12
13	·56	·54	·53	·52	·51	·50	·48	·47	·46	·45	·44	·43	·43	·42	·41	·40	13
14	·60	·59	·57	·56	·55	·53	·52	·51	·50	·49	·48	·47	·46	·45	·44	·43	14
15	·65	·63	·62	·60	·59	·57	·56	·55	·54	·53	·51	·50	·49	·48	·47	·46	15
16	·69	·68	·66	·64	·63	·61	·60	·59	·58	·56	·55	·54	·53	·52	·51	·50	16
17	·74	·72	·70	·69	·67	·66	·64	·63	·61	·60	·59	·58	·56	·55	·54	·53	17
18	·78	·77	·75	·73	·71	·70	·68	·67	·65	·64	·62	·61	·60	·59	·57	·56	18
19	·83	·81	·79	·77	·76	·74	·72	·71	·69	·68	·66	·65	·63	·62	·61	·60	19
20	·88	·86	·84	·82	·80	·78	·76	·75	·73	·71	·70	·68	·67	·66	·64	·63	20
21	·93	·90	·88	·86	·84	·82	·81	·79	·77	·75	·74	·72	·71	·69	·68	·66	21
22	·97	·95	·93	·91	·89	·87	·85	·83	·81	·79	·78	·76	·74	·73	·71	·70	22
23	1·02	1·00	·98	·95	·93	·91	·89	·87	·85	·83	·82	·80	·78	·77	·75	·74	23
24	1·07	1·05	1·02	1·00	·98	·95	·93	·91	·89	·87	·86	·84	·82	·80	·79	·77	24
25	1·13	1·10	1·07	1·05	1·02	1·00	·98	·96	·94	·92	·90	·88	·86	·84	·82	·81	25
26	1·18	1·15	1·12	1·10	1·07	1·05	1·02	1·00	·98	·96	·94	·92	·90	·88	·86	·84	26
27	1·23	1·20	1·17	1·14	1·12	1·09	1·07	1·04	1·02	1·00	·98	·96	·94	·92	·90	·88	27
28	1·28	1·25	1·22	1·19	1·17	1·14	1·11	1·09	1·07	1·04	1·02	1·00	·98	·96	·94	·92	28
29	1·34	1·31	1·27	1·25	1·22	1·19	1·16	1·14	1·11	1·09	1·06	1·04	1·02	1·00	·98	·96	29
30	1·39	1·36	1·33	1·30	1·27	1·24	1·21	1·18	1·16	1·13	1·11	1·09	1·06	1·04	1·02	1·00	30
31	1·45	1·42	1·38	1·35	1·32	1·29	1·26	1·23	1·21	1·18	1·15	1·13	1·11	1·08	1·06	1·04	31
32	1·51	1·47	1·44	1·40	1·37	1·34	1·31	1·28	1·25	1·23	1·20	1·18	1·15	1·13	1·10	1·08	32
33	1·57	1·53	1·49	1·46	1·42	1·39	1·36	1·33	1·30	1·27	1·25	1·22	1·20	1·17	1·15	1·12	33
34	1·63	1·59	1·55	1·51	1·48	1·45	1·41	1·38	1·35	1·32	1·30	1·27	1·24	1·22	1·19	1·17	34
35	1·69	1·65	1·61	1·57	1·54	1·50	1·47	1·44	1·40	1·37	1·35	1·32	1·29	1·26	1·24	1·21	35
36	1·75	1·71	1·67	1·63	1·59	1·56	1·52	1·49	1·46	1·43	1·40	1·37	1·34	1·31	1·28	1·26	36
37	1·82	1·78	1·73	1·69	1·65	1·62	1·58	1·55	1·51	1·48	1·45	1·42	1·39	1·36	1·33	1·31	37
38	1·89	1·84	1·80	1·75	1·71	1·68	1·64	1·60	1·57	1·53	1·50	1·47	1·44	1·41	1·38	1·35	38
39	1·95	1·91	1·86	1·82	1·78	1·74	1·70	1·66	1·62	1·59	1·56	1·52	1·49	1·46	1·43	1·40	39
40	2·03	1·98	1·93	1·88	1·84	1·80	1·76	1·72	1·68	1·65	1·61	1·58	1·55	1·51	1·48	1·45	40
41	2·10	2·05	2·00	1·95	1·91	1·86	1·82	1·78	1·74	1·71	1·67	1·63	1·60	1·57	1·54	1·51	41
42	2·17	2·12	2·07	2·02	1·98	1·93	1·89	1·85	1·81	1·77	1·73	1·69	1·66	1·62	1·59	1·56	42
43	2·25	2·20	2·14	2·09	2·05	2·00	1·96	1·91	1·87	1·83	1·79	1·75	1·72	1·68	1·65	1·62	43
44	2·33	2·28	2·22	2·17	2·12	2·07	2·02	1·98	1·94	1·90	1·86	1·82	1·78	1·74	1·71	1·67	44
45	2·41	2·36	2·30	2·25	2·19	2·14	2·10	2·05	2·01	1·96	1·92	1·88	1·84	1·80	1·77	1·73	45
46	2·50	2·44	2·38	2·33	2·27	2·22	2·17	2·12	2·08	2·03	1·99	1·95	1·91	1·87	1·83	1·79	46
47	2·59	2·53	2·47	2·41	2·35	2·30	2·25	2·20	2·15	2·10	2·06	2·02	1·98	1·93	1·90	1·86	47
48	2·68	2·62	2·55	2·49	2·44	2·38	2·33	2·28	2·23	2·18	2·13	2·09	2·05	2·00	1·96	1·92	48
49	2·78	2·71	2·65	2·58	2·52	2·47	2·41	2·36	2·31	2·26	2·21	2·16	2·12	2·08	2·03	1·99	49
50	2·88	2·81	2·74	2·68	2·62	2·56	2·50	2·44	2·39	2·34	2·29	2·24	2·19	2·15	2·11	2·06	50
51	2·98	2·91	2·84	2·77	2·71	2·65	2·59	2·53	2·48	2·42	2·37	2·32	2·27	2·23	2·18	2·14	51
52	3·09	3·02	2·94	2·87	2·81	2·74	2·68	2·62	2·57	2·51	2·46	2·41	2·36	2·31	2·26	2·22	52
53	3·20	3·13	3·05	2·98	2·91	2·85	2·78	2·72	2·66	2·60	2·55	2·50	2·44	2·39	2·35	2·30	53
54	3·32	3·24	3·17	3·09	3·02	2·95	2·89	2·82	2·76	2·70	2·64	2·59	2·53	2·48	2·43	2·38	54
55	3·45	3·36	3·28	3·21	3·13	3·06	2·99	2·93	2·86	2·80	2·74	2·69	2·63	2·58	2·52	2·47	55
56	3·58	3·49	3·41	3·33	3·25	3·18	3·11	3·04	2·97	2·91	2·85	2·79	2·73	2·67	2·62	2·57	56
57	3·72	3·63	3·54	3·46	3·38	3·30	3·23	3·16	3·09	3·02	2·96	2·90	2·84	2·78	2·72	2·67	57
58	3·86	3·77	3·68	3·59	3·51	3·43	3·36	3·28	3·21	3·14	3·07	3·01	2·95	2·89	2·83	2·77	58
59	4·02	3·92	3·83	3·74	3·65	3·57	3·49	3·41	3·34	3·27	3·20	3·13	3·07	3·00	2·94	2·88	59
60	4·18	4·08	3·98	3·89	3·80	3·71	3·63	3·55	3·47	3·40	3·33	3·26	3·19	3·12	3·06	3·00	60
Lat	157° 30′	157° 00′	156° 30′	156° 00′	155° 30′	155° 00′	154° 30′	154° 00′	153° 30′	153° 00′	152° 30′	152° 00′	151° 30′	151° 00′	150° 30′	150° 00′	Lat
	202° 30′	203° 00′	203° 30′	204° 00′	204° 30′	205° 00′	205° 30′	206° 00′	206° 30′	207° 00′	207° 30′	208° 00′	208° 30′	209° 00′	209° 30′	210° 00′	

A – Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A – Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A

HOUR ANGLE

TABLE B HOUR ANGLE

Dec. °	22° 30′ / 337° 30′	23° 00′ / 337° 00′	23° 30′ / 336° 30′	24° 00′ / 336° 00′	24° 30′ / 335° 30′	25° 00′ / 335° 00′	25° 30′ / 334° 30′	26° 00′ / 334° 00′	26° 30′ / 333° 30′	27° 00′ / 333° 00′	27° 30′ / 332° 30′	28° 00′ / 332° 00′	28° 30′ / 331° 30′	29° 00′ / 331° 00′	29° 30′ / 330° 30′	30° 00′ / 330° 00′	Dec. °
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·05	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·03	1
2	·09	·09	·09	·09	·08	·08	·08	·08	·08	·08	·08	·07	·07	·07	·07	·07	2
3	·14	·13	·13	·13	·13	·12	·12	·12	·12	·12	·11	·11	·11	11	·11	·10	3
4	·18	·18	18	·17	·17	·17	·16	·16	·16	·15	·15	·15	·15	·14	·14	·14	4
5	·23	·22	·22	·22	·21	·21	·20	·20	·20	·19	·19	·19	·18	·18	·18	·17	5
6	·27	·27	·26	·26	·25	·25	·24	·24	·24	·23	·23	·22	·22	·22	·21	·21	6
7	·32	·31	·31	·30	·30	·29	·29	·28	·28	·27	·27	·26	·26	·25	·25	·25	7
8	·37	·36	·35	·35	·34	·33	·33	·32	·31	·31	·30	·30	·29	·29	·29	·28	8
9	·41	·41	·40	·39	·38	·37	·37	·36	·35	·35	·34	·34	·33	·33	·32	·32	9
10	·46	·45	·44	·43	·43	·42	·41	·40	·40	·39	·38	·38	·37	·36	·36	·35	10
11	·51	·50	·49	·48	·47	·46	·45	·44	·44	·43	·42	·41	·41	·40	·39	·39	11
12	·56	·54	·53	·52	·51	·50	·49	·48	·48	·47	·46	·45	·45	·44	·43	·43	12
13	·60	·59	·58	·57	·56	·55	·54	·53	·52	·51	·50	·49	·48	·48	·47	·46	13
14	·65	64	·63	·61	·60	·59	·58	·57	·56	·55	·54	·53	·52	·51	·51	·50	14
15	·70	·69	·67	·66	·65	·63	·62	·61	·60	·59	·58	·57	·56	·55	·54	·54	15
16	·75	·73	·72	·71	·69	·68	·67	·65	·64	·63	·62	·61	·60	·59	·58	·57	16
17	·80	·78	·77	·75	·74	·72	·71	·70	·69	·67	·66	·65	·64	·63	·62	·61	17
18	·85	·83	·81	·80	·78	·77	·75	·74	·73	·72	·70	·69	·68	·67	·66	·65	18
19	·90	·88	·86	·85	·83	·81	·80	·79	·77	·76	·75	·73	·72	·71	·70	·69	19
20	·95	·93	·91	·89	·88	·86	·85	·83	·82	·80	·79	·78	·76	·75	·74	·73	20
21	1·00	·98	·96	·94	·93	·91	·89	·88	·86	·85	·83	·82	·80	·79	·78	·77	21
22	1·06	1·03	1·01	·99	·97	·96	·94	·92	·91	·89	·87	·86	·85	·83	·82	·81	22
23	1·11	1·09	1·06	1·04	1·02	1·00	·99	·97	·95	·93	·92	·90	·89	·88	·86	·85	23
24	1·16	1·14	1·12	1·09	1·07	1·05	1·03	1·02	1·00	·98	·96	·95	·93	·92	·90	·89	24
25	1·22	1·19	1·17	1·15	1·12	1·10	1·08	1·06	1·05	1·03	1·01	·99	·98	·96	·95	·93	25
26	1·27	1·25	1·22	1·20	1·18	1·15	1·13	1·11	1·09	1·07	1·06	1·04	1·02	1·01	·99	·98	26
27	1·33	1·30	1·28	1·25	1·23	1·21	1·18	1·16	1·14	1·12	1·10	1·09	1·07	1·05	1·03	1·02	27
28	1·39	1·36	1·33	1·31	1·28	1·26	1·24	1·21	1·19	1·17	1·15	1·13	1·11	1·10	1·08	1·06	28
29	1·45	1·42	1·39	1·36	1·34	1·31	1·29	1·26	1·24	1·22	1·20	1·18	1·16	1·14	1·13	1·11	29
30	1·51	1·48	1·45	1·42	1·39	1·37	1·34	1·32	1·29	1·27	1·25	1·23	1·21	1·19	1·17	1·15	30
31	1·57	1·54	1·51	1·48	1·45	1·42	1·40	1·37	1·35	1·32	1·30	1·28	1·26	1·24	1·22	1·20	31
32	1·63	1·60	1·57	1·54	1·51	1·48	1·45	1·43	1·40	1·38	1·35	1·33	1·31	1·29	1·27	1·25	32
33	1·70	1·66	1·63	1·60	1·57	1·54	1·51	1·48	1·46	1·43	1·41	1·38	1·36	1·34	1·32	1·30	33
34	1·76	1·73	1·69	1·66	1·63	1·60	1·57	1·54	1·51	1·49	1·46	1·44	1·41	1·39	1·37	1·35	34
35	1·83	1·79	1·76	1·72	1·69	1·66	1·63	1·60	1·57	1·54	1·52	1·49	1·47	1·44	1·42	1·40	35
36	1·90	1·86	1·82	1·79	1·75	1·72	1·69	1·66	1·63	1·60	1·57	1·55	1·52	1·50	1·48	1·45	36
37	1·97	1·93	1·89	1·85	1·82	1·78	1·75	1·72	1·69	1·66	1·63	1·61	1·58	1·55	1·53	1·51	37
38	2·04	2·00	1·96	1·92	1·88	1·85	1·81	1·78	1·75	1·72	1·69	1·66	1·64	1·61	1·59	1·56	38
39	2·12	2·07	2·03	1·99	1·95	1·92	1·88	1·85	1·81	1·78	1·75	1·72	1·70	1·67	1·64	1·62	39
40	2·19	2·15	2·10	2·06	2·02	1·99	1·95	1·91	1·88	1·85	1·82	1·79	1·76	1·73	1·70	1·68	40
41	2·27	2·22	2·18	2·14	2·10	2·06	2·02	1·98	1·95	1·91	1·88	1·85	1·82	1·79	1·77	1·74	41
42	2·35	2·30	2·26	2·21	2·17	2·13	2·09	2·05	2·02	1·98	1·95	1·92	1·89	1·86	1·83	1·80	42
43	2·44	2·39	2·34	2·29	2·25	2·21	2·17	2·13	2·09	2·05	2·02	1·99	1·95	1·92	1·89	1·87	43
44	2·52	2·47	2·42	2·37	2·33	2·29	2·24	2·20	2·16	2·13	2·09	2·06	2·02	1·99	1·96	1·93	44
45	2·61	2·56	2·51	2·46	2·41	2·37	2·32	2·28	2·24	2·20	2·17	2·13	2·10	2·06	2·03	2·00	45
46	2·71	2·65	2·60	2·55	2·50	2·45	2·41	2·36	2·32	2·28	2·24	2·21	2·17	2·14	2·10	2·07	46
47	2·80	2·74	2·69	2·64	2·59	2·54	2·49	2·45	2·40	2·36	2·32	2·28	2·25	2·21	2·18	2·14	47
48	2·90	2·84	2·79	2·73	2·68	2·63	2·58	2·53	2·49	2·45	2·41	2·37	2·33	2·29	2·26	2·22	48
49	3·01	2·94	2·88	2·83	2·77	2·72	2·67	2·62	2·58	2·53	2·49	2·45	2·41	2·37	2·34	2·30	49
50	3·11	3·05	2·99	2·93	2·87	2·82	2·77	2·72	2·67	2·63	2·58	2·54	2·50	2·46	2·42	2·38	50
51	3·23	3·16	3·10	3·04	2·98	2·92	2·87	2·82	2·77	2·72	2·67	2·63	2·59	2·55	2·51	2·47	51
52	3·35	3·28	3·21	3·15	3·09	3·03	2·97	2·92	2·87	2·82	2·77	2·73	2·68	2·64	2·60	2·56	52
53	3·47	3·40	3·33	3·26	3·20	3·14	3·08	3·03	2·97	2·92	2·87	2·83	2·78	2·74	2·69	2·65	53
54	3·60	3·52	3·45	3·38	3·32	3·26	3·20	3·14	3·08	3·03	2·98	2·93	2·88	2·84	2·80	2·75	54
55	3·73	3·66	3·58	3·51	3·44	3·38	3·32	3·26	3·20	3·15	3·09	3·04	2·99	2·95	2·90	2·86	55
56	3·87	3·79	3·72	3·65	3·58	3·51	3·44	3·38	3·32	3·27	3·21	3·16	3·11	3·06	3·01	2·97	56
57	4·02	3·94	3·86	3·79	3·71	3·64	3·58	3·51	3·45	3·39	3·34	3·28	3·23	3·18	3·13	3·08	57
58	4·18	4·10	4·01	3·93	3·86	3·79	3·72	3·65	3·59	3·53	3·47	3·41	3·35	3·30	3·25	3·20	58
59	4·35	4·26	4·17	4·09	4·01	3·94	3·87	3·80	3·73	3·67	3·60	3·55	3·49	3·43	3·38	3·33	59
60	4·53	4·43	4·34	4·26	4·18	4·10	4·02	3·95	3·88	3·82	3·75	3·69	3·63	3·57	3·52	3·46	60
Dec.	157° 30′ / 202° 30′	157° 00′ / 203° 00′	156° 30′ / 203° 30′	156° 00′ / 204° 00′	155° 30′ / 204° 30′	155° 00′ / 205° 00′	154° 30′ / 205° 30′	154° 00′ / 206° 00′	153° 30′ / 206° 30′	153° 00′ / 207° 00′	152° 30′ / 207° 30′	152° 00′ / 208° 00′	151° 30′ / 208° 30′	151° 00′ / 209° 00′	150° 30′ / 209° 30′	150° 00′ / 210° 00′	Dec.

HOUR ANGLE

B - Always named the **same** as Declination

B - Always named the **same** as Declination

B

TABLE A HOUR ANGLE

Lat °	30° 330°	31° 329°	32° 328°	33° 327°	34° 326°	35° 325°	36° 324°	37° 323°	38° 322°	39° 321°	40° 320°	41° 319°	42° 318°	43° 317°	44° 316°	45° 315°	Lat °
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·03	·03	·03	·03	·03	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	1
2	·06	·06	·06	·05	·05	·05	·05	·05	·04	·04	·04	·04	·04	·04	·04	·04	2
3	·09	·09	·08	·08	·08	·07	·07	·07	·07	·06	·06	·06	·06	·06	·05	·05	3
4	·12	·12	·11	·11	·10	·10	·10	·09	·09	·09	·08	·08	·08	·07	·07	·07	4
5	·15	·15	·14	·13	·13	·12	·12	·12	·11	·11	·10	·10	·10	·09	·09	·09	5
6	·18	·17	·17	·16	·16	·15	·14	·14	·13	·13	·13	·12	·12	·11	·11	·11	6
7	·21	·20	·20	·19	·18	·18	·17	·16	·16	·15	·15	·14	·14	·13	·13	·12	7
8	·24	·23	·22	·22	·21	·20	·19	·19	·18	·17	·17	·16	·16	·15	·15	·14	8
9	·27	·26	·25	·24	·23	·23	·22	·21	·20	·20	·19	·18	·18	·17	·16	·16	9
10	·31	·29	·28	·27	·26	·25	·24	·23	·23	·22	·21	·20	·20	·19	·18	·18	10
11	·34	·32	·31	·30	·29	·28	·27	·26	·25	·24	·23	·22	·22	·21	·20	·19	11
12	·37	·35	·34	·33	·32	·30	·29	·28	·27	·26	·25	·24	·24	·23	·22	·21	12
13	·40	·38	·37	·36	·34	·33	·32	·31	·30	·29	·28	·27	·26	·25	·24	·23	13
14	·43	·41	·40	·38	·37	·36	·34	·33	·32	·31	·30	·29	·27	·27	·26	·25	14
15	·46	·45	·43	·41	·40	·38	·37	·36	·34	·33	·32	·31	·30	·29	·28	·27	15
16	·50	·48	·46	·44	·43	·41	·39	·38	·37	·35	·34	·33	·32	·31	·30	·29	16
17	·53	·51	·49	·47	·45	·44	·42	·41	·39	·38	·36	·35	·34	·33	·32	·31	17
18	·56	·54	·52	·50	·48	·46	·45	·43	·42	·40	·39	·37	·36	·35	·34	·32	18
19	·60	·57	·55	·53	·51	·49	·47	·46	·44	·43	·41	·40	·38	·37	·36	·34	19
20	·63	·61	·58	·56	·54	·52	·50	·48	·47	·45	·43	·42	·40	·39	·38	·36	20
21	·66	·64	·61	·59	·57	·55	·53	·51	·49	·47	·46	·44	·43	·41	·40	·38	21
22	·70	·67	·65	·62	·60	·58	·56	·54	·52	·50	·48	·46	·45	·43	·42	·40	22
23	·74	·71	·68	·65	·63	·61	·58	·56	·54	·52	·51	·49	·47	·45	·44	·42	23
24	·77	·74	·71	·69	·66	·64	·61	·59	·57	·55	·53	·51	·49	·48	·46	·45	24
25	·81	·78	·75	·72	·69	·67	·64	·62	·60	·58	·56	·54	·52	·50	·48	·47	25
26	·84	·81	·78	·75	·72	·70	·67	·65	·62	·60	·58	·56	·54	·52	·51	·49	26
27	·88	·85	·82	·78	·76	·73	·70	·68	·65	·63	·61	·59	·57	·55	·53	·51	27
28	·92	·88	·85	·82	·79	·76	·73	·71	·68	·66	·63	·61	·59	·57	·55	·53	28
29	·96	·92	·89	·85	·82	·79	·76	·74	·71	·68	·66	·64	·62	·59	·57	·55	29
30	1·00	·96	·92	·89	·86	·82	·79	·77	·74	·71	·69	·66	·64	·62	·60	·58	30
31	1·04	1·00	·96	·93	·89	·86	·83	·80	·77	·74	·72	·69	·67	·64	·62	·60	31
32	1·08	1·04	1·00	·96	·93	·89	·86	·83	·80	·77	·74	·72	·69	·67	·65	·62	32
33	1·12	1·08	1·04	1·00	·96	·93	·89	·86	·83	·80	·77	·75	·72	·70	·67	·65	33
34	1·17	1·12	1·08	1·04	1·00	·96	·93	·90	·86	·83	·80	·78	·75	·72	·70	·67	34
35	1·21	1·17	1·12	1·08	1·04	1·00	·96	·93	·90	·86	·83	·81	·78	·75	·73	·70	35
36	1·26	1·21	1·16	1·12	1·08	1·04	1·00	·96	·93	·90	·87	·84	·81	·78	·75	·73	36
37	1·31	1·25	1·21	1·16	1·12	1·08	1·04	1·00	·96	·93	·90	·87	·84	·81	·78	·75	37
38	1·35	1·30	1·25	1·20	1·16	1·12	1·08	1·04	1·00	·96	·93	·90	·87	·84	·81	·78	38
39	1·40	1·35	1·30	1·25	1·20	1·16	1·11	1·07	1·04	1·00	·97	·93	·90	·87	·84	·81	39
40	1·45	1·40	1·34	1·29	1·24	1·20	1·15	1·11	1·07	1·04	1·00	·97	·93	·90	·87	·84	40
41	1·51	1·45	1·39	1·34	1·29	1·24	1·20	1·15	1·11	1·07	1·04	1·00	·97	·93	·90	·87	41
42	1·56	1·50	1·44	1·39	1·33	1·29	1·24	1·19	1·15	1·11	1·07	1·04	1·00	·97	·93	·90	42
43	1·62	1·55	1·49	1·44	1·38	1·33	1·28	1·24	1·19	1·15	1·11	1·07	1·04	1·00	·97	·93	43
44	1·67	1·61	1·55	1·49	1·43	1·38	1·33	1·28	1·24	1·19	1·15	1·11	1·07	1·04	1·00	·97	44
45	1·73	1·66	1·60	1·54	1·48	1·43	1·38	1·33	1·28	1·23	1·19	1·15	1·11	1·07	1·04	1·00	45
46	1·79	1·72	1·66	1·59	1·54	1·48	1·43	1·37	1·33	1·28	1·23	1·19	1·15	1·11	1·07	1·04	46
47	1·86	1·78	1·72	1·65	1·59	1·53	1·48	1·42	1·37	1·32	1·28	1·23	1·19	1·15	1·11	1·07	47
48	1·92	1·85	1·78	1·71	1·65	1·59	1·53	1·47	1·42	1·37	1·32	1·28	1·23	1·19	1·15	1·11	48
49	1·99	1·91	1·84	1·77	1·71	1·64	1·58	1·53	1·47	1·42	1·37	1·32	1·28	1·23	1·19	1·15	49
50	2·06	1·98	1·91	1·84	1·77	1·70	1·64	1·58	1·53	1·47	1·42	1·37	1·32	1·28	1·23	1·19	50
51	2·14	2·06	1·98	1·90	1·83	1·76	1·70	1·64	1·58	1·52	1·47	1·42	1·37	1·32	1·28	1·23	51
52	2·22	2·13	2·05	1·97	1·90	1·83	1·76	1·70	1·64	1·58	1·52	1·47	1·42	1·37	1·33	1·28	52
53	2·30	2·21	2·12	2·04	1·97	1·90	1·83	1·76	1·70	1·64	1·58	1·52	1·47	1·42	1·37	1·33	53
54	2·38	2·29	2·20	2·12	2·04	1·97	1·89	1·83	1·76	1·70	1·64	1·58	1·53	1·48	1·43	1·38	54
55	2·47	2·38	2·29	2·20	2·12	2·04	1·97	1·90	1·83	1·76	1·70	1·64	1·59	1·53	1·48	1·43	55
56	2·57	2·47	2·37	2·28	2·20	2·12	2·04	1·97	1·90	1·83	1·77	1·71	1·65	1·59	1·54	1·48	56
57	2·67	2·56	2·46	2·37	2·28	2·20	2·12	2·04	1·97	1·90	1·84	1·77	1·71	1·65	1·59	1·54	57
58	2·77	2·66	2·56	2·46	2·37	2·29	2·20	2·12	2·05	1·98	1·91	1·84	1·78	1·72	1·66	1·60	58
59	2·88	2·77	2·66	2·56	2·47	2·38	2·29	2·21	2·13	2·06	1·98	1·91	1·85	1·78	1·72	1·66	59
60	3·00	2·88	2·77	2·67	2·57	2·47	2·38	2·30	2·22	2·14	2·06	1·99	1·92	1·86	1·79	1·73	60
Lat	150° 210°	149° 211°	148° 212°	147° 213°	146° 214°	145° 215°	144° 216°	143° 217°	142° 218°	141° 219°	140° 220°	139° 221°	138° 222°	137° 223°	136° 224°	135° 225°	Lat

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A HOUR ANGLE

TABLE B HOUR ANGLE

Dec °	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	41°	42°	43°	44°	45°	Dec °
	330°	329°	328°	327°	326°	325°	324°	323°	322°	321°	320°	319°	318°	317°	316°	315°	
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·03	·03	·03	·03	·03	·03	·03	·03	·03	·03	·03	·03	·03	·03	·03	·02	1
2	·07	·07	·07	·06	·06	·06	·06	·06	·06	·06	·05	·05	·05	·05	·05	·05	2
3	·10	·10	·10	·10	·09	·09	·09	·09	·09	·08	·08	·08	·08	·08	·08	·07	3
4	·14	·14	·13	·13	·13	·12	·12	·12	·11	·11	·11	·11	·10	·10	·10	·10	4
5	·17	·17	·17	·16	·16	·15	·15	·15	·14	·14	·14	·13	·13	·13	·13	·12	5
6	·21	·20	·20	·19	·19	·18	·18	·17	·17	·17	·16	·16	·16	·15	·15	·15	6
7	·25	·24	·23	·23	·22	·21	·21	·20	·20	·20	·19	·19	·18	·18	·18	·17	7
8	·28	·27	·27	·26	·25	·25	·24	·23	·23	·22	·22	·21	·21	·21	·20	·20	8
9	·32	·31	·30	·29	·28	·28	·27	·26	·26	·25	·25	·24	·24	·23	·23	·22	9
10	·35	·34	·33	·32	·32	·31	·30	·29	·29	·28	·27	·27	·26	·26	·25	·25	10
11	·39	·38	·37	·36	·35	·34	·33	·32	·32	·31	·30	·30	·29	·29	·28	·27	11
12	·43	·41	·40	·39	·38	·37	·36	·35	·35	·34	·33	·32	·32	·31	·31	·30	12
13	·46	·45	·44	·42	·41	·40	·39	·38	·37	·37	·36	·35	·35	·34	·33	·33	13
14	·50	·48	·47	·46	·45	·43	·42	·41	·40	·40	·39	·38	·37	·37	·36	·35	14
15	·54	·52	·51	·49	·48	·47	·46	·45	·44	·43	·42	·41	·40	·39	·39	·38	15
16	·57	·56	·54	·53	·51	·50	·49	·48	·47	·46	·45	·44	·43	·42	·41	·41	16
17	·61	·59	·58	·56	·55	·53	·52	·51	·50	·49	·48	·47	·46	·45	·44	·43	17
18	·65	·63	·61	·60	·58	·57	·55	·54	·53	·52	·51	·50	·49	·48	·47	·46	18
19	·69	·67	·65	·63	·62	·60	·59	·57	·56	·55	·54	·52	·51	·50	·50	·49	19
20	·73	·71	·69	·67	·65	·63	·62	·60	·59	·58	·57	·55	·54	·53	·52	·51	20
21	·77	·75	·72	·70	·69	·67	·65	·64	·62	·61	·60	·59	·57	·56	·55	·54	21
22	·81	·78	·76	·74	·72	·70	·69	·67	·66	·64	·63	·62	·60	·59	·58	·57	22
23	·85	·82	·80	·78	·76	·74	·72	·71	·69	·67	·66	·65	·63	·62	·61	·60	23
24	·89	·86	·84	·82	·80	·78	·76	·74	·72	·71	·69	·68	·67	·65	·64	·63	24
25	·93	·91	·88	·86	·83	·81	·79	·77	·76	·74	·73	·71	·70	·68	·67	·66	25
26	·98	·95	·92	·90	·87	·85	·83	·81	·79	·78	·76	·74	·73	·72	·70	·69	26
27	1·02	·99	·96	·94	·91	·89	·87	·85	·83	·81	·79	·78	·76	·75	·73	·72	27
28	1·06	1·03	1·00	·98	·95	·93	·90	·88	·86	·84	·83	·81	·79	·78	·77	·75	28
29	1·11	1·08	1·05	1·02	·99	·97	·94	·92	·90	·88	·86	·84	·83	·81	·80	·78	29
30	1·15	1·12	1·09	1·06	1·03	1·01	·98	·96	·94	·92	·90	·88	·86	·85	·83	·82	30
31	1·20	1·17	1·13	1·10	1·07	1·05	1·02	1·00	·98	·95	·93	·92	·90	·88	·87	·85	31
32	1·25	1·21	1·18	1·15	1·12	1·09	1·06	1·04	1·01	·99	·97	·95	·93	·92	·90	·88	32
33	1·30	1·26	1·23	1·19	1·16	1·13	1·11	1·08	1·05	1·03	1·01	·99	·97	·95	·93	·92	33
34	1·35	1·31	1·27	1·24	1·21	1·18	1·15	1·12	1·10	1·07	1·05	1·03	1·01	·99	·97	·96	34
35	1·40	1·36	1·32	1·29	1·25	1·22	1·19	1·16	1·14	1·11	1·09	1·07	1·05	1·03	1·01	·99	35
36	1·45	1·41	1·37	1·33	1·30	1·27	1·24	1·21	1·18	1·15	1·13	1·11	1·09	1·07	1·05	1·03	36
37	1·51	1·46	1·42	1·38	1·35	1·31	1·28	1·25	1·22	1·20	1·17	1·15	1·13	1·10	1·08	1·07	37
38	1·56	1·52	1·47	1·43	1·40	1·36	1·33	1·30	1·27	1·24	1·22	1·19	1·17	1·15	1·12	1·11	38
39	1·62	1·57	1·53	1·49	1·45	1·41	1·38	1·35	1·32	1·29	1·26	1·23	1·21	1·19	1·17	1·15	39
40	1·68	1·63	1·58	1·54	1·50	1·46	1·43	1·39	1·36	1·33	1·31	1·28	1·25	1·23	1·21	1·19	40
41	1·74	1·69	1·64	1·60	1·55	1·52	1·48	1·44	1·41	1·38	1·35	1·33	1·30	1·27	1·25	1·23	41
42	1·80	1·75	1·70	1·65	1·61	1·57	1·53	1·50	1·46	1·43	1·40	1·37	1·35	1·32	1·30	1·28	42
43	1·87	1·81	1·76	1·71	1·67	1·63	1·59	1·55	1·51	1·48	1·45	1·42	1·39	1·37	1·34	1·32	43
44	1·93	1·87	1·82	1·77	1·73	1·68	1·64	1·60	1·57	1·53	1·50	1·47	1·44	1·42	1·39	1·37	44
45	2·00	1·94	1·89	1·84	1·79	1·74	1·70	1·66	1·62	1·59	1·56	1·52	1·49	1·47	1·44	1·41	45
46	2·07	2·01	1·95	1·90	1·85	1·81	1·76	1·72	1·68	1·65	1·61	1·58	1·55	1·52	1·49	1·47	46
47	2·14	2·08	2·02	1·97	1·92	1·87	1·82	1·78	1·74	1·70	1·67	1·63	1·60	1·57	1·54	1·52	47
48	2·22	2·16	2·10	2·04	1·99	1·94	1·89	1·85	1·80	1·76	1·73	1·69	1·66	1·63	1·60	1·57	48
49	2·30	2·23	2·17	2·11	2·06	2·01	1·96	1·91	1·87	1·83	1·79	1·75	1·72	1·69	1·66	1·63	49
50	2·38	2·31	2·25	2·19	2·13	2·08	2·03	1·98	1·94	1·89	1·85	1·82	1·78	1·75	1·72	1·69	50
51	2·47	2·40	2·33	2·27	2·21	2·15	2·10	2·05	2·01	1·96	1·92	1·88	1·85	1·81	1·78	1·75	51
52	2·56	2·49	2·42	2·35	2·29	2·23	2·18	2·13	2·08	2·03	1·99	1·95	1·91	1·88	1·84	1·81	52
53	2·65	2·58	2·50	2·44	2·37	2·31	2·26	2·21	2·16	2·11	2·06	2·02	1·98	1·95	1·91	1·88	53
54	2·75	2·67	2·60	2·53	2·46	2·40	2·34	2·29	2·24	2·19	2·14	2·10	2·06	2·02	1·98	1·95	54
55	2·86	2·77	2·70	2·62	2·55	2·49	2·43	2·37	2·32	2·27	2·22	2·18	2·13	2·09	2·06	2·02	55
56	2·97	2·88	2·80	2·72	2·65	2·58	2·52	2·46	2·41	2·36	2·31	2·26	2·22	2·17	2·13	2·10	56
57	3·08	2·99	2·91	2·83	2·75	2·68	2·62	2·56	2·50	2·45	2·40	2·35	2·30	2·26	2·22	2·18	57
58	3·20	3·11	3·02	2·94	2·86	2·79	2·72	2·66	2·60	2·54	2·49	2·44	2·39	2·35	2·30	2·27	58
59	3·33	3·23	3·14	3·06	2·98	2·90	2·83	2·77	2·70	2·64	2·59	2·54	2·49	2·44	2·40	2·36	59
60	3·46	3·36	3·27	3·18	3·10	3·02	2·95	2·88	2·81	2·75	2·69	2·64	2·59	2·54	2·49	2·45	60
Dec.	150°	149°	148°	147°	146°	145°	144°	143°	142°	141°	140°	139°	138	137°	136°	135°	Dec.
	210°	211°	212°	213°	214°	215°	216°	217°	218°	219°	220°	221°	222°	223°	224°	225°	

HOUR ANGLE

B

B - Always named the **same** as Declination

B - Always named the **same** as Declination

TABLE A HOUR ANGLE

Lat °	45°	46°	47°	48°	49°	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	Lat °
	315°	314°	313°	312°	311°	310°	309°	308°	307°	306°	305°	304°	303°	302°	301°	300°	
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·02	·02	·02	·02	·02	·01	·01	·01	·01	·01	·01	·01	·01	·01	·01	·01	1
2	·03	·03	·03	·03	·03	·03	·03	·03	·03	·03	·02	·02	·02	·02	·02	·02	2
3	·05	·05	·05	·05	·05	·04	·04	·04	·04	·04	·04	·04	·03	·03	·03	·03	3
4	·07	·07	·07	·06	·06	·06	·06	·05	·05	·05	·05	·05	·05	·04	·04	·04	4
5	·09	·08	·08	·08	·08	·07	·07	·07	·07	·06	·06	·06	·06	·05	·05	·05	5
6	·11	·10	·10	·09	·09	·09	·09	·08	·08	·08	·07	·07	·07	·07	·06	·06	6
7	·12	·12	·11	·11	·11	·10	·10	·10	·09	·09	·09	·08	·08	·08	·07	·07	7
8	·14	·14	·13	·13	·12	·12	·11	·11	·11	·10	·10	·09	·09	·09	·08	·08	8
9	·16	·15	·15	·14	·14	·13	·13	·12	·12	·12	·11	·11	·10	·10	·10	·09	9
10	·18	·17	·16	·16	·15	·15	·14	·14	·13	·13	·12	·12	·11	·11	·11	·10	10
11	·19	·19	·18	·18	·17	·16	·16	·15	·15	·14	·14	·13	·13	·12	·12	·11	11
12	·21	·21	·20	·19	·18	·18	·17	·17	·16	·15	·15	·14	·14	·13	·13	·12	12
13	·23	·22	·22	·21	·20	·19	·19	·18	·17	·17	·16	·16	·15	·14	·14	·13	13
14	·25	·24	·23	·22	·22	·21	·20	·19	·19	·18	·17	·17	·16	·16	·15	·14	14
15	·27	·26	·25	·24	·23	·22	·22	·21	·20	·19	·19	·18	·17	·17	·16	·15	15
16	·29	·28	·27	·26	·25	·24	·23	·22	·22	·21	·20	·19	·19	·18	·17	·17	16
17	·31	·30	·29	·28	·27	·26	·25	·24	·23	·22	·21	·21	·20	·19	·18	·18	17
18	·32	·31	·30	·29	·28	·27	·26	·25	·24	·24	·23	·22	·21	·20	·20	·19	18
19	·34	·33	·32	·31	·30	·29	·28	·27	·26	·25	·24	·23	·22	·22	·21	·20	19
20	·36	·35	·34	·33	·32	·31	·29	·28	·27	·26	·25	·25	·24	·23	·22	·21	20
21	·38	·37	·36	·35	·33	·32	·31	·30	·29	·28	·27	·26	·25	·24	·23	·22	21
22	·40	·39	·38	·36	·35	·34	·33	·32	·30	·29	·28	·27	·26	·25	·24	·23	22
23	·42	·41	·40	·38	·37	·36	·34	·33	·32	·31	·30	·29	·28	·27	·26	·25	23
24	·45	·43	·42	·40	·39	·37	·36	·35	·34	·32	·31	·30	·29	·28	·27	·26	24
25	·47	·45	·44	·42	·41	·39	·38	·36	·35	·34	·33	·31	·30	·29	·28	·27	25
26	·49	·47	·46	·44	·42	·41	·39	·38	·37	·35	·34	·33	·32	·30	·29	·28	26
27	·51	·49	·48	·46	·44	·43	·41	·40	·38	·37	·36	·34	·33	·32	·31	·29	27
28	·53	·51	·50	·48	·46	·45	·43	·42	·40	·39	·37	·36	·35	·33	·32	·31	28
29	·55	·54	·52	·50	·48	·47	·45	·43	·42	·40	·39	·37	·36	·35	·33	·32	29
30	·58	·56	·54	·52	·50	·48	·47	·45	·44	·42	·40	·39	·37	·36	·35	·33	30
31	·60	·58	·56	·54	·52	·50	·49	·47	·45	·44	·42	·40	·39	·38	·36	·35	31
32	·62	·60	·58	·56	·54	·52	·51	·49	·47	·45	·44	·42	·41	·39	·38	·36	32
33	·65	·63	·61	·58	·56	·55	·53	·51	·49	·47	·45	·44	·42	·41	·39	·37	33
34	·67	·65	·63	·61	·59	·57	·55	·53	·51	·49	·47	·46	·44	·42	·41	·39	34
35	·70	·68	·65	·63	·61	·59	·57	·55	·53	·51	·49	·47	·45	·44	·42	·40	35
36	·73	·70	·68	·65	·63	·61	·59	·57	·55	·53	·51	·49	·47	·45	·44	·42	36
37	·75	·73	·70	·68	·66	·63	·61	·59	·57	·55	·53	·51	·49	·47	·45	·44	37
38	·78	·75	·73	·70	·68	·66	·63	·61	·59	·57	·55	·53	·51	·49	·47	·45	38
39	·81	·78	·76	·73	·70	·68	·66	·63	·61	·59	·57	·55	·53	·51	·49	·47	39
40	·84	·81	·78	·76	·73	·70	·68	·66	·63	·61	·59	·57	·55	·52	·50	·48	40
41	·87	·84	·81	·78	·76	·73	·70	·68	·66	·63	·61	·59	·56	·54	·52	·50	41
42	·90	·87	·84	·81	·78	·76	·73	·70	·68	·65	·63	·61	·58	·56	·54	·52	42
43	·93	·90	·87	·84	·81	·78	·76	·73	·70	·68	·65	·63	·61	·58	·56	·54	43
44	·97	·93	·90	·87	·84	·81	·78	·75	·73	·70	·68	·65	·63	·60	·58	·56	44
45	1·00	·97	·93	·90	·87	·84	·81	·78	·75	·73	·70	·68	·65	·63	·60	·58	45
46	1·04	1·00	·97	·93	·90	·87	·84	·81	·78	·75	·73	·70	·67	·65	·62	·60	46
47	1·07	1·04	1·00	·97	·93	·90	·87	·84	·81	·78	·75	·72	·70	·67	·64	·62	47
48	1·11	1·07	1·04	1·00	·97	·93	·90	·87	·84	·81	·78	·75	·72	·69	·67	·64	48
49	1·15	1·11	1·07	1·04	1·00	·97	·93	·90	·87	·84	·81	·78	·75	·72	·69	·66	49
50	1·19	1 15	1·11	1·07	1·04	1·00	·97	·93	·90	·87	·83	·80	·77	·75	·72	·69	50
51	1·23	1·19	1·15	1·11	1·07	1·04	1·00	·97	·93	·90	·86	·83	·80	·77	·74	71	51
52	1·28	1·24	1·19	1·15	1·11	1·07	1·04	1·00	·96	·93	·90	·86	·83	·80	·77	·74	52
53	1·33	1·28	1·24	1·19	1·15	1·11	1·07	1·04	1·00	·96	·93	·90	·86	·83	·80	·77	53
54	1·38	1·33	1·28	1·24	1·20	1·15	1·11	1·08	1·04	1·00	·96	·93	·89	·86	·83	·79	54
55	1·43	1·38	1·33	1·29	1·24	1·20	1·16	1·12	1·08	1·04	1·00	·96	·93	·89	·86	·82	55
56	1·48	1·43	1·38	1·34	1·29	1·24	1·20	1·16	1·12	1·08	1·04	1·00	·96	·93	·89	·86	56
57	1·54	1·49	1·44	1·39	1·34	1·29	1·25	1·20	1·16	1·12	1·08	1·04	1·00	·96	·93	·89	57
58	1·60	1·55	1·49	1·44	1·39	1·34	1·30	1·25	1·21	1·16	1·12	1·08	1·04	1·00	·96	·92	58
59	1·66	1·61	1·55	1·50	1·45	1·40	1·35	1·30	1·25	1·21	1·17	1·12	1 08	1·04	1·00	·96	59
60	1·73	1·67	1·62	1·56	1·51	1·45	1·40	1·35	1·31	1·26	1·21	1·17	1·12	1·08	1·04	1·00	60
Lat	135°	134°	133°	132°	131°	130°	129°	128°	127°	126°	125°	124°	123°	122°	121°	120°	Lat
	225°	226°	227°	228°	229°	230°	231°	232°	233°	234°	235°	236°	237°	238°	239°	240°	

HOUR ANGLE

A

A – Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A – Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

TABLE B HOUR ANGLE

Dec °	45°	46°	47°	48°	49°	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	Dec °
	315°	314°	313°	312°	311°	310°	309°	308°	307°	306°	305°	304°	303°	302°	301°	300°	
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	1
2	·05	·05	·05	·05	·05	·05	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	2
3	·07	·07	·07	·07	·07	·07	·07	·07	·07	·06	·06	·06	·06	·06	·06	·06	3
4	·10	·10	·10	·09	·09	·09	·09	·09	·09	·09	·09	·08	·08	·08	·08	·08	4
5	·12	·12	·12	·12	·12	·11	·11	·11	·11	·11	·11	·11	·10	·10	·10	·10	5
6	·15	·15	·14	·14	·14	·14	·14	·13	·13	·13	·13	·13	·13	·12	·12	·12	6
7	·17	·17	·17	·17	·16	·16	·16	·16	·15	·15	·15	·15	·15	·14	·14	·14	7
8	·20	·20	·19	·19	·19	·18	·18	·18	·18	·17	·17	·17	·17	·17	·16	·16	8
9	·22	·22	·22	·21	·21	·21	·20	·20	·20	·20	·19	·19	·19	·19	·18	·18	9
10	·25	·25	·24	·24	·23	·23	·23	·22	·22	·22	·22	·21	·21	·21	·21	·20	10
11	·27	·27	·27	·26	·26	·25	·25	·25	·24	·24	·24	·23	·23	·23	·23	·22	11
12	·30	·30	·29	·29	·28	·28	·27	·27	·27	·26	·26	·26	·25	·25	·25	·25	12
13	·33	·32	·32	·31	·31	·30	·30	·29	·29	·29	·28	·28	·28	·27	·27	·27	13
14	·35	·35	·34	·34	·33	·33	·32	·32	·31	·31	·30	·30	·30	·29	·29	·29	14
15	·38	·37	·37	·36	·36	·35	·34	·34	·34	·33	·33	·32	·32	·32	·31	·31	15
16	·41	·40	·39	·39	·38	·37	·37	·36	·36	·35	·35	·35	·34	·34	·33	·33	16
17	·43	·43	·42	·41	·41	·40	·39	·39	·38	·38	·37	·37	·36	·36	·36	·35	17
18	·46	·45	·44	·44	·43	·42	·42	·41	·41	·40	·40	·39	·39	·38	·38	·38	18
19	·49	·48	·47	·46	·46	·45	·44	·44	·43	·43	·42	·42	·41	·41	·40	·40	19
20	·51	·51	·50	·49	·48	·48	·47	·46	·46	·45	·44	·44	·43	·43	·42	·42	20
21	·54	·53	·52	·52	·51	·50	·49	·49	·48	·47	·47	·46	·46	·45	·45	·44	21
22	·57	·56	·55	·54	·54	·53	·52	·51	·51	·50	·49	·49	·48	·48	·47	·47	22
23	·60	·59	·58	·57	·56	·55	·55	·54	·53	·52	·52	·51	·51	·50	·50	·49	23
24	·63	·62	·61	·60	·59	·58	·57	·57	·56	·55	·54	·54	·53	·53	·52	·51	24
25	·66	·65	·64	·63	·62	·61	·60	·59	·58	·58	·57	·56	·56	·55	·54	·54	25
26	·69	·68	·67	·66	·65	·64	·63	·62	·61	·60	·60	·59	·58	·58	·57	·56	26
27	·72	·71	·70	·69	·68	·67	·66	·65	·64	·63	·62	·61	·61	·60	·59	·59	27
28	·75	·74	·73	·72	·70	·69	·68	·67	·67	·66	·65	·64	·63	·63	·62	·61	28
29	·78	·77	·76	·75	·73	·72	·71	·70	·69	·69	·68	·67	·66	·65	·65	·64	29
30	·82	·80	·79	·78	·76	·75	·74	·73	·72	·71	·70	·70	·69	·68	·67	·67	30
31	·85	·84	·82	·81	·80	·78	·77	·76	·75	·74	·73	·72	·72	·71	·70	·69	31
32	·88	·87	·85	·84	·83	·82	·80	·79	·78	·77	·76	·75	·75	·74	·73	·72	32
33	·92	·90	·89	·87	·86	·85	·84	·82	·81	·80	·79	·78	·77	·77	·76	·75	33
34	·96	·94	·92	·91	·89	·88	·87	·86	·84	·83	·82	·81	·80	·80	·79	·78	34
35	·99	·97	·96	·94	·93	·91	·90	·89	·88	·87	·85	·84	·83	·83	·82	·81	35
36	1·03	1·01	·99	·98	·96	·95	·93	·92	·91	·90	·89	·88	·87	·86	·85	·84	36
37	1·07	1·05	1·03	1·01	1·00	·98	·97	·96	·94	·93	·92	·91	·90	·89	·88	·87	37
38	1·11	1·09	1·07	1·05	1·04	1·02	1·00	·99	·98	·97	·95	·94	·93	·92	·91	·90	38
39	1·15	1·13	1·11	1·09	1·07	1·06	1·04	1·03	1·01	1·00	·99	·98	·97	·95	·94	·94	39
40	1·19	1·17	1·15	1·13	1·11	1·10	1·08	1·06	1·05	1·04	1·02	1·01	1·00	·99	·98	·97	40
41	1·23	1·21	1·19	1·17	1·15	1·13	1·12	1·10	1·09	1·07	1·06	1·05	1·04	1·03	1·01	1·00	41
42	1·28	1·25	1·23	1·21	1·19	1·18	1·16	1·14	1·13	1·11	1·10	1·09	1·07	1·06	1·05	1·04	42
43	1·32	1·30	1·28	1·25	1·24	1·22	1·20	1·18	1·17	1·15	1·14	1·12	1·11	1·10	1·09	1·08	43
44	1·37	1·34	1·32	1·30	1·28	1·26	1·24	1·23	1·21	1·19	1·18	1·16	1·15	1·14	1·13	1·12	44
45	1·41	1·39	1·37	1·35	1·33	1·31	1·29	1·27	1·25	1·24	1·22	1·21	1·19	1·18	1·17	1·15	45
46	1·47	1·44	1·42	1·39	1·37	1·35	1·33	1·31	1·30	1·28	1·26	1·25	1·23	1·22	1·21	1·20	46
47	1·52	1·49	1·47	1·44	1·42	1·40	1·38	1·36	1·34	1·33	1·31	1·29	1·28	1·26	1·25	1·24	47
48	1·57	1·54	1·52	1·49	1·47	1·45	1·43	1·41	1·39	1·37	1·36	1·34	1·32	1·31	1·30	1·28	48
49	1·63	1·60	1·57	1·55	1·52	1·50	1·48	1·46	1·44	1·42	1·40	1·39	1·37	1·36	1·34	1·33	49
50	1·69	1·66	1·63	1·60	1·58	1·56	1·53	1·51	1·49	1·47	1·45	1·44	1·42	1·41	1·39	1·38	50
51	1·75	1·72	1·69	1·66	1·64	1·61	1·59	1·57	1·55	1·53	1·51	1·49	1·47	1·46	1·44	1·43	51
52	1·81	1·78	1·75	1·72	1·70	1·67	1·65	1·62	1·60	1·58	1·56	1·54	1·53	1·51	1·49	1·48	52
53	1·88	1·84	1·81	1·79	1·76	1·73	1·71	1·68	1·66	1·64	1·62	1·60	1·58	1·56	1·55	1·53	53
54	1·95	1·91	1·88	1·85	1·82	1·80	1·77	1·75	1·72	1·70	1·68	1·66	1·64	1·62	1·61	1·59	54
55	2·02	1·99	1·95	1·92	1·89	1·86	1·84	1·81	1·79	1·77	1·74	1·72	1·70	1·68	1·67	1·65	55
56	2·10	2·06	2·03	2·00	1·96	1·94	1·91	1·88	1·86	1·83	1·81	1·79	1·77	1·75	1·73	1·71	56
57	2·18	2·14	2·11	2·07	2·04	2·01	1·98	1·95	1·93	1·90	1·88	1·86	1·84	1·82	1·80	1·78	57
58	2·27	2·22	2·19	2·15	2·12	2·09	2·06	2·03	2·00	1·98	1·95	1·93	1·91	1·89	1·87	1·85	58
59	2·36	2·31	2·28	2·24	2·21	2·17	2·14	2·11	2·08	2·06	2·03	2·01	1·98	1·96	1·94	1·92	59
60	2·45	2·41	2·37	2·33	2·29	2·26	2·23	2·20	2·17	2·14	2·11	2·09	2·07	2·04	2·02	2·00	60
Dec	135°	134°	133°	132°	131°	130°	129°	128°	127°	126°	125°	124°	123°	122°	121°	120°	Dec.
	225°	226°	227°	228°	229°	230°	231°	232°	233°	234°	235°	236°	237°	238°	239°	240°	

HOUR ANGLE

B - Always named the **same** as Declination

B - Always named the **same** as Declination

B

TABLE A HOUR ANGLE

Lat °	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	71°	72°	73°	74°	75°	Lat °
	300°	299°	298°	297°	296°	295°	294°	293°	292°	291°	290°	289°	288°	287°	286°	285°	
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·01	·01	·01	·01	·01	·01	·01	·01	·01	·01	·01	·01	·01	·01	·01	·01	1
2	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·01	·01	·01	·01	·01	·01	2
3	·03	·03	·03	·03	·03	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·01	3
4	·04	·04	·04	·04	·03	·03	·03	·03	·03	·03	·03	·02	·02	·02	·02	·02	4
5	·05	·05	·05	·04	·04	·04	·04	·04	·04	·03	·03	·03	·03	·03	·03	·02	5
6	·06	·06	·06	·05	·05	·05	·05	·05	·04	·04	·04	·04	·03	·03	·03	·03	6
7	·07	·07	·07	·06	·06	·06	·06	·05	·05	·05	·05	·04	·04	·04	·04	·03	7
8	·08	·08	·07	·07	·07	·07	·06	·06	·06	·05	·05	·05	·05	·04	·04	·04	8
9	·09	·09	·08	·08	·08	·07	·07	·07	·06	·06	·06	·06	·05	·05	·05	·04	9
10	·10	·10	·09	·09	·09	·08	·08	·08	·07	·07	·06	·06	·06	·05	·05	·05	10
11	·11	·11	·10	·10	·10	·09	·09	·08	·08	·08	·07	·07	·06	·06	·06	·05	11
12	·12	·12	·11	·11	·10	·10	·10	·09	·09	·08	·08	·07	·07	·07	·06	·06	12
13	·13	·13	·12	·12	·11	·11	·10	·10	·09	·09	·08	·08	·08	·07	·07	·06	13
14	·14	·14	·13	·13	·12	·12	·11	·11	·10	·10	·09	·09	·08	·08	·07	·07	14
15	·15	·15	·14	·14	·13	·12	·12	·11	·11	·10	·10	·09	·09	·08	·08	·07	15
16	·17	·16	·15	·15	·14	·13	·13	·12	·12	·11	·10	·10	·09	·09	·08	·08	16
17	·18	·17	·16	·16	·15	·14	·14	·13	·12	·12	·11	·11	·10	·09	·09	·08	17
18	·19	·18	·17	·17	·16	·15	·15	·14	·13	·13	·12	·11	·11	·10	·09	·09	18
19	·20	·19	·18	·18	·17	·16	·15	·15	·14	·13	·13	·12	·11	·11	·10	·09	19
20	·21	·20	·19	·19	·18	·17	·16	·15	·15	·14	·13	·13	·12	·11	·10	·10	20
21	·22	·21	·20	·20	·19	·18	·17	·16	·16	·15	·14	·13	·13	·12	·11	·10	21
22	·23	·22	·21	·21	·20	·19	·18	·17	·16	·16	·15	·14	·13	·12	·12	·11	22
23	·25	·24	·23	·22	·21	·20	·19	·18	·17	·16	·15	·15	·14	·13	·12	·11	23
24	·26	·25	·24	·23	·22	·21	·20	·19	·18	·17	·16	·15	·15	·14	·13	·12	24
25	·27	·26	·25	·24	·23	·22	·21	·20	·19	·18	·17	·16	·15	·14	·13	·13	25
26	·28	·27	·26	·25	·24	·23	·22	·21	·20	·19	·18	·17	·16	·15	·14	·13	26
27	·29	·28	·27	·26	·25	·24	·23	·22	·21	·20	·19	·18	·17	·16	·15	·14	27
28	·31	·29	·28	·27	·26	·25	·24	·23	·22	·20	·19	·18	·17	·16	·15	·14	28
29	·32	·31	·29	·28	·27	·26	·25	·24	·22	·21	·20	·19	·18	·17	·16	·15	29
30	·33	·32	·31	·29	·28	·27	·26	·25	·23	·22	·21	·20	·19	·18	·17	·16	30
31	·35	·33	·32	·31	·29	·28	·27	·26	·24	·23	·22	·21	·20	·18	·17	16	31
32	·36	·35	·33	·32	·31	·29	·28	·27	·25	·24	·23	·22	·20	·19	·18	·17	32
33	·37	·36	·35	·33	·32	·30	·29	·28	·26	·25	·24	·22	·21	·20	·19	·17	33
34	·39	·37	·36	·34	·33	·31	·30	·29	·27	·26	·25	·23	·22	·21	·19	·18	34
35	·40	·39	·37	·36	·34	·33	·31	·30	·28	·27	·26	·24	·23	·21	·20	·19	35
36	·42	·40	·39	·37	·35	·34	·32	·31	·29	·28	·26	·25	·24	·22	·21	·20	36
37	·44	·42	·40	·38	·37	·35	·34	·32	·30	·29	·27	·26	·25	·23	·22	·20	37
38	·45	·43	·42	·40	·38	·36	·35	·33	·32	·30	·28	·27	·25	·24	·22	·21	38
39	·47	·45	·43	·41	·40	·38	·36	·34	·33	·31	·30	·28	·26	·25	·23	·22	39
40	·48	·47	·45	·43	·41	·39	·37	·36	·34	·32	·31	·29	·27	·26	·24	·23	40
41	·50	·48	·46	·44	·42	·41	·39	·37	·35	·33	·32	·30	·28	·27	·25	·23	41
42	·52	·50	·48	·46	·44	·42	·40	·38	·36	·35	·33	·31	·29	·28	·26	·24	42
43	·54	·52	·50	·48	·46	·43	·42	·40	·38	·36	·34	·32	·30	·29	·27	·25	43
44	·56	·54	·51	·49	·47	·45	·43	·41	·39	·37	·35	·33	·31	·30	·28	·26	44
45	·58	·55	·53	·51	·49	·47	·45	·42	·40	·38	·36	·34	·33	·31	·29	·27	45
46	·60	·57	·55	·53	·51	·48	·46	·44	·42	·40	·38	·36	·34	·32	·30	·28	46
47	·62	·59	·57	·55	·52	·50	·48	·45	·43	·41	·39	·37	·35	·33	·31	·29	47
48	·64	·62	·59	·57	·54	·52	·49	·47	·45	·43	·40	·38	·36	·34	·32	·30	48
49	·66	·64	·61	·59	·56	·54	·51	·49	·47	·44	·42	·40	·37	·35	·33	·31	49
50	·69	·66	·63	·61	·58	·56	·53	·51	·48	·46	·43	·41	·39	·36	·34	·32	50
51	·71	·68	·66	·63	·60	·58	·55	·52	·50	·47	·45	·43	·40	·38	·35	·33	51
52	·74	·71	·68	·65	·62	·60	·57	·54	·52	·49	·47	·44	·42	·39	·37	·34	52
53	·77	·74	·71	·68	·65	·62	·59	·56	·54	·51	·48	·46	·43	·41	·38	·36	53
54	·79	·76	·73	·70	·67	·64	·61	·58	·56	·53	·50	·47	·45	·42	·40	·37	54
55	·82	·79	·76	·73	·70	·67	·64	·61	·58	·55	·52	·49	·46	·44	·41	·38	55
56	·86	·82	·79	·76	·72	·69	·66	·63	·60	·57	·54	·51	·48	·45	·43	·40	56
57	·89	·85	·82	·78	·75	·72	·69	·65	·62	·59	·56	·53	·50	·47	·44	·41	57
58	·92	·89	·85	·81	·78	·75	·71	·68	·65	·61	·58	·55	·52	·49	·46	·43	58
59	·96	·92	·88	·85	·81	·78	·74	·71	·67	·64	·61	·57	·54	·51	·48	·45	59
60	1·00	·96	·92	·88	·85	·81	·77	·74	·70	·67	·63	·60	·56	·53	·50	·46	60
Lat	120°	119°	118°	117°	116°	115°	114°	113°	112°	111°	110°	109°	108°	107°	106°	105°	Lat
	240°	241°	242°	243°	244°	245°	246°	247°	248°	249°	250°	251°	252°	253°	254°	255°	

HOUR ANGLE

A

A = Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A = Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

TABLE B HOUR ANGLE

Dec °	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	71°	72°	73°	74°	75°	Dec °
	300°	299°	298°	297°	296°	295°	294°	293°	292°	291°	290°	289°	288°	287°	286°	285°	
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	1
2	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	2
3	·06	·06	·06	·06	·06	·06	·06	·06	·06	·06	·06	·06	·06	·06	·06	·05	3
4	·08	·08	·08	·08	·08	·08	·08	·08	·08	·08	·07	·07	·07	·07	·07	·07	4
5	·10	·10	·10	·10	·10	·10	·10	·10	·09	·09	·09	·09	·09	·09	·09	·09	5
6	·12	·12	·12	·12	·12	·12	·12	·11	·11	·11	·11	·11	·11	·11	·11	·11	6
7	·14	·14	·14	·14	·14	·14	·13	·13	·13	·13	·13	·13	·13	·13	·13	·13	7
8	·16	·16	·16	·16	·16	·16	·15	·15	·15	·15	·15	·15	·15	·15	·15	·15	8
9	·18	·18	·18	·18	·18	·17	·17	·17	·17	·17	·17	·17	·17	·17	·16	·16	9
10	·20	·20	·20	·20	·20	·19	·19	·19	·19	·19	·19	·19	·19	·18	·18	·18	10
11	·22	·22	·22	·22	·22	·21	·21	·21	·21	·21	·21	·21	·20	·20	·20	·20	11
12	·25	·24	·24	·24	·24	·23	·23	·23	·23	·23	·23	·23	·22	·22	·22	·22	12
13	·27	·26	·26	·26	·26	·25	·25	·25	·25	·25	·25	·24	·24	·24	·24	·24	13
14	·29	·29	·28	·28	·28	·28	·27	·27	·27	·27	·27	·26	·26	·26	·26	·26	14
15	·31	·31	·30	·30	·30	·30	·29	·29	·29	·29	·29	·28	·28	·28	·28	·28	15
16	·33	·33	·32	·32	·32	·32	·31	·31	·31	·31	·31	·30	·30	·30	30	·30	16
17	·35	·35	·35	·34	·34	·34	·33	·33	·33	·33	·33	·32	·32	·32	·32	·32	17
18	·38	·37	·37	·36	·36	·36	·36	·35	·35	·35	·35	·34	·34	·34	·34	·34	18
19	·40	·39	·39	·39	·38	·38	·38	·37	·37	·37	·37	·36	·36	·36	·36	·36	19
20	·42	·42	·41	·41	·41	·40	·40	·40	·39	·39	·39	·39	·38	·38	·38	·38	20
21	·44	·44	·43	·43	·43	·42	·42	·42	·41	·41	·41	·41	·40	·40	·40	·40	21
22	·47	·46	·46	·45	·45	·45	·44	·44	·44	·43	·43	·43	·43	·42	·42	·42	22
23	·49	·49	·48	·48	·47	·47	·46	·46	·46	·46	·45	·45	·45	·44	·44	·44	23
24	·51	·51	·50	·50	·50	·49	·49	·48	·48	·48	·47	·47	·47	·47	·46	·46	24
25	·54	·53	·53	·52	·52	·52	·51	·51	·50	·50	·49	·49	·49	·49	·49	·48	25
26	·56	·56	·55	·55	·54	·54	·53	·53	·53	·52	·52	·52	·51	·51	·51	·50	26
27	·59	·58	·58	·57	·57	·56	·56	·55	·55	·55	·54	·54	·54	·53	·53	·53	27
28	·61	·61	·60	·60	·59	·59	·58	·58	·57	·57	·57	·56	·56	·56	·55	·55	28
29	·64	·63	·63	·62	·62	·61	·61	·60	·60	·59	·59	·59	·58	·58	·58	·57	29
30	·67	·66	·65	·65	·64	·64	·63	·63	·62	·62	·62	·61	·61	·60	·60	·60	30
31	·69	·69	·68	·67	·67	·66	·66	·65	·65	·64	·64	·64	·63	·63	·63	·62	31
32	·72	·71	·71	·70	·70	·69	·68	·68	·67	·67	·67	·66	·66	·65	·65	·65	32
33	·75	·74	·74	·73	·72	·72	·71	·71	·70	·70	·69	·69	·68	·68	·68	·67	33
34	·78	·77	·76	·76	·75	·75	·74	·73	·73	·72	·72	·71	·71	·71	·70	·70	34
35	·81	·80	·79	·79	·78	·77	·77	·76	·76	·75	·74	·74	·74	·73	·73	·72	35
36	·84	·83	·82	·82	·81	·80	·80	·79	·78	·78	·77	·77	·76	·76	·76	·75	36
37	·87	·86	·85	·85	·84	·83	·82	·82	·81	·81	·80	·80	·79	·79	·78	·78	37
38	·90	·89	·88	·88	·87	·86	·86	·85	·84	·84	·83	·83	·82	·82	·81	·81	38
39	·94	·93	·92	·91	·90	·89	·89	·88	·87	·87	·86	·86	·85	·85	·84	·84	39
40	·97	·96	·95	·94	·93	·93	·92	·91	·91	·90	·89	·89	·88	·88	·87	·87	40
41	1·00	·99	·98	·98	·97	·96	·95	·94	·94	·93	·92	·92	·91	·91	·90	·90	41
42	1·04	1·03	1·02	1·01	1·00	·99	·99	·98	·97	·96	·96	·95	·95	·94	·94	·93	42
43	1·08	1·07	1·06	1·05	1·04	1·03	1·02	1·01	1·01	1·00	·99	·99	·98	·98	·97	·97	43
44	1·11	1·10	1·09	1·08	1·07	1·07	1·06	1·05	1·04	1·03	1·03	1·02	1·02	1·01	1·00	1·00	44
45	1·15	1·14	1·13	1·12	1·11	1·10	1·10	1·09	1·08	1·07	1·06	1·06	1·05	1·05	1·04	1·04	45
46	1·20	1·18	1·17	1·16	1·15	1·14	1·13	1·12	1·12	1·11	1·10	1·10	1·09	1·08	1·08	1·07	46
47	1·24	1·23	1·22	1·20	1·19	1·18	1·17	1·16	1·16	1·15	1·14	1·13	1·13	1·12	1·12	1·11	47
48	1·28	1·27	1·26	1·25	1·24	1·22	1·22	1·21	1·20	1·19	1·18	1·17	1·17	1·16	1·16	1·15	48
49	1·33	1·32	1·30	1·29	1·28	1·27	1·26	1·25	1·24	1·23	1·22	1·22	1·20	1·20	1·20	1·19	49
50	1·38	1·36	1·35	1·34	1·33	1·31	1·31	1·29	1·29	1·28	1·27	1·26	1·25	1·25	1·24	1·23	50
51	1·43	1·41	1·40	1·39	1·37	1·36	1·35	1·34	1·33	1·32	1·31	1·31	1·30	1·29	1·28	1·28	51
52	1·48	1·46	1·45	1·44	1·42	1·41	1·40	1·39	1·38	1·37	1·36	1·35	1·35	1·34	1·33	1·33	52
53	1·53	1·52	1·50	1·49	1·48	1·46	1·45	1·44	1·43	1·42	1·41	1·40	1·40	1·39	1·38	1·37	53
54	1·59	1·57	1·56	1·55	1·53	1·52	1·51	1·50	1·48	1·47	1·46	1·46	1·45	1·44	1·43	1·42	54
55	1·65	1·63	1·62	1·60	1·59	1·58	1·56	1·55	1·54	1·53	1·52	1·51	1·50	1·49	1·49	1·48	55
56	1·71	1·70	1·68	1·66	1·65	1·64	1·62	1·61	1·60	1·59	1·58	1·57	1·56	1·55	1·54	1·54	56
57	1·78	1·76	1·74	1·73	1·71	1·70	1·69	1·67	1·66	1·65	1·64	1·63	1·62	1·61	1·60	1·60	57
58	1·85	1·83	1·81	1·80	1·78	1·77	1·75	1·74	1·73	1·71	1·71	1·69	1·68	1·67	1·66	1·66	58
59	1·92	1·90	1·89	1·87	1·85	1·84	1·82	1·81	1·79	1·78	1·77	1·76	1·75	1·74	1·73	1·72	59
60	2·00	1·98	1·96	1·94	1·93	1·91	1·89	1·88	1·87	1·86	1·84	1·83	1·82	1·81	1·80	1·79	60
Dec.	120°	119°	118°	117°	116°	115°	114°	113°	112°	111°	110°	109°	108°	107°	106°	105°	Dec
	240°	241°	242°	243°	244°	245°	246°	247°	248°	249°	250°	251°	252°	253°	254°	255°	

HOUR ANGLE

B

B - Always named the **same** as Declination

B - Always named the **same** as Declination

TABLE A HOUR ANGLE

Lat °	75°	76°	77°	78°	79°	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	Lat °
	285°	284°	283°	282°	281°	280°	279°	278°	277°	276°	275°	274°	273°	272°	271°	270°	
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·01	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	1
2	·01	·01	·01	·01	·01	·01	·01	·01	·00	·00	·00	·00	·00	·00	·00	·00	2
3	·01	·01	·01	·01	·01	·01	·01	·01	·01	·01	·01	·00	·00	·00	·00	·00	3
4	·02	·02	·02	·02	·01	·01	·01	·01	·01	·01	·01	·01	·00	·00	·00	·00	4
5	·02	·02	·02	·02	·02	·02	·01	·01	·01	·01	·01	·01	·01	·00	·00	·00	5
6	·03	·03	·02	·02	·02	·02	·02	·02	·01	·01	·01	·01	·01	·00	·00	·00	6
7	·03	·03	·03	·03	·02	·02	·02	·02	·02	·01	·01	·01	·01	·00	·00	·00	7
8	·04	·04	·03	·03	·03	·03	·02	·02	·02	·02	·01	·01	·01	·01	·00	·00	8
9	·04	·04	·04	·03	·03	·03	·03	·02	·02	·02	·01	·01	·01	·01	·00	·00	9
10	·05	·04	·04	·04	·03	·03	·03	·03	·02	·02	·02	·01	·01	·01	·00	·00	10
11	·05	·05	·05	·04	·04	·03	·03	·03	·02	·02	·02	·01	·01	·01	·00	·00	11
12	·06	·05	·05	·05	·04	·04	·03	·03	·03	·02	·02	·02	·01	·01	·00	·00	12
13	·06	·06	·05	·05	·05	·04	·04	·03	·03	·02	·02	·02	·01	·01	·00	·00	13
14	·07	·06	·06	·05	·05	·04	·04	·04	·03	·03	·02	·02	·01	·01	·00	·00	14
15	·07	·07	·06	·06	·05	·05	·04	·04	·03	·03	·02	·02	·01	·01	·01	·00	15
16	·08	·07	·07	·06	·06	·05	·05	·04	·04	·03	·03	·02	·02	·01	·01	·00	16
17	·08	·08	·07	·07	·06	·05	·05	·04	·04	·03	·03	·02	·02	·01	·01	·00	17
18	·09	·08	·08	·07	·06	·06	·05	·05	·04	·03	·03	·02	·02	·01	·01	·00	18
19	·09	·09	·08	·07	·07	·06	·06	·05	·04	·04	·03	·02	·02	·01	·01	·00	19
20	·10	·09	·08	·08	·07	·06	·06	·05	·05	·04	·03	·03	·02	·01	·01	·00	20
21	·10	·10	·09	·08	·07	·07	·06	·05	·05	·04	·03	·03	·02	·01	·01	·00	21
22	·11	·10	·09	·09	·08	·07	·06	·06	·05	·04	·04	·03	·02	·01	·01	·00	22
23	·11	·11	·10	·09	·08	·08	·07	·06	·05	·05	·04	·03	·02	·02	·01	·00	23
24	·12	·11	·10	·10	·09	·08	·07	·06	·06	·05	·04	·03	·02	·02	·01	·00	24
25	·13	·12	·11	·10	·09	·08	·07	·07	·06	·05	·04	·03	·02	·02	·01	·00	25
26	·13	·12	·11	·10	·10	·09	·08	·07	·06	·05	·04	·03	·03	·02	·01	·00	26
27	·14	·13	·12	·11	·10	·09	·08	·07	·06	·05	·05	·04	·03	·02	·01	·00	27
28	·14	·13	·12	·11	·10	·09	·08	·08	·07	·06	·05	·04	·03	·02	·01	·00	28
29	·15	·14	·13	·12	·11	·10	·09	·08	·07	·06	·05	·04	·03	·02	·01	·00	29
30	·16	·14	·13	·12	·11	·10	·09	·08	·07	·06	·05	·04	·03	·02	·01	·00	30
31	·16	·15	·14	·13	·12	·11	·10	08	·07	·06	·05	·04	·03	·02	·01	·00	31
32	·17	·16	·14	·13	·12	·11	·10	09	·08	·07	·06	·04	·03	·02	·01	·00	32
33	·17	·16	·15	·14	·13	·12	·10	·09	·08	·07	·06	·05	·03	·02	·01	·00	33
34	·18	·17	·16	·14	·13	·12	·11	·10	·08	·07	·06	·05	·04	·02	·01	·00	34
35	·19	·18	·16	·15	·14	·12	·11	·10	·09	·07	·06	·05	·04	·02	·01	·00	35
36	·20	·18	·17	·15	·14	·13	·12	·10	·09	·08	·06	·05	·04	·03	·01	·00	36
37	·20	·19	·17	·16	·15	·13	·12	·11	·09	·08	·07	·05	·04	·03	·01	·00	37
38	·21	·20	·18	·17	·15	·14	·12	·11	·10	·08	·07	·06	·04	·03	·01	·00	38
39	·22	·20	·19	·17	·16	·14	·13	·11	·10	·09	·07	·06	·04	·03	·01	·00	39
40	·23	·21	·19	·18	·16	·15	·13	·12	·10	·09	·07	·06	·04	·03	·02	·00	40
41	·23	·22	·20	·19	·17	·15	·14	·12	·11	·09	·08	·06	·05	·03	·02	·00	41
42	·24	·22	·21	·19	·18	·16	·14	·13	·11	·10	·08	·06	·05	·03	·02	·00	42
43	·25	·23	·22	·20	·18	·16	·15	·13	·11	·10	·08	·07	·05	·03	·02	·00	43
44	·26	·24	·22	·21	·19	·17	·15	·14	·12	·10	·09	·07	·05	·03	·02	·00	44
45	·27	·25	·23	·21	·19	·18	·16	·14	·12	·11	·09	·07	·05	·04	·02	·00	45
46	·28	·26	·24	·22	·20	·18	·16	·15	·13	·11	·09	·07	·05	·04	·02	·00	46
47	·29	·27	·25	·23	·21	·19	·17	·15	·13	·11	·09	·08	·06	·04	·02	·00	47
48	·30	·28	·26	·24	·22	·20	·18	·16	·14	·12	·10	·08	·06	·04	·02	·00	48
49	·31	·29	·27	·25	·22	·20	·18	·16	·14	·12	·10	·08	·06	·04	·02	·00	49
50	·32	·30	·28	·25	·23	·21	·19	·17	·15	·13	·10	·08	·06	·04	·02	·00	50
51	·33	·31	·29	·26	·24	·22	·20	·17	·15	·13	·11	·09	·07	·04	·02	·00	51
52	·34	·32	·30	·27	·25	·23	·20	·18	·16	·14	·11	·09	·07	·05	·02	·00	52
53	·36	·33	·31	·28	·26	·23	·21	·19	·16	·14	·12	·09	·07	·05	·02	·00	53
54	·37	·34	·32	·29	·27	·24	·22	·19	·17	·15	·12	·10	·07	·05	·02	·00	54
55	·38	·36	·33	·30	·28	·25	·23	·20	·18	·15	·13	·10	·08	·05	·03	·00	55
56	·40	·37	·34	·32	·29	·26	·24	·21	·18	·16	·13	·10	·08	·05	·03	·00	56
57	·41	·38	·36	·33	·30	·27	·24	·22	·19	·16	·14	·11	·08	·05	·03	·00	57
58	·43	·40	·37	·34	·31	·28	·25	·23	·20	·17	·14	·11	·08	·06	·03	·00.	58
59	·45	·42	·38	·35	·32	·29	·26	·23	·20	·18	·15	·12	·09	·06	·03	·00.	59
60	·46	·43	·40	·37	·34	·31	·27	·24	·21	·18	·15	·12	·09	·06	·03	·00	60
Lat	105°	104°	103°	102°	101°	100°	99°	98°	97°	96°	95°	94°	93°	92°	91°	90°	Lat
	255°	256°	257°	258°	259°	260°	261°	262°	263°	264°	265°	266°	267°	268°	269°	270°	

HOUR ANGLE

A – Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A – Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A

TABLE B HOUR ANGLE

Dec °	75°	76°	77°	78°	79°	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	Dec °
	285°	284°	283°	282°	281°	280°	279°	278°	277°	276°	275°	274°	273°	272°	271°	270°	
0	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	·00	0
1	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	·02	1
2	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·04	·03	·03	2
3	·05	·05	·05	·05	·05	·05	·05	·05	·05	·05	·05	·05	·05	·05	·05	·05	3
4	·07	·07	·07	·07	·07	·07	·07	·07	·07	·07	·07	·07	·07	·07	·07	·07	4
5	·09	·09	·09	·09	·09	·09	·09	·09	·09	·09	·09	·09	·09	·09	·09	·09	5
6	·11	·11	·11	·11	·11	·11	·11	·11	·11	·11	·11	·11	·11	·11	·11	·11	6
7	·13	·13	·13	·13	·13	·12	·12	·12	·12	·12	·12	·12	·12	·12	·12	·12	7
8	·15	·15	·14	·14	·14	·14	·14	·14	·14	·14	·14	·14	·14	·14	·14	·14	8
9	·16	·16	·16	·16	·16	·16	·16	·16	·16	·16	·16	·16	·16	·16	·16	·16	9
10	·18	·18	·18	·18	·18	·18	·18	·18	·18	·18	·18	·18	·18	·18	·18	·18	10
11	·20	·20	·20	·20	·20	·20	·20	·20	·20	·20	·20	·20	·20	·19	·19	·19	11
12	·22	·22	·22	·22	·22	·22	·22	·22	·21	·21	·21	·21	·21	·21	·21	·21	12
13	·24	·24	·24	·24	·24	·23	·23	·23	·23	·23	·23	·23	·23	·23	·23	·23	13
14	·26	·26	·26	·26	·25	·25	·25	·25	·25	·25	·25	·25	·25	·25	·25	·25	14
15	·28	·28	·28	·27	·27	·27	·27	·27	·27	·27	·27	·27	·27	·27	·27	·27	15
16	·30	·30	·29	·29	·29	·29	·29	·29	·29	·29	·29	·29	·29	·29	·29	·29	16
17	·32	·32	·31	·31	·31	·31	·31	·31	·31	·31	·31	·31	·31	·31	·31	·31	17
18	·34	·34	·33	·33	·33	·33	·33	·33	·33	·33	·33	·33	·33	·33	·33	·32	18
19	·36	·36	·35	·35	·35	·35	·35	·35	·35	·35	·35	·35	·35	·35	·34	·34	19
20	·38	·38	·37	·37	·37	·37	·37	·37	·37	·37	·37	·37	·36	·36	·36	·36	20
21	·40	·40	·39	·39	·39	·39	·39	·39	·39	·39	·39	·39	·38	·38	·38	·38	21
22	·42	·42	·42	·41	·41	·41	·41	·41	·41	·41	·41	·41	·41	·40	·40	·40	22
23	·44	·44	·44	·43	·43	·43	·43	·43	·43	·43	·43	·43	·43	·43	·43	·42	23
24	·46	·46	·46	·46	·45	·45	·45	·45	·45	·45	·45	·45	·45	·45	·45	·45	24
25	·48	·48	·48	·48	·48	·47	·47	·47	·47	·47	·47	·47	·47	·47	·47	·47	25
26	·50	·50	·50	·50	·50	·50	·49	·49	·49	·49	·49	·49	·49	·49	·49	·49	26
27	·53	·53	·52	·52	·52	·52	·52	·52	·51	·51	·51	·51	·51	·51	·51	·51	27
28	·55	·55	·55	·54	·54	·54	·54	·54	·54	·54	·53	·53	·53	·53	·53	·53	28
29	·57	·57	·57	·57	·57	·56	·56	·56	·56	·56	·56	·56	·56	·56	·55	·55	29
30	·60	·60	·59	·59	·59	·59	·59	·58	·58	·58	·58	·58	·58	·58	·58	·58	30
31	·62	·62	·62	·61	·61	·61	·61	·61	·61	·60	·60	·60	·60	·60	·60	·60	31
32	·65	·64	·64	·64	·64	·63	·63	·63	·63	·63	·63	·63	·63	·63	·63	·62	32
33	·67	·67	·67	·66	·66	·66	·66	·66	·65	·65	·65	·65	·65	·65	·65	·65	33
34	·70	·70	·69	·69	·69	·68	·68	·68	·68	·68	·68	·68	·68	·68	·68	·67	34
35	·72	·72	·72	·72	·71	·71	·71	·71	·71	·70	·70	·70	·70	·70	·70	·70	35
36	·75	·75	·75	·74	·74	·74	·74	·73	·73	·73	·73	·73	·73	·73	·73	·73	36
37	·78	·78	·77	·77	·77	·77	·76	·76	·76	·76	·75	·76	·76	·75	·75	·75	37
38	·81	·81	·80	·80	·80	·79	·79	·79	·79	·79	·78	·78	·78	·78	·78	·78	38
39	·84	·84	·83	·83	·83	·82	·82	·82	·82	·81	·81	·81	·81	·81	·81	·81	39
40	·87	·87	·86	·86	·86	·85	·85	·85	·85	·84	·84	·84	·84	·84	·84	·84	40
41	·90	·90	·89	·89	·89	·88	·88	·88	·88	·87	·87	87	·87	·87	·87	·87	41
42	·93	·93	·92	·92	·92	·91	·91	·91	·91	·91	·90	·90	·90	·90	·90	·90	42
43	·97	·96	·96	·95	·95	·95	·94	·94	·94	·94	·94	·94	·93	·93	·93	·93	43
44	1·00	1·00	·99	·99	·99	·98	·98	·98	·97	·97	·97	·97	·97	·97	·97	·97	44
45	1·04	1·03	1·03	1·02	1·02	1·02	1·01	1·01	1·01	1·01	1·00	1·00	1·00	1·00	1·00	1·00	45
46	1·07	1·07	1·06	1·06	1·05	1·05	1·05	1·05	1·04	1·04	1·04	1·04	1·04	1·04	1·04	1·04	46
47	1·11	1·11	1·10	1·10	1·09	1·09	1·09	1·08	1·08	1·08	1·08	1·07	1·07	1·07	1·07	1·07	47
48	1·15	1·14	1·14	1·14	1·13	1·13	1·12	1·12	1·12	1·12	1·11	1·11	1·11	1·11	1·11	1·11	48
49	1·19	1·19	1·18	1·18	1·17	1·17	1·16	1·16	1·16	1·16	1·15	1·15	1·15	1·15	1·15	1·15	49
50	1·23	1·23	1·22	1·22	1·21	1·21	1·21	1·20	1·20	1·20	1·20	1·19	1·19	1·19	1·19	1·19	50
51	1·28	1·27	1·27	1·26	1·26	1·25	1·25	1·25	1·24	1·24	1·24	1·24	1·24	1·24	1·24	1·23	51
52	1·33	1·32	1·31	1·31	1·30	1·30	1·30	1·29	1·29	1·29	1·28	1·28	1·28	1·28	1·28	1·28	52
53	1·37	1·37	1·36	1·36	1·35	1·35	1·34	1·34	1·34	1·33	1·33	1·33	1·33	1·33	1·33	1·33	53
54	1·42	1·42	1·41	1·41	1·40	1·40	1·39	1·39	1·39	1·38	1·38	1·38	1·38	1·38	1·38	1·38	54
55	1·48	1·47	1·47	1·46	1·46	1·45	1·45	1·44	1·44	1·44	1·43	1·43	1·43	1·43	1·43	1·43	55
56	1·54	1·53	1·52	1·52	1·51	1·51	1·50	1·50	1·49	1·49	1·49	1·49	1·48	1·48	1·48	1·48	56
57	1·60	1·59	1·58	1·57	1·57	1·57	1·56	1·55	1·55	1·55	1·55	1·54	1·54	1·54	1·54	1·54	57
58	1·66	1·65	1·64	1·64	1·63	1·63	1·62	1·62	1·61	1·61	1·61	1·60	1·60	1·60	1·60	1·60	58
59	1·72	1·72	1·71	1·70	1·70	1·69	1·69	1·68	1·68	1·67	1·67	1·67	1·67	1·67	1·66	1·66	59
60	1·79	1·79	1·78	1·77	1·76	1·76	1·75	1·75	1·75	1·74	1·74	1·74	1·73	1·73	1·73	1·73	60
Dec.	105°	104°	103°	102°	101°	100°	99°	98°	97°	96°	95°	94°	93°	92°	91°	90°	Dec.
	255°	256°	257°	258°	259°	260°	261°	262°	263°	264°	265°	266°	267°	268°	269°	270°	

HOUR ANGLE

B - Always named the **same** as Declination

B - Always named the **same** as Declination

TABLE A HOUR ANGLE

Lat. °	0° 15′	0° 30′	0° 45′	1° 00′	1° 15′	1° 30′	1° 45′	2° 00′	2° 15′	2° 30′	2° 45′	3° 00′	3° 15′	3° 30′	3° 45′	Lat. °
	359° 45′	359° 30′	359° 15′	359° 00′	358° 45′	358° 30′	358° 15′	358° 00′	357° 45′	357° 30′	357° 15′	357° 00′	356° 45′	356° 30′	356° 15′	
60	397	198	132	99·2	79·4	66·1	56·7	49·6	44·1	39·7	36·1	33·0	30·5	28·3	26·4	60
61	414	207	138	103	82·7	68·9	59·0	51·7	45·9	41·3	37·6	34·4	31·8	29·5	27·5	61
62	431	216	144	108	86·2	71·8	61·6	53·9	47·9	43·1	39·2	35·9	33·1	30·8	28·7	62
63	450	225	150	112	89·9	74·9	64·2	56·2	50·0	45·0	40·9	37·4	34·6	32·1	29·9	63
64	470	235	157	117	94·0	78·3	67·1	58·7	52·2	47·0	42·7	39·1	36·1	33·5	31·3	64
65	491	246	164	123	98·3	81·9	70·2	61·4	54·6	49·1	44·6	40·9	37·8	35·1	32·7	65
66	515	257	172	129	103	85·8	73·5	64·3	57·2	51·4	46·8	42·9	39·6	36·7	34·3	66
67	540	270	180	135	108	90·0	77·1	67·5	60·0	54·0	49·0	45·0	41·5	38·5	35·9	67
68	567	284	189	142	113	94·5	81·0	70·9	63·0	56·7	51·5	47·2	43·6	40·5	37·8	68
69	597	299	199	149	119	99·5	85·3	74·6	66·3	59·7	54·2	49·7	45·9	42·6	39·7	69
70	630	315	210	157	126	105	89·9	78·7	69·9	62·9	57·2	52·4	48·4	44·9	41·9	70
71	666	333	222	166	133	111	95·1	83·2	73·9	66·5	60·5	55·4	51·2	47·5	44·3	71
72	705	353	235	176	141	118	101	88·1	78·3	70·5	64·1	58·7	54·2	50·3	47·0	72
73	750	375	250	187	150	125	107	93·7	83·3	74·9	68·1	62·4	57·6	53·5	49·9	73
74	799	400	266	200	160	133	114	99·9	88·8	79·9	72·6	66·6	61·4	57·0	53·2	74
75	855	428	285	215	171	143	122	107	95·0	85·5	77·7	71·3	65·7	61·0	56·9	75
76	919	460	306	230	184	153	131	115	102	91·9	83·5	76·5	70·6	65·6	61·2	76
77	993	496	331	248	199	165	142	124	110	99·2	90·2	82·7	76·3	70·8	66·1	77
78	1078	539	359	270	216	180	154	135	120	108	97·9	89·7	82·9	76·9	71·8	78
79	1179	590	393	295	236	197	168	147	131	118	107	98·2	90·6	84·1	78·5	79
80	1300	650	433	325	260	217	186	162	144	130	118	108	100	92·7	86·5	80
81	1447	724	482	362	289	241	207	181	161	145	131	121	111	103	96·3	81
82	1631	815	544	408	326	272	233	204	181	163	148	136	125	116	109	82
83	1867	933	622	467	373	311	267	233	207	187	170	155	143	133	124	83
Lat.	179° 45′	179° 30′	179° 15′	179° 00′	178° 45′	178° 30′	178° 15′	178° 00′	177° 45′	177° 30′	177° 15′	177° 00′	176° 45′	176° 30′	176° 15′	Lat.
	180° 15′	180° 30′	180° 45′	181° 00′	181° 15′	181° 30′	181° 45′	182° 00′	182° 15′	182° 30′	182° 45′	183° 00′	183° 15′	183° 30′	183° 45′	

HOUR ANGLE

A – Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A – Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

TABLE A HOUR ANGLE

Lat. °	4° 00′	4° 15′	4° 30′	4° 45′	5° 00′	5° 15′	5° 30′	5° 45′	6° 00′	6° 15′	6° 30′	6° 45′	7° 00′	7° 15′	7° 30′	Lat. °
	356° 00′	355° 45′	355° 30′	355° 15′	355° 00′	354° 45′	354° 30′	354° 15′	354° 00′	353° 45′	353° 30′	353° 15′	353° 00′	352° 45′	352° 30′	
60	24·8	23·3	22·0	20·8	19·8	18·8	18·0	17·2	16·5	15·8	15·2	14·6	14·1	13·6	13·2	60
61	25·8	24·3	22·9	21·7	20·6	19·6	18·7	17·9	17·2	16·5	15·8	15·2	14·7	14·2	13·7	61
62	26·9	25·3	23·9	22·6	21·5	20·5	19·5	18·7	17·9	17·2	16·5	15·9	15·3	14·8	14·3	62
63	28·1	26·4	24·9	23·6	22·4	21·4	20·4	19·5	18·7	17·9	17·2	16·6	16·0	15·4	14·9	63
64	29·3	27·6	26·1	24·7	23·4	22·3	21·3	20·4	19·5	18·7	18·0	17·3	16·7	16·1	15·6	64
65	30·7	28·9	27·2	25·8	24·5	23·3	22·3	21·3	20·4	19·6	18·8	18·1	17·5	16·9	16·3	65
66	32·1	30·2	28·5	27·0	25·7	24·4	23·3	22·3	21·4	20·5	19·7	19·0	18·3	17·7	17·1	66
67	33·7	31·7	29·9	28·4	26·9	25·6	24·5	23·4	22·4	21·5	20·7	19·9	19·2	18·5	17·9	67
68	35·4	33·3	31·4	29·8	28·3	26·9	25·7	24·6	23·5	22·6	21·7	20·9	20·2	19·5	18·8	68
69	37·3	35·1	33·1	31·4	29·8	28·4	27·1	25·9	24·8	23·8	22·9	22·0	21·2	20·5	19·8	69
70	39·3	37·0	34·9	33·1	31·4	29·9	28·5	27·3	26·1	25·1	24·1	23·2	22·4	21·6	20·9	70
71	41·5	39·1	36·9	35·0	33·2	31·6	30·2	28·9	27·6	26·5	25·5	24·5	23·7	22·8	22·1	71
72	44·0	41·4	39·1	37·0	35·2	33·5	32·0	30·6	29·3	28·1	27·0	26·0	25·1	24·2	23·4	72
73	46·8	44·0	41·6	39·4	37·4	35·6	34·0	32·5	31·1	30·0	28·7	27·6	26·6	25·7	24·8	73
74	50·0	46·9	44·3	42·0	39·9	38·0	36·2	34·6	33·2	31·9	30·6	29·5	28·4	27·4	26·5	74
75	53·4	50·2	47·4	44·9	42·7	40·6	38·8	37·1	35·5	34·1	32·8	31·5	30·4	29·3	28·4	75
76	57·4	54·0	51·0	48·3	45·8	43·7	41·7	39·8	38·2	36·6	35·2	33·9	32·7	31·5	30·5	76
77	62·0	58·3	55·0	52·1	49·5	47·1	45·0	43·0	41·2	39·6	38·0	36·6	35·2	34·1	32·9	77
78	67·3	63·3	59·8	56·6	53·8	51·2	48·9	46·7	44·8	43·0	41·3	39·8	38·3	37·0	35·7	78
79	73·6	69·2	65·4	61·9	58·8	56·0	53·4	51·1	49·0	47·0	45·2	43·5	41·9	40·0	39·1	79
80	81·1	76·3	72·1	68·3	64·8	61·7	58·9	56·3	54·0	51·8	49·8	47·9	46·2	44·6	43·1	80
81	90·3	85·0	80·2	76·0	72·2	68·7	65·6	62·7	60·1	57·7	55·4	53·3	51·4	49·6	48·0	81
82	102	96·0	90·4	85·6	81·3	77·4	73·9	70·7	67·7	65·0	62·5	60·1	58·0	55·9	54·0	82
83	117	110	104	98·0	93·1	88·6	84·6	80·9	77·5	74·4	71·5	68·8	66·3	64·0	61·9	83
Lat.	176° 00′	175° 45′	175° 30′	175° 15′	175° 00′	174° 45′	174° 30′	174° 15′	174° 00′	173° 45′	173° 30′	173° 15′	173° 00′	172° 45′	172° 30′	Lat.
	184° 00′	184° 15′	184° 30′	184° 45′	185° 00′	185° 15′	185° 30′	185° 45′	186° 00′	186° 15′	186° 30′	186° 45′	187° 00′	187° 15′	187° 30′	

HOUR ANGLE

A

TABLE B HOUR ANGLE

Dec °	0° 15′	0° 30′	0° 45′	1° 00′	1° 15′	1° 30′	1° 45′	2° 00′	2° 15′	2° 30′	2° 45′	3° 00′	3° 15′	3° 30′	3° 45′	Dec °
	359° 45′	359° 30′	359° 15′	359° 00′	358° 45′	358° 30′	358° 15′	358° 00′	357° 45′	357° 30′	357° 15′	357° 00′	356° 45′	356° 30′	356° 15′	
60	397	198	132	99·2	79·4	66·2	56·7	49·6	44·1	39·7	36·1	33·1	30·6	28·4	26·5	**60**
61	414	207	138	103	82·7	68·9	59·1	51·7	46·0	41·4	37·6	34·5	31·8	29·6	27·6	**61**
62	431	216	144	108	86·2	71·8	61·6	53·9	47·9	43·1	39·2	35·9	33·2	30·8	28·8	**62**
63	450	225	150	112	90·0	75·0	64·3	56·2	50·0	45·0	40·9	37·5	34·6	32·1	30·0	**63**
64	470	235	157	117	94·0	78·3	67·1	58·7	52·2	47·0	42·7	39·2	36·2	33·6	31·4	**64**
65	491	246	164	123	98·3	81·9	70·2	61·4	54·6	49·2	44·7	41·0	37·8	35·1	32·8	**65**
66	515	257	172	129	103	85·8	73·5	64·4	57·2	51·5	46·8	42·9	39·6	36·8	34·3	**66**
67	540	270	180	135	108	90·0	77·1	67·5	60·0	54·0	49·1	45·0	41·6	38·6	36·0	**67**
68	567	284	189	142	113	94·6	81·0	70·9	63·0	56·7	51·6	47·3	43·7	40·5	37·8	**68**
69	597	299	199	149	119	99·5	85·3	74·6	66·4	59·7	54·3	49·8	46·0	42·7	39·8	**69**
70	630	315	210	157	126	105	90·0	78·7	70·0	63·0	57·3	52·5	48·5	45·0	42·0	**70**
71	666	333	222	166	133	111	95·1	83·2	74·0	66·6	60·5	55·5	51·2	47·6	44·4	**71**
72	705	353	235	176	141	118	101	88·2	78·4	70·6	64·2	58·8	54·3	50·4	47·1	**72**
73	750	375	250	187	150	125	107	93·7	83·3	75·0	68·2	62·5	57·7	53·6	50·0	**73**
74	799	400	266	200	160	133	114	100	88·8	80·0	72·7	66·6	61·5	57·1	53·3	**74**
75	855	428	285	214	171	143	122	107	95·1	85·6	77·8	71·3	65·8	61·1	57·1	**75**
Dec.	**179° 45′**	**179° 30′**	**179° 15′**	**179° 00′**	**178° 45′**	**178° 30′**	**178° 15′**	**178° 00′**	**177° 45′**	**177° 30′**	**177° 15′**	**177° 00′**	**176° 45′**	**176° 30′**	**176° 15′**	Dec.
	180° 15′	180° 30′	180° 45′	181° 00′	181° 15′	181° 30′	181° 45′	182° 00′	182° 15′	182° 30′	182° 45′	183° 00′	183° 15′	183° 30′	183° 45′	

HOUR ANGLE

B - Always named the **same** as Declination

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TABLE B - HOUR ANGLE

Dec °	3° 45′	4° 00′	4° 15′	4° 30′	4° 45′	5° 00′	5° 15′	5° 30′	5° 45′	6° 00′	6° 15′	6° 30′	6° 45′	7° 00′	7° 15′	7° 30′	Dec °
	356° 15′	356° 00′	355° 45′	355° 30′	355° 15′	355° 00°	354° 45′	354° 30′	354° 15′	354° 00′	353° 45′	353° 30′	353° 15′	353° 00′	352° 45′	352° 30′	
60	26·5	24·8	23·4	22·1	20·9	19·9	18·9	18·1	17·3	16·6	15·9	15·3	14·7	14·2	13·7	13·3	**60**
61	27·6	25·9	24·3	23·0	21·8	20·7	19·7	18·8	18·0	17·3	16·6	15·9	15·3	14·8	14·3	13·8	**61**
62	28·8	27·0	25·4	24·0	22·7	21·6	20·6	19·6	18·8	18·0	17·3	16·6	16·0	15·4	14·9	14·4	**62**
63	30·0	28·1	26·5	25·0	23·7	22·5	21·4	20·5	19·6	18·8	18·0	17·3	16·7	16·1	15·6	15·0	**63**
64	31·3	29·4	27·7	26·1	24·8	23·5	22·4	21·4	20·5	19·6	18·8	18·1	17·4	16·8	16·2	15·7	**64**
65	32·8	30·7	28·9	27·3	25·9	24·6	23·4	22·4	21·4	20·5	19·7	18·9	18·2	17·6	17·0	16·4	**65**
66	34·3	32·2	30·3	28·6	27·1	25·8	24·5	23·4	22·4	21·5	20·6	19·8	19·1	18·4	17·8	17·2	**66**
67	36·0	33·8	31·8	30·0	28·4	27·0	25·7	24·6	23·5	22·5	21·6	20·8	20·1	19·3	18·7	18·0	**67**
68	37·8	35·5	33·4	31·5	29·9	28·4	27·0	25·8	24·7	23·7	22·7	21·9	21·1	20·3	19·6	19·0	**68**
69	39·8	37·3	35·2	33·2	31·5	29·9	28·5	27·2	26·0	24·9	23·9	23·0	22·2	21·4	20·6	20·0	**69**
70	42·0	39·4	37·1	35·0	33·2	31·5	30·0	28·7	27·4	26·3	25·2	24·3	23·4	22·5	21·8	21·1	**70**
71	44·4	41·6	39·2	37·0	35·1	33·3	31·7	30·3	29·0	27·8	26·7	25·7	24·7	23·8	23·0	22·6	**71**
72	47·1	44·1	41·5	39·2	37·2	35·3	33·6	32·1	30·7	29·4	28·3	27·2	26·2	25·3	24·4	23·3	**72**
73	50·0	46·9	44·1	41·7	39·5	37·5	35·8	34·1	32·7	31·3	30·0	28·9	27·8	26·8	25·9	25·1	**73**
74	53·3	50·0	47·1	44·5	42·1	40·0	38·1	36·4	34·8	33·4	32·0	30·8	29·7	28·6	27·6	26·7	**74**
75	57·1	53·5	50·4	47·6	45·1	42·8	40·8	38·9	37·3	35·7	34·3	33·0	31·8	30·6	29·6	28·6	**75**
Dec.	**176° 15′**	**176° 00′**	**175° 45′**	**175° 30′**	**175° 15′**	**175° 00′**	**174° 45′**	**174° 30′**	**174° 15′**	**174° 00′**	**173° 45′**	**173° 30′**	**173° 15′**	**173° 00′**	**172° 45′**	**172° 30′**	Dec
	183° 45′	184° 00′	184° 15′	184° 30′	184° 45′	185° 00′	185° 15′	185° 30′	185° 45′	186° 00′	186° 15′	186° 30′	186° 45′	187° 00′	187° 15′	187° 30′	

HOUR ANGLE

B - Always named the **same** as Declination

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B

TABLE A - HOUR ANGLE

Lat °	7° 30′	7° 45′	8° 00′	8° 15′	8° 30′	8° 45′	9° 00′	9° 15′	9° 30′	9° 45′	10° 00′	10° 15′	10° 30′	10° 45′	11° 00′	11° 15′	Lat °
	352° 30′	352° 15′	352° 00′	351° 45′	351° 30′	351° 15′	351° 00′	350° 45′	350° 30′	350° 15′	350° 00′	349° 45′	349° 30′	349° 15′	349° 00′	348° 45′	
60	13·2	12·7	12·3	11·9	11·6	11·3	10·9	10·6	10·4	10·1	9·82	9·58	9·35	9·12	8·91	8·71	60
61	13·7	13·3	12·8	12·4	12·1	11·7	11·4	11·1	10·8	10·5	10·2	9·98	9·73	9·50	9·28	9·07	61
62	14·3	13·8	13·4	13·0	12·6	12·2	11·9	11·5	11·2	10·9	10·7	10·4	10·1	9·91	9·68	9·46	62
63	14·9	14·4	14·0	13·5	13·1	12·8	12·4	12·1	11·7	11·4	11·1	10·9	10·6	10·3	10·1	9·87	63
64	15·6	15·1	14·6	14·1	13·7	13·3	12·9	12·6	12·3	11·9	11·6	11·3	11·1	10·8	10·5	10·3	64
65	16·3	15·8	15·3	14·8	14·3	13·9	13·5	13·2	12·8	12·5	12·2	11·9	11·6	11·3	11·0	10·8	65
66	17·1	16·5	16·0	15·5	15·0	14·6	14·2	13·8	13·4	13·1	12·7	12·4	12·1	11·8	11·6	11·3	66
67	17·9	17·3	16·8	16·2	15·8	15·3	14·9	14·5	14·1	13·7	13·4	13·0	12·7	12·4	12·1	11·8	67
68	18·8	18·2	17·6	17·1	16·6	16·1	15·6	15·2	14·8	14·4	14·0	13·7	13·4	13·0	12·7	12·4	68
69	19·8	19·1	18·5	18·0	17·4	16·9	16·5	16·0	15·6	15·2	14·8	14·4	14·1	13·7	13·4	13·1	69
70	20·9	20·2	19·6	19·0	18·4	17·9	17·4	16·9	16·4	16·0	15·6	15·2	14·8	14·5	14·1	13·8	70
71	22·1	21·3	20·7	20·0	19·4	18·9	18·3	17·8	17·4	16·9	16·5	16·1	15·7	15·3	14·9	14·6	71
72	23·4	22·6	21·9	21·2	20·6	20·0	19·4	18·9	18·4	17·9	17·5	17·0	16·6	16·2	15·8	15·5	72
73	24·8	24·0	23·3	22·6	21·9	21·3	20·6	20·1	19·5	19·0	18·6	18·1	17·7	17·2	16·8	16·4	73
74	26·5	25·6	24·8	24·1	23·3	22·7	22·0	21·4	20·8	20·3	19·8	19·3	18·8	18·4	17·9	17·5	74
75	28·4	27·4	26·6	25·7	25·0	24·3	23·6	22·9	22·3	21·7	21·2	20·6	20·1	19·7	19·2	18·8	75
76	30·5	29·5	28·5	27·7	26·8	26·1	25·3	24·6	24·0	23·3	22·8	22·2	21·6	21·1	20·6	20·2	76
77	32·9	31·8	30·8	29·9	29·0	28·1	27·4	26·6	25·9	25·2	24·6	24·0	23·4	22·8	22·3	21·8	77
78	35·7	34·6	33·5	32·5	31·5	30·6	29·7	28·9	28·1	27·4	26·7	26·0	25·4	24·8	24·2	23·7	78
79	39·1	37·8	36·6	35·5	34·4	33·4	32·5	31·6	30·7	29·9	29·2	28·5	27·8	27·1	26·5	25·9	79
80	43·1	41·7	40·4	39·1	38·0	36·9	35·8	34·8	33·9	33·0	32·2	31·4	30·6	29·9	29·2	28·5	80
81	48·0	46·4	44·9	43·6	42·2	41·0	39·9	38·8	37·7	36·7	35·8	34·9	34·1	33·3	32·5	31·7	81
82	54·0	52·3	50·6	49·1	47·6	46·2	44·9	43·7	42·5	41·4	40·4	39·4	38·4	37·5	36·6	35·8	82
83	61·9	59·9	58·0	56·2	54·5	52·9	51·4	50·0	48·7	47·4	46·2	45·0	43·9	42·9	41·9	41·0	83
Lat	172° 30′	172° 15′	172° 00′	171° 45′	171° 30′	171° 15′	171° 00′	170° 45′	170° 30′	170° 15′	170° 00′	169° 45′	169° 30′	169° 15′	169° 00′	168° 45′	Lat
	187° 30′	187° 45′	188° 00′	188° 15′	188° 30′	188° 45′	189° 00′	189° 15′	189° 30′	189° 45′	190° 00′	190° 15′	190° 30′	190° 45′	191° 00′	191° 15′	

HOUR ANGLE

TABLE A - HOUR ANGLE

Lat °	11° 15′	11° 30′	11° 45′	12° 00′	12° 15′	12° 30′	12° 45′	13° 00′	13° 15′	13° 30′	13° 45′	14° 00′	14° 15′	14° 30′	14° 45′	15° 00′	Lat °
	348° 45′	348° 30′	348° 15′	348° 00′	347° 45′	347° 30′	347° 15′	347° 00′	346° 45′	346° 30′	346° 15′	346° 00′	345° 45′	345° 30′	345° 15′	345° 00′	
60	8·71	8·51	8·33	8·15	7·98	7·81	7·65	7·50	7·36	7·21	7·08	6·95	6·82	6·70	6·58	6·46	60
61	9·07	8·87	8·67	8·49	8·31	8·14	7·97	7·81	7·66	7·51	7·37	7·24	7·10	6·98	6·85	6·73	61
62	9·46	9·24	9·04	8·85	8·66	8·48	8·31	8·15	7·99	7·83	7·69	7·54	7·41	7·27	7·14	7·02	62
63	9·87	9·65	9·44	9·23	9·04	8·85	8·67	8·50	8·33	8·17	8·02	7·87	7·73	7·59	7·45	7·32	63
64	10·3	10·1	9·86	9·65	9·44	9·25	9·06	8·88	8·71	8·54	8·38	8·22	8·07	7·93	7·79	7·65	64
65	10·8	10·5	10·3	10·1	9·88	9·67	9·48	9·29	9·11	8·93	8·76	8·60	8·44	8·29	8·15	8·00	65
66	11·3	11·0	10·8	10·6	10·3	10·1	9·93	9·73	9·54	9·36	9·18	9·01	8·84	8·68	8·53	8·38	66
67	11·8	11·6	11·3	11·1	10·9	10·6	10·4	10·2	10·0	9·81	9·63	9·45	9·28	9·11	8·95	8·79	67
68	12·4	12·2	11·9	11·6	11·4	11·2	10·9	10·7	10·5	10·3	10·1	9·93	9·75	9·57	9·40	9·24	68
69	13·1	12·8	12·5	12·3	12·0	11·8	11·5	11·3	11·1	10·9	10·7	10·5	10·3	10·1	9·90	9·72	69
70	13·8	13·5	13·2	12·9	12·7	12·4	12·1	11·9	11·7	11·4	11·2	11·0	10·8	10·6	10·4	10·3	70
71	14·6	14·3	14·0	13·7	13·4	13·1	12·8	12·6	12·3	12·1	11·9	11·7	11·4	11·2	11·0	10·8	71
72	15·5	15·1	14·8	14·5	14·2	13·9	13·6	13·3	13·1	12·8	12·6	12·3	12·1	11·9	11·7	11·5	72
73	16·4	16·1	15·7	15·4	15·1	14·8	14·5	14·2	13·9	13·6	13·4	13·1	12·9	12·7	12·4	12·2	73
74	17·5	17·1	16·8	16·4	16·1	15·7	15·4	15·1	14·8	14·5	14·3	14·0	13·7	13·5	13·3	13·0	74
75	18·8	18·3	17·9	17·6	17·2	16·8	16·5	16·2	15·9	15·6	15·3	15·0	14·7	14·4	14·2	13·9	75
76	20·2	19·7	19·3	18·9	18·5	18·1	17·7	17·4	17·0	16·7	16·4	16·1	15·8	15·5	15·2	15·0	76
77	21·8	21·3	20·8	20·4	20·0	19·5	19·2	18·8	18·4	18·0	17·7	17·4	17·1	16·8	16·5	16·2	77
78	23·7	23·1	22·6	22·1	21·7	21·2	20·8	20·4	20·0	19·6	19·2	18·9	18·5	18·2	17·9	17·6	78
79	25·9	25·3	24·7	24·2	23·7	23·2	22·7	22·3	21·9	21·4	21·0	20·6	20·3	19·9	19·5	19·2	79
80	28·5	27·9	27·3	26·7	26·1	25·6	25·1	24·5	24·1	23·6	23·2	22·8	22·3	21·9	21·5	21·2	80
81	31·7	31·0	30·4	29·7	29·1	28·5	27·9	27·4	26·8	26·3	25·8	25·3	24·9	24·4	24·0	23·6	81
82	35·8	35·0	34·2	33·5	32·8	32·1	31·5	30·8	30·2	29·6	29·1	28·5	28·0	27·5	27·0	26·6	82
83	41·0	40·0	39·2	38·3	37·5	36·7	36·0	35·3	34·6	33·9	33·3	32·7	32·1	31·5	30·9	30·4	83
Lat	168° 45′	168° 30′	168° 15′	168° 00′	167° 45′	167° 30′	167° 15′	167° 00′	166° 45′	166° 30′	166° 15′	166° 00′	165° 45′	165° 30′	165° 15′	165° 00′	Lat
	191° 15′	191° 30′	191° 45′	192° 00′	192° 15′	192° 30′	192° 45′	193° 00′	193° 15′	193° 30′	193° 45′	194° 00′	194° 15′	194° 30′	194° 45′	195° 00′	

HOUR ANGLE

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

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TABLE B HOUR ANGLE

Dec °	7° 30′	7° 45′	8° 00′	8° 15′	8° 30′	8° 45′	9° 00′	9° 15′	9° 30′	9° 45′	10° 00′	10° 15′	10° 30′	10° 45′	11° 00′	11° 15′	Dec °
	352° 30′	352° 15′	352° 00′	351° 45′	351° 30′	351° 15′	351° 00′	350° 45′	350° 30′	350° 15′	350° 00′	349° 45′	349° 30′	349° 15′	349° 00′	348° 45′	
60	13·3	12·8	12·4	12·1	11·7	11·4	11·1	10·8	10·5	10·2	9·97	9·73	9·50	9·29	9·08	8·88	60
61	13·8	13·4	13·0	12·6	12·2	11·9	11·5	11·2	10·9	10·7	10·4	10·1	9·90	9·67	9·45	9·25	61
62	14·4	13·9	13·5	13·1	12·7	12·4	12·0	11·7	11·4	11·1	10·8	10·6	10·3	10·1	9·86	9·64	62
63	15·0	14·6	14·1	13·7	13·3	12·9	12·5	12·2	11·9	11·6	11·3	11·0	10·8	10·5	10·3	10·1	63
64	15·7	15·2	14·7	14·3	13·9	13·5	13·1	12·8	12·4	12·1	11·8	11·5	11·3	11·0	10·7	10·5	64
65	16·4	15·9	15·4	14·9	14·5	14·1	13·7	13·3	13·0	12·7	12·3	12·1	11·8	11·5	11·2	11·0	65
66	17·2	16·7	16·1	15·7	15·2	14·8	14·4	14·0	13·6	13·3	12·9	12·6	12·3	12·0	11·8	11·5	66
67	18·0	17·5	16·9	16·4	15·9	15·5	15·1	14·7	14·3	13·9	13·6	13·2	12·9	12·6	12·3	12·1	67
68	19·0	18·4	17·8	17·2	16·7	16·3	15·8	15·4	15·0	14·6	14·3	13·9	13·6	13·3	13·0	12·7	68
69	20·0	19·3	18·7	18·2	17·6	17·1	16·7	16·2	15·8	15·4	15·0	14·6	14·3	14·0	13·7	13·4	69
70	21·1	20·4	19·7	19·1	18·6	18·1	17·6	17·1	16·6	16·2	15·8	15·4	15·1	14·7	14·4	14·1	70
71	22·3	21·5	20·9	20·2	19·6	19·1	18·6	18·1	17·6	17·1	16·7	16·3	15·9	15·6	15·2	14·9	71
72	23·6	22·8	22·1	21·4	20·8	20·2	19·7	19·1	18·6	18·2	17·7	17·3	16·9	16·5	16·1	15·8	72
73	25·1	24·3	23·5	22·8	22·1	21·5	20·9	20·3	19·8	19·3	18·8	18·4	18·0	17·5	17·1	16·8	73
74	26·7	25·9	25·1	24·3	23·6	22·9	22·3	21·7	21·1	20·6	20·1	19·6	19·1	18·7	18·3	17·9	74
75	28·6	27·7	26·8	26·0	25·3	24·5	23·9	23·2	22·6	22·0	21·5	21·0	20·5	20·0	19·6	19·1	75
Dec.	172° 30′	172° 15′	172° 00′	171° 45′	171° 30′	171° 15′	171° 00′	170° 45′	170° 30′	170° 15′	170° 00′	169° 45′	169° 30′	169° 15′	169° 00′	168° 45′	Dec.
	187° 30′	187° 45′	188° 00′	188° 15′	188° 30′	188° 45′	189° 00′	189° 15′	189° 30′	189° 45′	190° 00′	190° 15′	190° 30′	190° 45′	191° 00′	191° 15′	

HOUR ANGLE

B - Always named the **same** as Declination

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TABLE B - HOUR ANGLE

Dec °	11° 15′	11° 30′	11° 45′	12° 00′	12° 15′	12° 30	12° 45′	13° 00′	13° 15′	13° 30′	13° 45′	14° 00′	14° 15′	14° 30′	14° 45′	15° 00′	Dec °
	348° 45′	348° 30′	348° 15′	348° 00′	347° 45′	347° 30′	347° 15′	347° 00′	346° 45′	346° 30′	346° 15′	346 00′	345° 45′	345° 30′	345° 15′	345° 00′	
60	8·88	8·69	8·51	8·33	8·16	8·00	7·85	7·70	7·56	7·42	7·29	7·16	7·04	6·92	6·80	6·69	60
61	9·25	9·05	8·86	8·68	8·50	8·34	8·17	8·02	7·87	7·73	7·59	7·46	7·33	7·21	7·09	6·97	61
62	9·64	9·43	9·24	9·05	8·86	8·69	8·52	8·36	8·21	8·06	7·91	7·77	7·64	7·51	7·39	7·27	62
63	10·1	9·84	9·64	9·44	9·25	9·07	8·89	8·72	8·56	8·41	8·26	8·11	7·97	7·84	7·71	7·58	63
64	10·5	10·3	10·1	9·86	9·66	9·47	9·29	9·11	8·95	8·78	8·63	8·48	8·33	8·19	8·05	7·92	64
65	11·0	10·8	10·5	10·3	10·1	9·91	9·72	9·53	9·36	9·19	9·02	8·86	8·71	8·57	8·42	8·29	65
66	11·5	11·3	11·0	10·8	10·6	10·4	10·2	9·98	9·80	9·62	9·45	9·28	9·12	8·97	8·82	8·68	66
67	12·1	11·8	11·6	11·3	11·1	10·9	10·7	10·5	10·3	10·1	9·91	9·74	9·57	9·41	9·25	9·10	67
68	12·7	12·4	12·2	11·9	11·7	11·4	11·2	11·0	10·8	10·6	10·4	10·2	10·1	9·89	9·72	9·56	68
69	13·4	13·1	12·8	12·5	12·3	12·0	11·8	11·6	11·4	11·2	11·0	10·8	10·6	10·4	10·2	10·1	69
70	14·1	13·8	13·5	13·2	12·9	12·7	12·4	12·2	12·0	11·8	11·6	11·4	11·2	11·0	10·8	10·6	70
71	14·9	14·6	14·3	14·0	13·7	13·4	13·2	12·9	12·7	12·4	12·2	12·0	11·8	11·6	11·4	11·2	71
72	15·8	15·4	15·1	14·8	14·5	14·2	13·9	13·7	13·4	13·2	12·9	12·7	12·5	12·3	12·1	11·9	72
73	16·8	16·4	16·1	15·7	15·4	15·1	14·8	14·5	14·3	14·0	13·8	13·5	13·3	13·1	12·8	12·6	73
74	17·9	17·5	17·1	16·8	16·4	16·1	15·8	15·5	15·2	14·9	14·7	14·4	14·2	13·9	13·7	13·5	74
75	19·1	18·7	18·3	18·0	17·6	17·2	16·9	16·6	16·3	16·0	15·7	15·4	15·2	14·9	14·7	14·4	75
Dec.	168° 45′	168° 30′	168° 15′	168 00′	167° 45′	167° 30′	167° 15′	167° 00′	166° 45′	166° 30′	166° 15′	166° 00′	165° 45′	165 30′	165° 15′	165° 00′	Dec.
	191° 15′	191° 30′	191° 45′	192° 00′	192° 15′	192° 30′	192° 45′	193° 00′	193° 15′	193° 30′	193° 45′	194° 00′	194° 15′	194° 30′	194° 45′	195° 00′	

HOUR ANGLE

TABLE A HOUR ANGLE

Lat °	15° 00′ / 345° 00′	15° 30′ / 344° 30′	16° 00′ / 344° 00′	16° 30′ / 343° 30′	17° 00′ / 343° 00′	17° 30′ / 342° 30′	18° 00′ / 342° 00′	18° 30′ / 341° 30′	19° 00′ / 341° 00′	19° 30′ / 340° 30′	20° 00′ / 340° 00′	20° 30′ / 339° 30′	21° 00′ / 339° 00′	21° 30′ / 338° 30′	22° 00′ / 338° 00′	22° 30′ / 337° 30′	Lat °
60	6·46	6·25	6·04	5·85	5·67	5·49	5·33	5·18	5·03	4·89	4·76	4·63	4·51	4·40	4·29	4·18	60
61	6·73	6·51	6·29	6·09	5·90	5·72	5·55	5·39	5·24	5·09	4·96	4·83	4·70	4·58	4·47	4·36	61
62	7·02	6·78	6·56	6·35	6·15	5·96	5·79	5·62	5·46	5·31	5·17	5·03	4·90	4·77	4·65	4·54	62
63	7·32	7·08	6·84	6·63	6·42	6·23	6·04	5·87	5·70	5·54	5·39	5·25	5·11	4·98	4·86	4·74	63
64	7·65	7·39	7·15	6·92	6·71	6·50	6·31	6·13	5·95	5·79	5·63	5·48	5·34	5·21	5·08	4·95	64
65	8·00	7·73	7·48	7·24	7·01	6·80	6·60	6·41	6·23	6·06	5·89	5·74	5·59	5·44	5·31	5·18	65
66	8·38	8·10	7·83	7·58	7·35	7·12	6·91	6·71	6·52	6·34	6·17	6·01	5·85	5·70	5·56	5·42	66
67	8·79	8·50	8·22	7·95	7·71	7·47	7·25	7·04	6·84	6·65	6·47	6·30	6·14	5·98	5·83	5·69	67
68	9·24	8·92	8·63	8·36	8·10	7·85	7·62	7·40	7·19	6·99	6·80	6·62	6·45	6·28	6·13	5·98	68
69	9·72	9·39	9·09	8·80	8·52	8·26	8·02	7·79	7·57	7·36	7·16	6·97	6·79	6·61	6·45	6·29	69
70	10·3	9·91	9·58	9·28	8·99	8·71	8·46	8·21	7·98	7·76	7·55	7·35	7·16	6·98	6·80	6·63	70
71	10·8	10·5	10·1	9·81	9·50	9·21	8·94	8·68	8·43	8·20	7·98	7·77	7·57	7·37	7·19	7·01	71
72	11·5	11·1	10·7	10·4	10·1	9·76	9·47	9·20	8·94	8·69	8·46	8·23	8·02	7·81	7·62	7·43	72
73	12·2	11·8	11·4	11·1	10·7	10·4	10·1	9·78	9·50	9·24	8·99	8·75	8·52	8·30	8·10	7·90	73
74	13·0	12·6	12·2	11·8	11·4	11·1	10·7	10·4	10·1	9·85	9·58	9·33	9·09	8·85	8·63	8·42	74
75	13·9	13·5	13·0	12·6	12·2	11·8	11·5	11·2	10·8	10·5	10·3	9·98	9·72	9·47	9·24	9·01	75
76	15·0	14·5	14·0	13·5	13·1	12·7	12·4	12·0	11·7	11·3	11·1	10·7	10·5	10·2	9·93	9·68	76
77	16·2	15·6	15·1	14·6	14·2	13·7	13·3	13·0	12·6	12·2	11·9	11·6	11·3	11·0	10·7	10·5	77
78	17·6	17·0	16·4	15·9	15·4	14·9	14·5	14·1	13·7	13·3	12·9	12·6	12·3	11·9	11·7	11·4	78
79	19·2	18·6	17·9	17·4	16·8	16·3	15·8	15·4	14·9	14·5	14·1	13·8	13·4	13·1	12·7	12·4	79
80	21·2	20·5	19·8	19·2	18·6	18·0	17·5	17·0	16·5	16·0	15·6	15·2	14·8	14·4	14·0	13·7	80
81	23·6	22·8	22·0	21·3	20·7	20·0	19·4	18·9	18·3	17·8	17·4	16·9	16·5	16·0	15·6	15·2	81
82	26·6	25·7	24·8	24·0	23·3	22·6	21·9	21·3	20·7	20·1	19·6	19·0	18·5	18·1	17·6	17·2	82
83	30·4	29·4	28·4	27·5	26·6	25·8	25·1	24·3	23·7	23·0	22·4	21·8	21·2	20·7	20·2	19·7	83
Lat	165° 00′ / 195° 00′	164° 30′ / 195° 30′	164° 00′ / 196° 00′	163° 30′ / 196° 30′	163° 00′ / 197° 00′	162° 30′ / 197° 30′	162° 00′ / 198° 00′	161° 30′ / 198° 30′	161° 00′ / 199° 00′	160° 30′ / 199° 30′	160° 00′ / 200° 00′	159° 30′ / 200° 30′	159° 00′ / 201° 00′	158° 30′ / 201° 30′	158° 00′ / 202° 00′	157° 30′ / 202° 30′	Lat

HOUR ANGLE

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

TABLE A - HOUR ANGLE

Lat °	22° 30′ / 337° 30′	23° 00′ / 337° 00′	23° 30′ / 336° 30′	24° 00′ / 336° 00′	24° 30′ / 335° 30′	25° 00′ / 335° 00′	25° 30′ / 334° 30′	26° 00′ / 334° 00′	26° 30′ / 333° 30′	27° 00′ / 333° 00′	27° 30′ / 332° 30′	28° 00′ / 332° 00′	28° 30′ / 331° 30′	29° 00′ / 331° 00′	29° 30′ / 330° 30′	30° 00′ / 330° 00′	Lat °
60	4·18	4·08	3·98	3·89	3·80	3·71	3·63	3·55	3·47	3·40	3·33	3·26	3·19	3·12	3·06	3·00	60
61	4·36	4·25	4·15	4·05	3·96	3·87	3·78	3·70	3·62	3·54	3·47	3·39	3·32	3·25	3·18	3·12	61
62	4·54	4·43	4·33	4·22	4·13	4·03	3·94	3·86	3·77	3·69	3·61	3·54	3·46	3·39	3·32	3·26	62
63	4·74	4·62	4·51	4·41	4·31	4·21	4·11	4·02	3·94	3·85	3·77	3·69	3·61	3·54	3·47	3·40	63
64	4·95	4·83	4·72	4·61	4·50	4·40	4·30	4·20	4·11	4·02	3·94	3·86	3·78	3·70	3·62	3·55	64
65	5·18	5·05	4·93	4·82	4·71	4·60	4·50	4·40	4·30	4·21	4·12	4·03	3·95	3·87	3·79	3·71	65
66	5·42	5·29	5·17	5·04	4·93	4·82	4·71	4·61	4·51	4·41	4·31	4·22	4·13	4·05	3·97	3·89	66
67	5·69	5·55	5·42	5·29	5·17	5·05	4·94	4·83	4·73	4·62	4·53	4·43	4·34	4·25	4·16	4·08	67
68	5·98	5·83	5·69	5·56	5·43	5·31	5·19	5·07	4·97	4·86	4·75	4·65	4·56	4·47	4·38	4·29	68
69	6·29	6·14	5·99	5·85	5·72	5·59	5·46	5·34	5·23	5·11	5·00	4·90	4·80	4·70	4·60	4·51	69
70	6·63	6·47	6·32	6·17	6·03	5·89	5·76	5·63	5·51	5·39	5·28	5·17	5·06	4·96	4·86	4·76	70
71	7·01	6·84	6·68	6·52	6·37	6·23	6·09	5·96	5·83	5·70	5·58	5·46	5·35	5·24	5·13	5·03	71
72	7·43	7·25	7·08	6·91	6·75	6·60	6·45	6·31	6·17	6·04	5·91	5·79	5·67	5·55	5·44	5·33	72
73	7·90	7·71	7·52	7·35	7·18	7·01	6·86	6·71	6·56	6·42	6·28	6·15	6·03	5·90	5·78	5·67	73
74	8·42	8·22	8·02	7·83	7·65	7·48	7·31	7·15	6·99	6·84	6·70	6·56	6·42	6·29	6·16	6·04	74
75	9·01	8·79	8·58	8·38	8·19	8·00	7·82	7·65	7·49	7·32	7·17	7·02	6·87	6·73	6·60	6·46	75
76	9·68	9·45	9·22	9·01	8·80	8·60	8·41	8·22	8·04	7·87	7·71	7·54	7·39	7·24	7·09	6·95	76
77	10·5	10·2	9·96	9·73	9·51	9·29	9·08	8·88	8·69	8·50	8·32	8·15	7·98	7·81	7·66	7·50	77
78	11·4	11·1	10·8	10·6	10·3	10·1	9·86	9·65	9·44	9·23	9·04	8·85	8·67	8·49	8·32	8·15	78
79	12·4	12·1	11·8	11·6	11·3	11·0	10·8	10·6	10·3	10·1	9·88	9·68	9·48	9·28	9·09	8·91	79
80	13·7	13·4	13·0	12·7	12·4	12·2	11·9	11·6	11·4	11·1	10·9	10·7	10·4	10·3	10·0	9·82	80
81	15·2	14·9	14·5	14·2	13·9	13·5	13·2	13·0	12·7	12·4	12·1	11·9	11·6	11·4	11·2	10·9	81
82	17·2	16·8	16·4	16·0	15·6	15·3	14·9	14·6	14·3	14·0	13·7	13·4	13·1	12·8	12·6	12·3	82
83	19·7	19·2	18·7	18·3	17·9	17·5	17·1	16·7	16·3	16·0	15·7	15·3	15·0	14·7	14·4	14·1	83
Lat	157° 30′ / 202° 30′	157° 00′ / 203° 00′	156° 30′ / 203° 30′	156° 00′ / 204° 00′	155° 30′ / 204° 30′	155° 00′ / 205° 00′	154° 30′ / 205° 30′	154° 00′ / 206° 00′	153° 30′ / 206° 30′	153° 00′ / 207° 00′	152° 30′ / 207° 30′	152° 00′ / 208° 00′	151° 30′ / 208° 30′	151° 00′ / 209° 00′	150° 30′ / 209° 30′	150° 00′ / 210° 00′	Lat

HOUR ANGLE

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A

TABLE B HOUR ANGLE

Dec °	15° 00′ / 345° 00′	15° 30′ / 344° 30′	16° 00′ / 344° 00′	16° 30′ / 343° 30′	17° 00′ / 343° 00′	17° 30′ / 342° 30′	18° 00′ / 342° 00′	18° 30′ / 341° 30′	19° 00′ / 341° 00′	19° 30′ / 340° 30′	20° 00′ / 340° 00′	20° 30′ / 339° 30′	21° 00′ / 339° 00′	21° 30′ / 338° 30′	22° 00′ / 338° 00′	22° 30′ / 337° 30′	Dec °
60	6·69	6·48	6·28	6·10	5·92	5·76	5·61	5·46	5·32	5·19	5·06	4·95	4·83	4·73	4·62	4·53	60
61	6·97	6·75	6·55	6·35	6·17	6·00	5·84	5·69	5·54	5·40	5·27	5·15	5·03	4·92	4·82	4·71	61
62	7·27	7·04	6·82	6·62	6·43	6·25	6·09	5·93	5·78	5·63	5·50	5·37	5·25	5·13	5·02	4·91	62
63	7·58	7·34	7·12	6·91	6·71	6·53	6·35	6·19	6·03	5·88	5·74	5·60	5·48	5·36	5·24	5·13	63
64	7·92	7·67	7·44	7·22	7·01	6·82	6·63	6·46	6·30	6·14	5·99	5·85	5·72	5·59	5·47	5·36	64
65	8·29	8·02	7·78	7·55	7·33	7·13	6·94	6·76	6·59	6·42	6·27	6·12	5·98	5·85	5·72	5·60	65
66	8·68	8·40	8·15	7·91	7·68	7·47	7·27	7·08	6·90	6·73	6·57	6·41	6·27	6·13	6·00	5·87	66
67	9·10	8·82	8·55	8·29	8·06	7·83	7·62	7·42	7·24	7·06	6·89	6·73	6·57	6·43	6·29	6·16	67
68	9·56	9·26	8·98	8·72	8·47	8·23	8·01	7·80	7·60	7·41	7·24	7·07	6·91	6·75	6·61	6·47	68
69	10·1	9·75	9·45	9·17	8·91	8·66	8·43	8·21	8·00	7·80	7·62	7·44	7·27	7·11	6·95	6·81	69
70	10·6	10·3	9·97	9·67	9·40	9·14	8·89	8·66	8·44	8·23	8·03	7·85	7·67	7·50	7·33	7·18	70
71	11·2	10·9	10·5	10·2	9·93	9·66	9·40	9·15	8·92	8·70	8·49	8·29	8·10	7·92	7·75	7·59	71
72	11·9	11·5	11·2	10·8	10·5	10·2	9·96	9·70	9·45	9·22	9·00	8·79	8·59	8·40	8·22	8·04	72
73	12·6	12·2	11·9	11·5	11·2	10·9	10·6	10·3	10·0	9·80	9·57	9·34	9·13	8·93	8·73	8·55	73
74	13·5	13·1	12·7	12·3	11·9	11·6	11·3	11·0	10·7	10·4	10·2	9·96	9·73	9·52	9·31	9·11	74
75	14·4	14·0	13·5	13·1	12·8	12·4	12·1	11·8	11·5	11·2	10·9	10·7	10·4	10·2	9·96	9·75	75
Dec	165° 00′ / 195° 00′	164° 30′ / 195° 30′	164° 00′ / 196° 00′	163° 30′ / 196° 30′	163° 00′ / 197° 00′	162° 30′ / 197° 30′	162° 00′ / 198° 00′	161° 30′ / 198° 30′	161° 00′ / 199° 00′	160° 30′ / 199° 30′	160° 00′ / 200° 00′	159° 30′ / 200° 30′	159° 00′ / 201° 00′	158° 30′ / 201° 30′	158° 00′ / 202° 00′	157° 30′ / 202° 30′	Dec

HOUR ANGLE

B - Always named the **same** as Declination

TABLE B - HOUR ANGLE

Dec °	22° 30′ / 337° 30′	23° 00′ / 337° 00′	23° 30′ / 336° 30′	24° 00′ / 336° 00′	24° 30′ / 335° 30′	25° 00′ / 335° 00′	25° 30′ / 334° 30′	26° 00′ / 334° 00′	26° 30′ / 333° 30′	27° 00′ / 333° 00′	27° 30′ / 332° 30′	28° 00′ / 332° 00′	28° 30′ / 331° 30′	29° 00′ / 331° 00′	29° 30′ / 330° 30′	30° 00′ / 330° 00′	Dec °
60	4·53	4·43	4·34	4·26	4·18	4·10	4·02	3·95	3·88	3·82	3·75	3·69	3·63	3·57	3·52	3·46	60
61	4·71	4·62	4·52	4·44	4·35	4·27	4·19	4·12	4·04	3·97	3·91	3·84	3·78	3·72	3·66	3·61	61
62	4·91	4·81	4·72	4·62	4·54	4·45	4·37	4·29	4·22	4·14	4·07	4·01	3·94	3·88	3·82	3·76	62
63	5·13	5·02	4·92	4·83	4·73	4·64	4·56	4·48	4·40	4·32	4·25	4·18	4·11	4·05	3·99	3·93	63
64	5·36	5·25	5·14	5·04	4·94	4·85	4·76	4·68	4·60	4·52	4·44	4·37	4·30	4·23	4·16	4·10	64
65	5·60	5·49	5·38	5·27	5·17	5·07	4·98	4·89	4·81	4·72	4·64	4·57	4·49	4·42	4·35	4·29	65
66	5·87	5·75	5·63	5·52	5·42	5·31	5·22	5·12	5·03	4·95	4·86	4·78	4·71	4·63	4·56	4·49	66
67	6·16	6·03	5·91	5·79	5·68	5·57	5·47	5·37	5·28	5·19	5·10	5·02	4·94	4·86	4·78	4·71	67
68	6·47	6·33	6·21	6·09	5·97	5·86	5·75	5·65	5·55	5·45	5·36	5·27	5·19	5·11	5·03	4·95	68
69	6·81	6·67	6·53	6·40	6·28	6·16	6·05	5·94	5·84	5·74	5·64	5·55	5·46	5·37	5·29	5·21	69
70	7·18	7·03	6·89	6·75	6·63	6·50	6·38	6·27	6·16	6·05	5·95	5·85	5·76	5·67	5·58	5·49	70
71	7·59	7·43	7·28	7·14	7·00	6·87	6·75	6·63	6·51	6·40	6·29	6·19	6·08	5·99	5·90	5·81	71
72	8·04	7·88	7·72	7·57	7·42	7·28	7·15	7·02	6·90	6·78	6·67	6·56	6·45	6·35	6·25	6·15	72
73	8·55	8·37	8·20	8·04	7·89	7·74	7·60	7·46	7·33	7·21	7·08	6·97	6·86	6·75	6·64	6·54	73
74	9·11	8·93	8·75	8·57	8·41	8·25	8·10	7·96	7·82	7·68	7·55	7·43	7·31	7·19	7·08	6·97	74
75	9·75	9·55	9·36	9·18	9·00	8·83	8·67	8·52	8·37	8·22	8·08	7·95	7·82	7·70	7·58	7·46	75
Dec.	157° 30′ / 202° 30′	157° 00′ / 203° 00′	156° 30′ / 203° 30′	156° 00′ / 204° 00′	155° 30′ / 204° 30′	155° 00′ / 205° 00′	154° 30′ / 205° 30′	154° 00′ / 206° 00′	153° 30′ / 206° 30′	153° 00′ / 207° 00′	152° 30′ / 207° 30′	152° 00′ / 208° 00′	151° 30′ / 208° 30′	151° 00′ / 209° 00′	150° 30′ / 209° 30′	150° 00′ / 210° 00′	Dec.

HOUR ANGLE

B - Always named the **same** as Declination

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TABLE A HOUR ANGLE

Lat. °	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	41°	42°	43°	44°	45°	Lat. °
	330°	329°	328°	327°	326°	325°	324°	323°	322°	321°	320°	319°	318°	317°	316°	315°	
60	3·00	2·88	2·77	2·67	2·57	2·47	2·38	2·30	2·22	2·14	2·06	1·99	1·92	1·86	1·79	1·73	60
61	3·12	3·00	2·89	2·78	2·67	2·58	2·48	2·39	2·31	2·23	2·15	2·08	2·00	1·93	1·87	1·80	61
62	3·26	3·13	3·01	2·90	2·79	2·69	2·59	2·50	2·41	2·32	2·24	2·16	2·09	2·02	1·95	1·88	62
63	3·40	3·27	3·14	3·02	2·91	2·80	2·70	2·60	2·51	2·42	2·34	2·26	2·18	2·10	2·03	1·96	63
64	3·55	3·41	3·28	3·16	3·04	2·93	2·82	2·72	2·62	2·53	2·44	2·36	2·28	2·20	2·12	2·05	64
65	3·71	3·57	3·43	3·30	3·18	3·06	2·95	2·85	2·74	2·65	2·56	2·47	2·38	2·30	2·22	2·14	65
66	3·89	3·74	3·59	3·46	3·33	3·21	3·09	2·98	2·87	2·77	2·68	2·58	2·49	2·41	2·33	2·25	66
67	4·08	3·92	3·77	3·63	3·49	3·36	3·24	3·13	3·02	2·91	2·81	2·71	2·62	2·53	2·44	2·36	67
68	4·29	4·12	3·96	3·81	3·67	3·53	3·41	3·28	3·17	3·06	2·95	2·85	2·75	2·65	2·56	2·48	68
69	4·51	4·34	4·17	4·01	3·86	3·72	3·59	3·46	3·34	3·22	3·11	3·00	2·89	2·79	2·70	2·61	69
70	4·76	4·57	4·40	4·23	4·07	3·92	3·78	3·65	3·52	3·39	3·27	3·16	3·04	2·95	2·85	2·75	70
71	5·03	4·83	4·65	4·47	4·31	4·15	4·00	3·85	3·72	3·59	3·46	3·34	3·23	3·11	3·01	2·90	71
72	5·33	5·12	4·93	4·74	4·56	4·40	4·24	4·08	3·94	3·80	3·67	3·54	3·42	3·30	3·19	3·08	72
73	5·67	5·44	5·23	5·04	4·85	4·67	4·50	4·34	4·19	4·04	3·90	3·76	3·63	3·51	3·39	3·27	73
74	6·04	5·80	5·58	5·37	5·17	4·98	4·80	4·63	4·46	4·31	4·16	4·01	3·87	3·74	3·61	3·49	74
75	6·46	6·21	5·97	5·75	5·53	5·33	5·14	4·95	4·78	4·61	4·45	4·29	4·15	4·00	3·87	3·73	75
76	6·95	6·68	6·42	6·18	5·95	5·73	5·52	5·32	5·13	4·95	4·78	4·61	4·45	4·30	4·15	4·01	76
77	7·50	7·21	6·93	6·67	6·42	6·19	5·96	5·75	5·54	5·35	5·16	4·98	4·81	4·65	4·49	4·33	77
78	8·15	7·83	7·53	7·25	6·98	6·72	6·48	6·24	6·02	5·81	5·61	5·41	5·23	5·05	4·87	4·70	78
79	8·91	8·56	8·23	7·92	7·63	7·35	7·08	6·83	6·59	6·35	6·13	5·92	5·71	5·52	5·33	5·14	79
80	9·82	9·44	9·08	8·73	8·41	8·10	7·81	7·53	7·26	7·00	6·76	6·52	6·30	6·08	5·87	5·67	80
81	10·9	10·5	10·1	9·72	9·36	9·02	8·69	8·38	8·08	7·80	7·52	7·26	7·01	6·77	6·54	6·31	81
82	12·3	11·8	11·4	11·0	10·6	10·2	9·79	9·44	9·11	8·79	8·48	8·19	7·90	7·63	7·37	7·12	82
83	14·1	13·6	13·0	12·5	12·1	11·6	11·2	10·8	10·4	10·1	9·71	9·37	9·05	8·73	8·43	8·14	83
Lat.	150°	149°	148°	147°	146°	145°	144°	143°	142°	141°	140°	139°	138°	137°	136°	135°	Lat.
	210°	211°	212°	213°	214°	215°	216°	217°	218°	219°	220°	221°	222°	223°	224°	225°	

HOUR ANGLE

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

TABLE A HOUR ANGLE

Lat. °	45°	46°	47°	48°	49°	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	Lat. °
	315°	314°	313°	312°	311°	310°	309°	308°	307°	306°	305°	304°	303°	302°	301°	300°	
60	1·73	1·67	1·62	1·56	1·51	1·45	1·40	1·35	1·31	1·26	1·21	1·17	1·12	1·08	1·04	1·00	60
61	1·80	1·74	1·68	1·62	1·57	1·51	1·46	1·41	1·36	1·31	1·26	1·22	1·17	1·13	1·08	1·04	61
62	1·88	1·82	1·75	1·69	1·63	1·58	1·52	1·47	1·42	1·37	1·32	1·27	1·22	1·18	1·13	1·09	62
63	1·96	1·90	1·83	1·77	1·71	1·65	1·59	1·53	1·48	1·43	1·37	1·32	1·27	1·23	1·18	1·13	63
64	2·05	1·98	1·91	1·85	1·78	1·72	1·66	1·60	1·55	1·49	1·44	1·38	1·33	1·28	1·23	1·18	64
65	2·14	2·07	2·00	1·93	1·86	1·80	1·74	1·68	1·62	1·56	1·50	1·45	1·39	1·34	1·29	1·24	65
66	2·25	2·17	2·09	2·02	1·95	1·88	1·82	1·75	1·69	1·63	1·57	1·52	1·46	1·40	1·35	1·30	66
67	2·36	2·28	2·20	2·12	2·05	1·98	1·91	1·84	1·78	1·71	1·65	1·59	1·53	1·47	1·42	1·36	67
68	2·48	2·39	2·31	2·23	2·15	2·08	2·00	1·93	1·87	1·80	1·73	1·67	1·61	1·55	1·49	1·43	68
69	2·61	2·52	2·43	2·35	2·26	2·19	2·11	2·04	1·96	1·89	1·82	1·76	1·69	1·63	1·57	1·50	69
70	2·75	2·65	2·56	2·47	2·39	2·31	2·23	2·15	2·07	2·00	1·92	1·85	1·78	1·72	1·65	1·59	70
71	2·90	2·80	2·71	2·62	2·52	2·44	2·35	2·27	2·19	2·11	2·03	1·96	1·89	1·82	1·75	1·68	71
72	3·08	2·97	2·87	2·77	2·68	2·58	2·49	2·41	2·32	2·24	2·16	2·08	2·00	1·92	1·85	1·78	72
73	3·27	3·16	3·05	2·95	2·84	2·74	2·65	2·56	2·47	2·38	2·29	2·21	2·12	2·04	1·97	1·89	73
74	3·49	3·37	3·25	3·14	3·03	2·93	2·82	2·73	2·63	2·53	2·44	2·35	2·27	2·18	2·10	2·01	74
75	3·73	3·60	3·48	3·36	3·24	3·13	3·02	2·92	2·81	2·71	2·61	2·52	2·42	2·33	2·24	2·16	75
76	4·01	3·87	3·74	3·61	3·49	3·37	3·25	3·13	3·02	2·91	2·81	2·71	2·61	2·51	2·41	2·32	76
77	4·33	4·18	4·04	3·90	3·77	3·64	3·51	3·38	3·26	3·15	3·03	2·92	2·81	2·71	2·60	2·50	77
78	4·70	4·54	4·39	4·24	4·09	3·95	3·81	3·68	3·55	3·42	3·29	3·17	3·06	2·94	2·83	2·72	78
79	5·14	4·97	4·80	4·63	4·47	4·32	4·17	4·02	3·88	3·74	3·60	3·47	3·34	3·22	3·09	2·97	79
80	5·67	5·48	5·29	5·11	4·93	4·76	4·59	4·43	4·27	4·12	3·97	3·83	3·68	3·54	3·41	3·27	80
81	6·31	6·10	5·89	5·69	5·49	5·30	5·11	4·93	4·76	4·59	4·42	4·26	4·10	3·95	3·79	3·65	81
82	7·12	6·87	6·64	6·41	6·19	5·97	5·76	5·56	5·36	5·17	4·98	4·80	4·62	4·45	4·28	4·11	82
83	8·14	7·86	7·60	7·33	7·08	6·83	6·60	6·36	6·14	5·92	5·70	5·49	5·29	5·09	4·89	4·70	83
Lat.	135°	134°	133°	132°	131°	130°	129°	128°	127°	126°	125°	124°	123°	122°	121°	120°	Lat.
	225°	226°	227°	228°	229°	230°	231°	232°	233°	234°	235°	236°	237°	238	239°	240°	

HOUR ANGLE

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A

TABLE B HOUR ANGLE

Dec °	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	41°	42°	43°	44°	45°	Dec °
	330°	329°	328°	327°	326°	325°	324°	323°	322°	321°	320°	319°	318°	317°	316°	315°	
60	3·46	3·36	3·27	3·18	3·10	3·02	2·95	2·88	2·81	2·75	2·69	2·64	2·59	2·54	2·49	2·45	60
61	3·61	3·50	3·40	3·31	3·23	3·15	3·07	3·00	2·93	2·87	2·81	2·75	2·70	2·65	2·60	2·55	61
62	3·76	3·65	3·55	3·45	3·36	3·28	3·20	3·13	3·05	2·99	2·93	2·87	2·81	2·76	2·71	2·66	62
63	3·93	3·81	3·70	3·60	3·51	3·42	3·34	3·26	3·19	3·12	3·05	2·99	2·93	2·88	2·83	2·78	63
64	4·10	3·98	3·87	3·76	3·67	3·57	3·49	3·41	3·33	3·26	3 19	3 13	3·06	3·01	2·95	2·90	64
65	4·29	4·16	4·05	3·94	3·84	3·74	3·65	3·56	3·48	3·41	3·34	3·27	3·20	3·14	3·09	3 03	65
66	4·49	4·36	4·24	4·12	4·02	3·92	3·82	3·73	3·65	3·57	3·49	3·42	3·36	3·29	3·23	3·18	66
67	4·71	4·57	4·45	4·33	4·21	4·11	4·01	3·91	3·83	3·74	3·67	3·59	3·52	3·45	3·39	3·33	67
68	4·95	4·81	4·67	4·54	4·43	4·32	4·21	4·11	4·02	3·93	3·85	3·77	3·70	3·63	3·56	3·50	68
69	5·21	5·06	4·92	4·78	4·66	4·54	4·43	4·33	4·23	4·14	4·05	3·97	3·89	3·82	3·75	3·68	69
70	5·49	5·33	5·18	5·04	4·91	4·79	4·67	4·56	4·46	4·37	4·27	4·19	4·11	4·03	3·95	3·89	70
71	5·81	5·64	5·48	5·33	5·19	5·06	4·94	4·83	4·72	4·61	4·52	4·43	4·34	4·26	4·18	4·11	71
72	6·15	5·98	5·81	5·65	5·50	5·37	5·24	5·11	5·00	4·89	4·79	4·69	4·60	4·51	4·43	4·35	72
73	6·54	6·35	6·17	6·01	5·85	5·70	5·57	5·44	5·31	5·20	5·09	4·99	4·89	4·80	4·71	4·63	73
74	6·97	6·77	6·58	6·40	6·24	6·08	5·93	5·79	5·67	5·54	5·43	5·32	5·21	5·11	5·02	4·93	74
75	7·46	7·25	7·04	6·85	6·67	6·51	6·35	6·20	6·06	5·93	5·81	5·69	5·58	5·47	5·37	5·28	75
Dec.	150°	149°	148°	147°	146°	145°	144°	143°	142°	141°	140°	139°	138°	137°	136°	135°	Dec.
	210°	211°	212°	213°	214°	215°	216°	217°	218°	219°	220°	221°	222°	223°	224°	225°	

HOUR ANGLE

B - Always named the **same** as Declination

B - Always named the **same** as Declination

TABLE B - HOUR ANGLE

Dec °	45°	46°	47°	48°	49°	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	Dec °
	315°	314°	313°	312°	311°	310°	309°	308°	307°	306°	305°	304°	303°	302°	301°	300°	
60	2·45	2·41	2·37	2·33	2·29	2·26	2·23	2·20	2·17	2·14	2 11	2·09	2·07	2 04	2·02	2·00	60
61	2·55	2·51	2·47	2·43	2·39	2·36	2·32	2·29	2·26	2·23	2·20	2·18	2·15	2·13	2·10	2·08	61
62	2·66	2·62	2·57	2·53	2·49	2·46	2·42	2·39	2·35	2·32	2·30	2·27	2·24	2·22	2·19	2·17	62
63	2·78	2·73	2·68	2·64	2·60	2·56	2·53	2·49	2·46	2·43	2·40	2·36	2·34	2·31	2·29	2·27	63
64	2·90	2·85	2·80	2·76	2·72	2·68	2·64	2·60	2·57	2·53	2·50	2·47	2·44	2·42	2·39	2·37	64
65	3·03	2·98	2·93	2·89	2·84	2·80	2·76	2·72	2·69	2·65	2·62	2·59	2·56	2·53	2·50	2·48	65
66	3·18	3·12	3·07	3·02	2·98	2·93	2·89	2·85	2·81	2·78	2·74	2·71	2·68	2·65	2·62	2·59	66
67	3·33	3·28	3·22	3·17	3·12	3·08	3·03	2·99	2·95	2·91	2·88	2·84	2·81	2·78	2·75	2·72	67
68	3·50	3·44	3·38	3·33	3·28	3·23	3·18	3·14	3·10	3·06	3·02	2·99	2·95	2·92	2·89	2·86	68
69	3·68	3·62	3·56	3·51	3·45	3·40	3·35	3·31	3·26	3·22	3·18	3·14	3·11	3·07	3·04	3·01	69
70	3·89	3·82	3·76	3·70	3·64	3·59	3·54	3·49	3·44	3·40	3·35	3·31	3·28	3·24	3·20	3·17	70
71	4·11	4·04	3·97	3·91	3·85	3·79	3·74	3·68	3·64	3·59	3·54	3·50	3·46	3·42	3·39	3·35	71
72	4·35	4·28	4·21	4·14	4·08	4·02	3·96	3·91	3·85	3·80	3·76	3·71	3·67	3·63	3·59	3·55	72
73	4·63	4·55	4·47	4·40	4·33	4·27	4·21	4·15	4·10	4·04	3·99	3·95	3·90	3·86	3·82	3·78	73
74	4·93	4·85	4·77	4·69	4·62	4·55	4·49	4·43	4·37	4·31	4·26	4·21	4·16	4·11	4·07	4·03	74
75	5·28	5·19	5·10	5·02	4·95	4·87	4·80	4·74	4·67	4·61	4·56	4·50	4·45	4·40	4·35	4·31	75
Dec.	135°	134°	133°	132°	131°	130°	129°	128°	127°	126°	125°	124°	123°	122°	121°	120°	Dec.
	225°	226°	227°	228°	229°	230°	231°	232°	233°	234°	235°	236°	237°	238°	239°	240°	

HOUR ANGLE

B

B - Always named the **same** as Declination

TABLE A HOUR ANGLE

Lat °	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	71°	72°	73°	74°	75°	Lat °
	300°	299°	298°	297°	296°	295°	294°	293°	292°	291°	290°	289°	288°	287°	286°	285°	
60	1·00	·96	·92	·88	·85	·81	·77	·74	·70	·67	·63	·60	·56	·53	·50	·46	60
61	1·04	1·00	·96	·92	·88	·84	·80	·77	·73	·69	·66	·62	·59	·55	·52	·48	61
62	1·09	1·04	1·00	·96	·92	·88	·84	·80	·76	·72	·68	·65	·61	·58	·54	·50	62
63	1·13	1·09	1·04	1·00	·96	·92	·87	·83	·79	·75	·71	·68	·64	·60	·56	·53	63
64	1·18	1·14	1·09	1·05	1·00	·96	·91	·87	·83	·79	·75	·71	·67	·63	·59	·55	64
65	1·24	1·19	1·14	1·09	1·05	1·00	·96	·91	·87	·82	·78	·74	·70	·66	·62	·57	65
66	1·30	1·25	1·19	1·14	1·10	1·05	1·00	·95	·91	·86	·82	·77	·73	·69	·64	·60	66
67	1·36	1·31	1·25	1·20	1·15	1·10	1·05	1·00	·95	·90	·86	·81	·77	·72	·68	·63	67
68	1·43	1·37	1·32	1·26	1·21	1·15	1·09	1·05	1·00	·95	·90	·85	·80	·76	·71	·66	68
69	1·50	1·44	1·39	1·33	1·27	1·22	1·16	1·11	1·05	1·00	·95	·90	·85	·80	·75	·70	69
70	1·59	1·52	1·46	1·40	1·34	1·28	1·22	1·17	1·11	1·05	1·00	·95	·89	·84	·79	·74	70
71	1·68	1·61	1·54	1·48	1·42	1·35	1·29	1·23	1·17	1·11	1·06	1·00	·94	·89	·83	·78	71
72	1·78	1·71	1·64	1·57	1·50	1·44	1·37	1·31	1·24	1·18	1·12	1·06	1·00	·94	·88	·82	72
73	1·89	1·81	1·74	1·67	1·60	1·53	1·46	1·39	1·32	1·26	1·19	1·13	1·06	1·00	·94	·88	73
74	2·01	1·93	1·85	1·78	1·70	1·63	1·55	1·48	1·41	1·34	1·27	1·20	1·13	1·07	1·00	·93	74
75	2·16	2·07	1·98	1·90	1·82	1·74	1·66	1·58	1·51	1·43	1·36	1·29	1·21	1·14	1·07	1·00	75
76	2·32	2·22	2·13	2·04	1·96	1·87	1·79	1·70	1·62	1·54	1·46	1·38	1·30	1·23	1·15	1·07	76
77	2·50	2·40	2·30	2·21	2·11	2·02	1·93	1·84	1·75	1·66	1·58	1·49	1·41	1·32	1·24	1·16	77
78	2·72	2·61	2·50	2·40	2·29	2·19	2·09	2·00	1·90	1·81	1·71	1·62	1·53	1·44	1·35	1·26	78
79	2·97	2·85	2·74	2·62	2·51	2·40	2·29	2·18	2·08	1·97	1·87	1·77	1·67	1·57	1·48	1·37	79
80	3·27	3·14	3·02	2·89	2·77	2·64	2·53	2·41	2·29	2·18	2·06	1·95	1·84	1·73	1·63	1·52	80
81	3·65	3·50	3·36	3·22	3·08	2·94	2·81	2·68	2·55	2·42	2·30	2·17	2·05	1·93	1·81	1·69	81
82	4·11	3·94	3·78	3·63	3·47	3·32	3·17	3·02	2·87	2·73	2·59	2·45	2·31	2·18	2·04	1·91	82
83	4·70	4·51	4·33	4·15	3·97	3·80	3·63	3·46	3·29	3·13	2·96	2·80	2·65	2·49	2·34	2·18	83
Lat	120°	119°	118°	117°	116°	115°	114°	113°	112°	111°	110°	109°	108°	107°	106°	105°	Lat
	240°	241°	242°	243°	244°	245°	246°	247°	248°	249°	250°	251°	252°	253°	254°	255°	

HOUR ANGLE

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

TABLE A HOUR ANGLE

Lat °	75°	76°	77°	78°	79°	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	Lat °
	285°	284°	283°	282°	281°	280°	279°	278°	277°	276°	275°	274°	273°	272°	271°	270°	
60	·46	·43	·40	·37	·34	·31	·27	·24	·21	·18	·15	·12	·09	·06	·03	·00	60
61	·48	·45	·42	·38	·35	·32	·29	·25	·22	·19	·16	·13	·10	·06	·03	·00	61
62	·50	·47	·43	·40	·37	·33	·30	·26	·23	·20	·16	·13	·10	·07	·03	·00	62
63	·53	·49	·45	·42	·38	·35	·31	·28	·24	·21	·17	·14	·10	·07	·03	·00	63
64	·55	·51	·47	·44	·40	·36	·33	·29	·25	·22	·18	·14	·11	·07	·04	·00	64
65	·57	·54	·50	·46	·42	·38	·34	·30	·26	·23	·19	·15	·11	·08	·04	·00	65
66	·60	·56	·52	·48	·44	·40	·36	·32	·28	·24	·20	·16	·12	·08	·04	·00	66
67	·63	·59	·54	·50	·46	·42	·37	·33	·29	·25	·21	·17	·12	·08	·04	·00	67
68	·66	·62	·57	·53	·48	·44	·39	·35	·30	·26	·22	·17	·13	·09	·04	·00	68
69	·70	·65	·60	·55	·51	·46	·41	·37	·32	·27	·23	·18	·14	·09	·05	·00	69
70	·74	·69	·63	·58	·53	·48	·44	·39	·34	·29	·24	·19	·14	·10	·05	·00	70
71	·78	·72	·67	·62	·57	·51	·46	·41	·36	·31	·25	·20	·15	·10	·05	·00	71
72	·82	·77	·71	·65	·60	·54	·49	·43	·38	·32	·27	·22	·16	·11	·05	·00	72
73	·88	·82	·78	·70	·64	·58	·52	·46	·40	·34	·29	·23	·17	·11	·06	·00	73
74	·93	·87	·81	·74	·68	·61	·55	·49	·43	·37	·31	·24	·18	·12	·06	·00	74
75	1·00	·93	·86	·79	·73	·66	·59	·53	·46	·39	·33	·26	·20	·13	·07	·00	75
76	1·07	1·00	·93	·85	·78	·71	·64	·56	·49	·42	·35	·28	·21	·14	·07	·00	76
77	1·16	1·08	1·00	·92	·84	·76	·69	·61	·53	·46	·38	·30	·23	·15	·08	·00	77
78	1·26	1·17	1·09	1·00	·91	·83	·75	·66	·58	·49	·41	·33	·25	·16	·08	·00	78
79	1·37	1·28	1·19	1·09	1·00	·91	·82	·72	·63	·54	·45	·36	·27	·18	·09	·00	79
80	1·52	1·41	1·31	1·21	1·10	1·00	·90	·80	·70	·60	·50	·40	·30	·20	·10	·00	80
81	1·69	1·57	1·46	1·34	1·23	1·11	1·00	·89	·78	·66	·55	·44	·33	·22	·11	·00	81
82	1·91	1·77	1·64	1·51	1·38	1·26	1·13	1·00	·87	·75	·62	·50	·37	·25	·12	·00	82
83	2·18	2·03	1·88	1·73	1·58	1·44	1·29	1·15	1·00	·86	·71	·57	·43	·28	·14	·00	83
Lat	105°	104°	103°	102°	101°	100°	99°	98°	97°	96°	95°	94°	93°	92°	91°	90°	Lat
	255°	256°	257°	258°	259°	260°	261°	262°	263°	264°	265°	266°	267°	268°	269°	270°	

HOUR ANGLE

A - Named opposite to Latitude, **except** when **Hour Angle** is between 90° and 270°

A

TABLE B HOUR ANGLE

Dec °	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	71°	72°	73°	74°	75°	Dec °
	300°	299°	298°	297°	296°	295°	294°	293°	292°	291°	290°	289°	288°	287°	286°	285°	
60	2·00	1·98	1·96	1·94	1·93	1·91	1·89	1·88	1·87	1·86	1·84	1·83	1·82	1·81	1·80	1·79	60
61	2·08	2·06	2·04	2·03	2·01	1·99	1·98	1·96	1·95	1·93	1·92	1·91	1·90	1·89	1·88	1·87	61
62	2·17	2·15	2·13	2·11	2·09	2·08	2·06	2·04	2·03	2·01	2·00	1·99	1·98	1·97	1·96	1·95	62
63	2·27	2·24	2·22	2·20	2·18	2·17	2·15	2·13	2·12	2·10	2·09	2·08	2·06	2·05	2·04	2·03	63
64	2·37	2·34	2·32	2·30	2·28	2·26	2·24	2·23	2·21	2·20	2·18	2·16	2·16	2·14	2·13	2·12	64
65	2·48	2·45	2·43	2·41	2·39	2·37	2·35	2·33	2·31	2·30	2·28	2·27	2·25	2·24	2·23	2·22	65
66	2·59	2·57	2·54	2·52	2·50	2·48	2·46	2·44	2·42	2·41	2·39	2·38	2·36	2·35	2·34	2·33	66
67	2·72	2·69	2·67	2·64	2·62	2·60	2·58	2·56	2·54	2·52	2·51	2·49	2·48	2·46	2·45	2·44	67
68	2·86	2·83	2·80	2·78	2·75	2·73	2·71	2·69	2·67	2·65	2·63	2·62	2·60	2·59	2·57	2·56	68
69	3·01	2·98	2·95	2·92	2·90	2·87	2·85	2·83	2·81	2·79	2·77	2·76	2·74	2·72	2·71	2·70	69
70	3·17	3·14	3·11	3·08	3·06	3·03	3·01	2·98	2·96	2·94	2·92	2·91	2·89	2·87	2·86	2·84	70
71	3·35	3·32	3·29	3·26	3·23	3·20	3·18	3·16	3·13	3·11	3·09	3·07	3·05	3·04	3·02	3·01	71
72	3·55	3·52	3·49	3·45	3·42	3·40	3·37	3·34	3·32	3·30	3·28	3·26	3·24	3·22	3·20	3·19	72
73	3·78	3·74	3·70	3·67	3·64	3·61	3·58	3·55	3·53	3·50	3·48	3·46	3·44	3·42	3·40	3·39	73
74	4·03	3·99	3·95	3·91	3·88	3·85	3·82	3·79	3·76	3·74	3·71	3·69	3·67	3·65	3·63	3·61	74
75	4·31	4·27	4·23	4·19	4·15	4·12	4·09	4·05	4·03	4·00	3·97	3·95	3·92	3·90	3·88	3·86	75
Dec	120°	119°	118°	117°	116°	115°	114°	113°	112°	111°	110°	109°	108°	107°	106°	105°	Dec
	240°	241°	242°	243°	244°	245°	246°	247°	248°	249°	250°	251°	252°	253°	254°	255°	

HOUR ANGLE

B - Always named the **same** as Declination

B - Always named the **same** as Declination

TABLE B - HOUR ANGLE

Dec °	75°	76°	77°	78°	79°	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	Dec °
	285°	284°	283°	282°	281°	280°	279°	278°	277°	276°	275°	274°	273°	272°	271°	270°	
60	1·79	1·79	1·78	1·77	1·76	1·76	1·75	1·75	1·75	1·74	1·74	1·74	1·73	1·73	1·73	1·73	60
61	1·87	1·86	1·85	1·84	1·84	1·83	1·83	1·82	1·82	1·81	1·81	1·81	1·81	1·80	1·80	1·80	61
62	1·95	1·94	1·93	1·92	1·92	1·91	1·90	1·90	1·89	1·89	1·89	1·89	1·88	1·88	1·88	1·88	62
63	2·03	2·02	2·01	2·01	2·00	1·99	1·99	1·98	1·98	1·97	1·97	1·97	1·97	1·96	1·96	1·96	63
64	2·12	2·11	2·10	2·10	2·09	2·08	2·08	2·07	2·07	2·06	2·06	2·06	2·05	2·05	2·05	2·05	64
65	2·22	2·21	2·20	2·19	2·18	2·18	2·17	2·17	2·16	2·16	2·15	2·15	2·15	2·14	2·14	2·14	65
66	2·33	2·31	2·31	2·30	2·29	2·28	2·27	2·27	2·26	2·26	2·25	2·25	2·25	2·25	2·25	2·25	66
67	2·44	2·43	2·42	2·41	2·40	2·39	2·39	2·38	2·37	2·37	2·36	2·36	2·36	2·36	2·36	2·36	67
68	2·56	2·55	2·54	2·53	2·52	2·51	2·51	2·50	2·49	2·49	2·48	2·48	2·48	2·48	2·48	2·48	68
69	2·70	2·68	2·67	2·66	2·65	2·65	2·64	2·63	2·62	2·62	2·62	2·61	2·61	2·61	2·61	2·61	69
70	2·84	2·83	2·82	2·81	2·80	2·79	2·78	2·78	2·77	2·76	2·76	2·75	2·75	2·75	2·75	2·75	70
71	3·01	2·99	2·98	2·97	2·96	2·95	2·94	2·93	2·93	2·92	2·92	2·91	2·91	2·90	2·90	2·90	71
72	3·19	3·17	3·16	3·15	3·14	3·13	3·12	3·11	3·10	3·09	3·09	3·09	3·08	3·08	3·08	3·08	72
73	3·39	3·37	3·36	3·34	3·33	3·32	3·31	3·30	3·30	3·29	3·28	3·28	3·28	3·27	3·27	3·27	73
74	3·61	3·59	3·58	3·57	3·55	3·54	3·53	3·52	3·51	3·51	3·50	3·50	3·49	3·49	3·49	3·49	74
75	3·86	3·85	3·83	3·82	3·80	3·79	3·78	3·77	3·76	3·75	3·75	3·74	3·74	3·73	3·73	3·73	75
Dec	105°	104°	103°	102°	101°	100°	99°	98°	97°	96°	95°	94°	93°	92°	91°	90°	Dec
	255°	256°	257°	258°	259°	260°	261°	262°	263°	264°	265°	266°	267°	268°	269°	270°	

HOUR ANGLE

B

B - Always named the **same** as Declination

TABLE C

A ± B =	·00′	·01′	·02′	·03′	·04′	·05′	A & B CORRECTION. ·06′	·07	·08′	09	·10′	·11′	·12′	.13′	·14′	15′ = A ± B
Lat	AZIMUTHS															Lat
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	90·0	89·4	88·9	88·3	87·7	87·1	86·6	86·0	85·4	84·9	84·3	83·7	83·2	82·6	82·0	81·5	0
5	90·0	89·4	88·9	88·3	87·7	87·1	86·6	86·0	85·4	84·9	84·3	83·7	83·2	82·6	82·1	81·5	5
10	90·0	89·4	88·9	88·3	87·7	87·2	86·6	86·1	85·5	84·9	84·4	83·8	83·3	82·7	82·1	81·6	10
14	90·0	89·5	88·9	88·3	87·8	87·2	86·7	86·1	85·6	85·0	84·4	83·9	83·4	82·8	82·3	81·7	14
18	90·0	89·5	88·9	88·4	87·8	87·3	86·7	86·2	85·6	85·1	84·5	84·0	83·5	83·0	82·4	81·9	18
20	90·0	89·5	88·9	88·4	87·8	87·3	86·8	86·2	85·7	85·2	84·6	84·1	83·6	83·0	82·5	82·0	20
22	90·0	89·5	88·9	88·4	87·9	87·3	86·8	86·3	85·8	85·2	84·7	84·2	83·7	83·1	82·6	82·1	22
24	90·0	89·5	89·0	88·4	87·9	87·4	86·9	86·3	85·8	85·3	84·8	84·3	83·7	83·2	82·7	82·2	24
26	90·0	89·5	89·0	88·5	87·9	87·4	86·9	86·4	85·9	85·4	84·9	84·4	83·8	83·3	82·8	82·3	26
28	90·0	89·5	89·0	88·5	88·0	87·5	87·0	86·5	86·0	85·5	85·0	84·5	84·0	83·5	83·0	82·5	28
30	90·0	89·5	89·0	88·5	88·0	87·5	87·0	86·5	86·0	85·5	85·1	84·6	84·1	83·6	83·1	82·6	30
31	90·0	89·5	89·0	88·5	88·0	87·5	87·1	86·6	86·1	85·6	85·1	84·6	84·1	83·6	83·2	82·7	31
32	90·0	89·5	89·0	88·5	88·1	87·6	87·1	86·6	86·1	85·6	85·2	84·7	84·2	83·7	83·2	82·8	32
33	90·0	89·5	89·0	88·6	88·1	87·6	87·1	86·6	86·2	85·7	85·2	84·7	84·3	83·8	83·3	82·8	33
34	90·0	89·5	89·1	88·6	88·1	87·6	87·2	86·7	86·2	85·7	85·3	84·8	84·3	83·8	83·4	82·9	34
35	90·0	89·5	89·1	88·6	88·1	87·7	87·2	86·7	86·3	85·8	85·3	84·9	84·4	83·9	83·5	83·0	35
36	90·0	89·5	89·1	88·6	88·1	87·7	87·2	86·8	86·3	85·8	85·4	84·9	84·5	84·0	83·5	83·1	36
37	90·0	89·5	89·1	88·6	88·2	87·7	87·3	86·8	86·3	85·9	85·4	85·0	84·5	84·1	83·6	83·2	37
38	90·0	89·5	89·1	88·6	88·2	87·7	87·3	86·8	86·4	85·9	85·5	85·0	84·6	84·2	83·7	83·3	38
39	90·0	89·6	89·1	88·7	88·2	87·8	87·3	86·9	86·4	86·0	85·6	85·1	84·7	84·2	83·8	83·4	39
40	90·0	89·6	89·1	88·7	88·2	87·8	87·4	86·9	86·5	86·1	85·6	85·2	84·7	84·3	83·9	83·4	40
41	90·0	89·6	89·1	88·7	88·3	87·8	87·4	87·0	86·5	86·1	85·7	85·3	84·8	84·4	84·0	83·5	41
42	90·0	89·6	89·1	88·7	88·3	87·9	87·4	87·0	86·6	86·2	85·7	85·3	84·9	84·5	84·1	83·6	42
43	90·0	89·6	89·2	88·7	88·3	87·9	87·5	87·1	86·7	86·2	85·8	85·4	85·0	84·6	84·2	83·7	43
44	90·0	89·6	89·2	88·8	88·4	87·9	87·5	87·1	86·7	86·3	85·9	85·5	85·1	84·7	84·2	83·8	44
45	90·0	89·6	89·2	88·8	88·4	88·0	87·6	87·2	86·8	86·4	86·0	85·6	85·1	84·7	84·3	83·9	45
46	90·0	89·6	89·2	88·8	88·4	88·0	87·6	87·2	86·8	86·4	86·0	85·6	85·2	84·8	84·4	84·1	46
47	90·0	89·6	89·2	88·8	88·4	88·0	87·7	87·3	86·9	86·5	86·1	85·7	85·3	84·9	84·5	84·2	47
48	90·0	89·6	89·2	88·9	88·5	88·1	87·7	87·3	86·9	86·6	86·2	85·8	85·4	85·0	84·6	84·3	48
49	90·0	89·6	89·2	88·9	88·5	88·1	87·7	87·4	87·0	86·6	86·2	85·9	85·5	85·1	84·8	84·4	49
50	90·0	89·6	89·3	88·9	88·5	88·2	87·8	87·4	87·1	86·7	86·3	86·0	85·6	85·2	84·9	84·5	50
51	90·0	89·6	89·3	88·9	88·6	88·2	87·8	87·5	87·1	86·8	86·4	86·0	85·7	85·3	85·0	84·6	51
52	90·0	89·6	89·3	88·9	88·6	88·2	87·9	87·5	87·2	86·8	86·5	86·1	85·8	85·4	85·1	84·7	52
53	90·0	89·7	89·3	89·0	88·6	88·3	87·9	87·6	87·2	86·9	86·6	86·2	85·9	85·5	85·2	84·8	53
54	90·0	89·7	89·3	89·0	88·7	88·3	88·0	87·6	87·3	87·0	86·6	86·3	86·0	85·6	85·3	85·0	54
55	90·0	89·7	89·3	89·0	88·7	88·4	88·0	87·7	87·4	87·0	86·7	86·4	86·1	85·7	85·4	85·1	55
56	90·0	89·7	89·4	89·0	88·7	88·4	88·1	87·8	87·4	87·1	86·8	86·5	86·2	85·8	85·5	85·2	56
57	90·0	89·7	89·4	89·1	88·8	88·4	88·1	87·8	87·5	87·2	86·9	86·6	86·3	86·0	85·6	85·3	57
58	90·0	89·7	89·4	89·1	88·8	88·5	88·2	87·9	87·6	87·3	87·0	86·7	86·4	86·1	85·8	85·5	58
59	90·0	89·7	89·4	89·1	88·8	88·5	88·2	87·9	87·6	87·3	87·1	86·8	86·5	86·2	85·9	85·6	59
60	90·0	89·7	89·4	89·1	88·9	88·6	88·3	88·0	87·7	87·4	87·1	86·9	86·6	86·3	86·0	85·7	60
61	90·0	89·7	89·4	89·2	88·9	88·6	88·3	88·1	87·8	87·5	87·2	86·9	86·7	86·4	86·1	85·8	61
62	90·0	89·7	89·5	89·2	88·9	88·7	88·4	88·1	87·8	87·6	87·3	87·0	86·8	86·5	86·2	86·0	62
63	90·0	89·7	89·5	89·2	89·0	88·7	88·4	88·2	87·9	87·7	87·4	87·1	86·9	86·6	86·4	86·1	63
64	90·0	89·7	89·5	89·2	89·0	88·7	88·5	88·2	88·0	87·7	87·5	87·2	87·0	86·7	86·5	86·2	64
65	90·0	89·8	89·5	89·3	89·0	88·8	88·5	88·3	88·1	87·8	87·6	87·3	87·1	86·9	86·6	86·4	65
66	90·0	89·8	89·5	89·3	89·1	88·8	88·6	88·4	88·1	87·9	87·7	87·4	87·2	87·0	86·7	86·5	66
67	90·0	89·8	89·6	89·3	89·1	88·9	88·7	88·4	88·2	88·0	87·8	87·5	87·3	87·1	86·9	86·6	67
68	90·0	89·8	89·6	89·4	89·1	88·9	88·7	88·5	88·3	88·1	87·9	87·6	87·4	87·2	87·0	86·8	68
Lat																	Lat
A ± B =	·00′	·01′	·02′	·03′	·04′	·05′	·06′	·07	·08′	·09	·10′	·11′	·12′	·13	·14′	·15′ = A ± B

A & B take Same Names (add), RULE TO FIND C CORRECTION, A & B take Different names (Sub.)

C CORRECTION, (A ± B) is named the same as the greater of these quantities.

AZIMUTH takes combined names of **C** Correction and Hour Angle

C

TABLE C

A ± B =	15′	16′	17′	18′	19′	20′	A & B CORRECTION. 21′	22′	23′	24′	25′	26′	27′	28′	29′	30′ = A ± B
Lat.							AZIMUTHS									Lat.
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	81·5	80·9	80·4	79·8	79·2	78·7	78·1	77·6	77·0	76·5	76·0	75·4	74·9	74·4	73·8	73·3	0
5	81·5	80·9	80·4	79·8	79·3	78·7	78·2	77·6	77·1	76·6	76·0	75·5	74·9	74·4	73·9	73·4	5
10	81·6	81·0	80·5	79·9	79·4	78·9	78·3	77·8	77·2	76·7	76·2	75·6	75·1	74·6	74·1	73·5	10
14	81·7	81·2	80·6	80·1	79·6	79·1	78·5	78·0	77·4	76·9	76·4	75·8	75·3	74·8	74·3	73·7	14
18	81·9	81·3	80·8	80·3	79·8	79·2	78·7	78·2	77·7	77·1	76·6	76·1	75·6	75·1	74·6	74·1	18
20	82·0	81·4	80·9	80·4	79·9	79·4	78·8	78·3	77·8	77·3	76·8	76·3	75·8	75·3	74·8	74·3	20
22	82·1	81·6	81·0	80·5	80·0	79·5	79·0	78·5	78·0	77·5	76·9	76·4	75·9	75·4	75·0	74·5	22
24	82·2	81·7	81·2	80·7	80·2	79·6	79·1	78·6	78·1	77·6	77·1	76·6	76·1	75·7	75·2	74·7	24
26	82·3	81·8	81·3	80·8	80·3	79·8	79·3	78·8	78·3	77·8	77·3	76·8	76·4	75·9	75·4	74·9	26
28	82·5	82·0	81·5	81·0	80·5	80·0	79·5	79·0	78·5	78·0	77·6	77·1	76·6	76·1	75·6	75·2	28
30	82·6	82·1	81·6	81·1	80·7	80·2	79·7	79·2	78·7	78·3	77·8	77·3	76·8	76·4	75·9	75·4	30
31	82·7	82·2	81·7	81·2	80·7	80·3	79·8	79·3	78·8	78·4	77·9	77·4	77·0	76·5	76·0	75·6	31
32	82·8	82·3	81·8	81·3	80·8	80·4	79·9	79·4	79·0	78·5	78·0	77·6	77·1	76·6	76·2	75·7	32
33	82·8	82·4	81·9	81·4	80·9	80·5	80·0	79·5	79·1	78·6	78·2	77·7	77·2	76·8	76·3	75·9	33
34	82·9	82·4	82·0	81·5	81·0	80·6	80·1	79·7	79·2	78·7	78·3	77·8	77·4	76·9	76·5	76·0	34
35	83·0	82·5	82·1	81·6	81·2	80·7	80·2	79·8	79·3	78·9	78·4	78·0	77·5	77·1	76·6	76·2	35
36	83·1	82·6	82·2	81·7	81·3	80·8	80·4	79·9	79·5	79·0	78·6	78·1	77·7	77·2	76·8	76·4	36
37	83·2	82·7	82·3	81·8	81·4	80·9	80·5	80·0	79·6	79·1	78·7	78·3	77·8	77·4	77·0	76·5	37
38	83·3	82·8	82·4	81·9	81·5	81·0	80·6	80·2	79·7	79·3	78·9	78·4	78·0	77·6	77·1	76·7	38
39	83·4	82·9	82·5	82·0	81·6	81·2	80·7	80·3	79·9	79·4	79·0	78·6	78·1	77·7	77·3	76·9	39
40	83·4	83·0	82·6	82·1	81·7	81·3	80·9	80·4	80·0	79·6	79·2	78·7	78·3	77·9	77·5	77·1	40
41	83·5	83·1	82·7	82·3	81·8	81·4	81·0	80·6	80·2	79·7	79·3	78·9	78·5	78·1	77·7	77·2	41
42	83·6	83·2	82·8	82·4	82·0	81·5	81·1	80·7	80·3	79·9	79·5	79·1	78·7	78·2	77·8	77·4	42
43	83·7	83·3	82·9	82·5	82·1	81·7	81·3	80·9	80·5	80·0	79·6	79·2	78·8	78·4	78·0	77·6	43
44	83·8	83·4	83·0	82·6	82·2	81·8	81·4	81·0	80·6	80·2	79·8	79·4	79·0	78·6	78·2	77·8	44
45	83·9	83·5	83·1	82·7	82·3	82·0	81·6	81·2	80·8	80·4	80·0	79·6	79·2	78·8	78·4	78·0	45
46	84·1	83·7	83·3	82·9	82·5	82·1	81·7	81·3	80·9	80·5	80·1	79·8	79·4	79·0	78·6	78·2	46
47	84·2	83·8	83·4	83·0	82·6	82·2	81·8	81·5	81·1	80·7	80·3	79·9	79·6	79·2	78·8	78·4	47
48	84·3	83·9	83·5	83·1	82·8	82·4	82·0	81·6	81·3	80·9	80·5	80·1	79·8	79·4	79·0	78·6	48
49	84·4	84·0	83·6	83·3	82·9	82·5	82·2	81·8	81·4	81·1	80·7	80·3	80·0	79·6	79·2	78·9	49
50	84·5	84·1	83·8	83·4	83·0	82·7	82·3	82·0	81·6	81·2	80·9	80·5	80·2	79·8	79·4	79·1	50
51	84·6	84·3	83·9	83·5	83·2	82·8	82·5	82·1	81·8	81·4	81·1	80·7	80·4	80·0	79·7	79·3	51
52	84·7	84·4	84·0	83·7	83·3	83·0	82·6	82·3	81·9	81·6	81·2	80·9	80·6	80·2	79·9	79·5	52
53	84·8	84·5	84·2	83·8	83·5	83·1	82·8	82·5	82·1	81·8	81·4	81·1	80·8	80·4	80·1	79·8	53
54	85·0	84·6	84·3	84·0	83·6	83·3	83·0	82·6	82·3	82·0	81·6	81·3	81·0	80·7	80·3	80·0	54
55	85·1	84·8	84·4	84·1	83·8	83·5	83·1	82·8	82·5	82·2	81·8	81·5	81·2	80·9	80·6	80·2	55
56	85·2	84·9	84·6	84·3	83·9	83·6	83·3	83·0	82·7	82·4	82·0	81·7	81·4	81·1	80·8	80·5	56
57	85·3	85·0	84·7	84·4	84·1	83·8	83·5	83·2	82·9	82·6	82·2	81·9	81·6	81·3	81·0	80·7	57
58	85·5	85·2	84·9	84·6	84·3	84·0	83·7	83·4	83·1	82·8	82·5	82·2	81·9	81·6	81·3	81·0	58
59	85·6	85·3	85·0	84·7	84·4	84·1	83·8	83·5	83·2	83·0	82·7	82·4	82·1	81·8	81·5	81·2	59
60	85·7	85·4	85·1	84·9	84·6	84·3	84·0	83·7	83·4	83·2	82·9	82·6	82·3	82·0	81·7	81·5	60
61	85·8	85·6	85·3	85·0	84·7	84·5	84·2	83·9	83·6	83·4	83·1	82·8	82·5	82·3	82·0	81·7	61
62	86·0	85·7	85·4	85·2	84·9	84·6	84·4	84·1	83·8	83·6	83·3	83·0	82·8	82·5	82·2	82·0	62
63	86·1	85·8	85·6	85·3	85·1	84·8	84·6	84·3	84·0	83·8	83·5	83·3	83·0	82·8	82·5	82·2	63
64	86·2	86·0	85·7	85·5	85·2	85·0	84·7	84·5	84·2	84·0	83·7	83·5	83·2	83·0	82·8	82·5	64
65	86·4	86·1	85·9	85·6	85·4	85·2	84·9	84·7	84·4	84·2	84·0	83·7	83·5	83·3	83·0	82·8	65
66	86·5	86·3	86·0	85·8	85·6	85·3	85·1	84·9	84·7	84·4	84·2	84·0	83·7	83·5	83·3	83·0	66
67	86·6	86·4	86·2	86·0	85·8	85·5	85·3	85·1	84·9	84·6	84·4	84·2	84·0	83·8	83·5	83·3	67
68	86·8	86·6	86·4	86·1	85·9	85·7	85·5	85·3	85·1	84·9	84·6	84·4	84·2	84·0	83·8	83·6	68
Lat.																	Lat.
A ± B =	15′	16′	17′	18′	19′	20′	21′	22′	23′	24′	25′	26′	27′	28′	29′	30′ = A ± B

A & B take Same Names Sum, (add) } RULE TO FIND C CORRECTION { A & B take Different names Difference (Sub.)

C CORRECTION, (A ± B) is named the same as the greater of these quantities.

AZIMUTH takes combined names of **C** Correction and Hour Angle

C

TABLE C

A±B=	·30′	·31′	·32′	·33′	·34′	·35′	A. & B. CORRECTION ·36′	·37′	·38′	·39′	·40′	·41′	·42′	·43′	·44′	·45′ = A±B
Lat. °	AZIMUTHS °	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	73·3	72·8	72·3	71·7	71·2	70·7	70·2	69·7	69·2	68·7	68·2	67·7	67·2	66·7	66·3	65·8
5	73·4	72·8	72·3	71·8	71·3	70·8	70·3	69·8	69·3	68·8	68·3	67·8	67·3	66·8	66·4	65·9
10	73·5	73·0	72·5	72·0	71·5	71·0	70·5	70·0	69·5	69·0	68·5	68·0	67·5	67·0	66·6	66·1
14	73·7	73·2	72·7	72·2	71·7	71·2	70·7	70·2	69·7	69·3	68·8	68·3	67·8	67·4	66·9	66·4
18	74·1	73·6	73·1	72·6	72·1	71·6	71·1	70·6	70·1	69·6	69·2	68·7	68·2	67·8	67·3	66·8
20	74·3	73·8	73·3	72·8	72·3	71·8	71·3	70·8	70·3	69·9	69·4	68·9	68·5	68·0	67·5	67·1
22	74·5	74·0	73·5	73·0	72·5	72·0	71·5	71·1	70·6	70·1	69·7	69·2	68·7	68·3	67·8	67·4
24	74·7	74·2	73·7	73·2	72·7	72·3	71·8	71·3	70·9	70·4	69·9	69·5	69·0	68·6	68·1	67·7
26	74·9	74·4	74·0	73·5	73·0	72·5	72·1	71·6	71·1	70·7	70·2	69·8	69·3	68·9	68·4	68·0
28	75·2	74·7	74·2	73·8	73·3	72·8	72·4	71·9	71·5	71·0	70·5	70·1	69·7	69·2	68·8	68·3
30	75·4	75·0	74·5	74·1	73·6	73·1	72·7	72·2	71·8	71·3	70·9	70·5	70·0	69·6	69·1	68·7
31	75·6	75·1	74·7	74·2	73·8	73·3	72·9	72·4	72·0	71·5	71·1	70·6	70·2	69·8	69·3	68·9
32	75·7	75·3	74·8	74·4	73·9	73·5	73·0	72·6	72·1	71·7	71·3	70·8	70·4	70·0	69·5	69·1
33	75·9	75·4	75·0	74·5	74·1	73·6	73·2	72·8	72·3	71·9	71·5	71·0	70·6	70·2	69·7	69·3
34	76·0	75·6	75·1	74·7	74·3	73·8	73·4	72·9	72·5	72·1	71·7	71·2	70·8	70·4	70·0	69·5
35	76·2	75·8	75·3	74·9	74·4	74·0	73·6	73·1	72·7	72·3	71·9	71·4	71·0	70·6	70·2	69·8
36	76·4	75·9	75·5	75·1	74·6	74·2	73·8	73·3	72·9	72·5	72·1	71·6	71·2	70·8	70·4	70·0
37	76·5	76·1	75·7	75·2	74·8	74·4	74·0	73·5	73·1	72·7	72·3	71·9	71·5	71·0	70·6	70·2
38	76·7	76·3	75·8	75·4	75·0	74·6	74·2	73·7	73·3	72·9	72·5	72·1	71·7	71·3	70·9	70·5
39	76·9	76·5	76·0	75·6	75·2	74·8	74·4	74·0	73·5	73·1	72·7	72·3	71·9	71·5	71·1	70·7
40	77·1	76·6	76·2	75·8	75·4	75·0	74·6	74·2	73·8	73·4	73·0	72·6	72·2	71·8	71·4	71·0
41	77·2	76·8	76·4	76·0	75·6	75·2	74·8	74·4	74·0	73·6	73·2	72·8	72·4	72·0	71·6	71·2
42	77·4	77·0	76·6	76·2	75·8	75·4	75·0	74·6	74·2	73·8	73·4	73·1	72·7	72·3	71·9	71·5
43	77·6	77·2	76·8	76·4	76·0	75·6	75·2	74·9	74·5	74·1	73·7	73·3	72·9	72·5	72·2	71·8
44	77·8	77·4	77·0	76·6	76·3	75·9	75·5	75·1	74·7	74·3	73·9	73·6	73·2	72·8	72·4	72·1
45	78·0	77·6	77·3	76·9	76·5	76·1	75·7	75·3	75·0	74·6	74·2	73·8	73·5	73·1	72·7	72·3
46	78·2	77·8	77·5	77·1	76·7	76·3	76·0	75·6	75·2	74·8	74·5	74·1	73·7	73·4	73·0	72·6
47	78·4	78·1	77·7	77·3	76·9	76·6	76·2	75·8	75·5	75·1	74·7	74·4	74·0	73·7	73·3	72·9
48	78·6	78·3	77·9	77·5	77·2	76·8	76·5	76·1	75·7	75·4	75·0	74·7	74·3	73·9	73·6	73·2
49	78·9	78·5	78·1	77·8	77·4	77·1	76·7	76·4	76·0	75·6	75·3	74·9	74·6	74·2	73·9	73·6
50	79·1	78·7	78·4	78·0	77·7	77·3	77·0	76·6	76·3	75·9	75·6	75·2	74·9	74·5	74·2	73·9
51	79·3	79·0	78·6	78·3	77·9	77·6	77·2	76·9	76·6	76·2	75·9	75·5	75·2	74·9	74·5	74·2
52	79·5	79·2	78·9	78·5	78·2	77·8	77·5	77·2	76·8	76·5	76·2	75·8	75·5	75·2	74·8	74·5
53	79·8	79·4	79·1	78·8	78·4	78·1	77·8	77·4	77·1	76·8	76·5	76·1	75·8	75·5	75·2	74·8
54	80·0	79·7	79·3	79·0	78·7	78·4	78·1	77·7	77·4	77·1	76·8	76·5	76·1	75·8	75·5	75·2
55	80·2	79·9	79·6	79·3	79·0	78·6	78·3	78·0	77·7	77·4	77·1	76·8	76·5	76·1	75·8	75·5
56	80·5	80·2	79·9	79·5	79·2	78·9	78·6	78·3	78·0	77·7	77·4	77·1	76·8	76·5	76·2	75·9
57	80·7	80·4	80·1	79·8	79·5	79·2	78·9	78·6	78·3	78·0	77·7	77·4	77·1	76·8	76·5	76·2
58	81·0	80·7	80·4	80·1	79·8	79·5	79·2	78·9	78·6	78·3	78·0	77·7	77·5	77·2	76·9	76·6
59	81·2	80·9	80·6	80·4	80·1	79·8	79·5	79·2	78·9	78·6	78·4	78·1	77·8	77·5	77·2	77·0
60	81·5	81·2	80·9	80·6	80·4	80·1	79·8	79·5	79·2	79·0	78·7	78·4	78·1	77·9	77·6	77·3
61	81·7	81·5	81·2	80·9	80·6	80·4	80·1	79·8	79·6	79·3	79·0	78·8	78·5	78·2	78·0	77·7
62	82·0	81·7	81·5	81·2	80·9	80·7	80·4	80·1	79·9	79·6	79·4	79·1	78·8	78·6	78·3	78·1
63	82·2	82·0	81·7	81·5	81·2	81·0	80·7	80·5	80·2	80·0	79·7	79·5	79·2	79·0	78·7	78·5
64	82·5	82·3	82·0	81·8	81·5	81·3	81·0	80·8	80·5	80·3	80·1	79·8	79·6	79·3	79·1	78·8
65	82·8	82·5	82·3	82·1	81·8	81·6	81·3	81·1	80·9	80·6	80·4	80·2	79·9	79·7	79·5	79·2
66	83·0	82·8	82·6	82·4	82·1	81·9	81·7	81·4	81·2	81·0	80·8	80·5	80·3	80·1	79·9	79·6
67	83·3	83·1	82·9	82·7	82·4	82·2	82·0	81·8	81·6	81·3	81·1	80·9	80·7	80·5	80·2	80·0
68	83·6	83·4	83·2	83·0	82·7	82·5	82·3	82·1	81·9	81·7	81·5	81·3	81·1	80·8	80·6	80·4
Lat.																
A±B=	·30′	·31′	·32′	·33′	·34′	·35′	·36′	·37′	·38′	·39′	·40′	·41′	·42′	·43′	·44′	·45′ = A±B

A & B take **S**ame Names Sum, (add). } RULE TO FIND **C** CORRECTION { A & B take **D**ifferent names Difference (Sub.)

C CORRECTION, (A ± B) is named the same as the greater of these quantities.

AZIMUTH takes combined names of **C** Correction and Hour Angle

TABLE C

A ± B =	·45′	·46′	·47′	·48′	·49′	·50′	A & B CORRECTION. ·51′	·52′	·53′	·54′	·55′	·56′	·57′	·58′	·59′	60′ =	A ± B
Lat.							AZIMUTHS										Lat.
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	65·8	65·3	64·8	64·4	63·9	63·4	63·0	62·5	62·1	61·6	61·2	60·8	60·3	59·9	59·5	59·0	0
5	65·9	65·4	64·9	64·4	64·0	63·5	63·1	62·6	62·2	61·7	61·3	60·8	60·4	60·0	59·6	59·1	5
10	66·1	65·6	65·2	64·7	64·2	63·8	63·3	62·9	62·4	62·0	61·6	61·1	60·7	60·3	59·8	59·4	10
14	66·4	65·9	65·5	65·0	64·6	64·1	63·7	63·2	62·8	62·3	61·9	61·5	61·1	60·6	60·2	59·8	14
18	66·8	66·4	65·9	65·5	65·0	64·6	64·1	63·7	63·2	62·8	62·4	62·0	61·5	61·1	60·7	60·3	18
20	67·1	66·6	66·2	65·7	65·3	64·8	64·4	64·0	63·5	63·1	62·7	62·2	61·8	61·4	61·0	60·6	20
22	67·4	66·9	66·5	66·0	65·6	65·1	64·7	64·3	63·8	63·4	63·0	62·6	62·1	61·7	61·3	60·9	22
24	67·7	67·2	66·8	66·3	65·9	65·5	65·0	64·6	64·2	63·7	63·3	62·9	62·5	62·1	61·7	61·3	24
26	68·0	67·5	67·1	66·7	66·2	65·8	65·4	64·9	64·5	64·1	63·7	63·3	62·9	62·5	62·1	61·7	26
28	68·3	67·9	67·5	67·0	66·6	66·2	65·8	65·3	64·9	64·5	64·1	63·7	63·3	62·9	62·5	62·1	28
30	68·7	68·3	67·9	67·4	67·0	66·6	66·2	65·8	65·3	64·9	64·5	64·1	63·7	63·3	62·9	62·5	30
31	68·9	68·5	68·1	67·6	67·2	66·8	66·4	66·0	65·6	65·2	64·8	64·4	64·0	63·6	63·2	62·8	31
32	69·1	68·7	68·3	67·9	67·4	67·0	66·6	66·2	65·8	65·4	65·0	64·6	64·2	63·8	63·4	63·0	32
33	69·3	68·9	68·5	68·1	67·7	67·2	66·8	66·4	66·0	65·6	65·2	64·8	64·5	64·1	63·7	63·3	33
34	69·5	69·1	68·7	68·3	67·9	67·5	67·1	66·7	66·3	65·9	65·5	65·1	64·7	64·3	63·9	63·6	34
35	69·8	69·4	68·9	68·5	68·1	67·7	67·3	66·9	66·5	66·1	65·7	65·4	65·0	64·6	64·2	63·8	35
36	70·0	69·6	69·2	68·8	68·4	68·0	67·6	67·2	66·8	66·4	66·0	65·6	65·2	64·9	64·5	64·1	36
37	70·2	69·8	69·4	69·0	68·6	68·2	67·8	67·4	67·1	66·7	66·3	65·9	65·5	65·1	64·8	64·4	37
38	70·5	70·1	69·7	69·3	68·9	68·5	68·1	67·7	67·3	66·9	66·6	66·2	65·8	65·4	65·1	64·7	38
39	70·7	70·3	69·9	69·5	69·2	68·8	68·4	68·0	67·6	67·2	66·9	66·5	66·1	65·7	65·4	65·0	39
40	71·0	70·6	70·2	69·8	69·4	69·0	68·7	68·3	67·9	67·5	67·2	66·8	66·4	66·0	65·7	65·3	40
41	71·2	70·9	70·5	70·1	69·7	69·3	68·9	68·6	68·2	67·8	67·5	67·1	66·7	66·4	66·0	65·6	41
42	71·5	71·1	70·7	70·4	70·0	69·6	69·2	68·9	68·5	68·1	67·8	67·4	67·0	66·7	66·3	66·0	42
43	71·8	71·4	71·0	70·7	70·3	69·9	69·5	69·2	68·8	68·4	68·1	67·7	67·4	67·0	66·7	66·3	43
44	72·1	71·7	71·3	71·0	70·6	70·2	69·9	69·5	69·1	68·8	68·4	68·1	67·7	67·4	67·0	66·7	44
45	72·3	72·0	71·6	71·3	70·9	70·5	70·2	69·8	69·5	69·1	68·7	68·4	68·0	67·7	67·4	67·0	45
46	72·6	72·3	71·9	71·6	71·2	70·8	70·5	70·1	69·8	69·4	69·1	68·7	68·4	68·1	67·7	67·4	46
47	72·9	72·6	72·2	71·9	71·5	71·2	70·8	70·5	70·1	69·8	69·4	69·1	68·8	68·4	68·1	67·7	47
48	73·2	72·9	72·5	72·2	71·8	71·5	71·2	70·8	70·5	70·1	69·8	69·5	69·1	68·8	68·5	68·1	48
49	73·6	73·2	72·9	72·5	72·2	71·8	71·5	71·2	70·8	70·5	70·2	69·8	69·5	69·2	68·8	68·5	49
50	73·9	73·5	73·2	72·9	72·5	72·2	71·8	71·5	71·2	70·9	70·5	70·2	69·9	69·6	69·2	68·9	50
51	74·2	73·9	73·5	73·2	72·9	72·5	72·2	71·9	71·6	71·2	70·9	70·6	70·3	69·9	69·6	69·3	51
52	74·5	74·2	73·9	73·5	73·2	72·9	72·6	72·2	71·9	71·6	71·3	71·0	70·7	70·3	70·0	69·7	52
53	74·8	74·5	74·2	73·9	73·6	73·3	72·9	72·6	72·3	72·0	71·7	71·4	71·1	70·8	70·5	70·1	53
54	75·2	74·9	74·6	74·2	73·9	73·6	73·3	73·0	72·7	72·4	72·1	71·8	71·5	71·2	70·9	70·6	54
55	75·5	75·2	74·9	74·6	74·3	74·0	73·7	73·4	73·1	72·8	72·5	72·2	71·9	71·6	71·3	71·0	55
56	75·9	75·6	75·3	75·0	74·7	74·4	74·1	73·8	73·5	73·2	72·9	72·6	72·3	72·0	71·7	71·5	56
57	76·2	75·9	75·6	75·3	75·1	74·8	74·5	74·2	73·9	73·6	73·3	73·0	72·8	72·5	72·2	71·9	57
58	76·6	76·3	76·0	75·7	75·4	75·2	74·9	74·6	74·3	74·0	73·8	73·5	73·2	72·9	72·6	72·4	58
59	77·0	76·7	76·4	76·1	75·8	75·6	75·3	75·0	74·7	74·5	74·2	73·9	73·6	73·4	73·1	72·8	59
60	77·3	77·0	76·8	76·5	76·2	76·0	75·7	75·4	75·2	74·9	74·6	74·4	74·1	73·8	73·6	73·3	60
61	77·7	77·4	77·2	76·9	76·6	76·4	76·1	75·9	75·6	75·3	75·1	74·8	74·6	74·3	74·0	73·8	61
62	78·1	77·8	77·6	77·3	77·0	76·8	76·5	76·3	76·0	75·8	75·5	75·3	75·0	74·8	74·5	74·3	62
63	78·5	78·2	78·0	77·7	77·5	77·2	77·0	76·7	76·5	76·2	76·0	75·7	75·5	75·2	75·0	74·8	63
64	78·8	78·6	78·4	78·1	77·9	77·6	77·4	77·2	76·9	76·7	76·4	76·2	76·0	75·7	75·5	75·3	64
65	79·2	79·0	78·8	78·5	78·3	78·1	77·8	77·6	77·4	77·1	76·9	76·7	76·5	76·2	76·0	75·8	65
66	79·6	79·4	79·2	79·0	78·7	78·5	78·3	78·1	77·8	77·6	77·4	77·2	76·9	76·7	76·5	76·3	66
67	80·0	79·8	79·6	79·4	79·2	78·9	78·7	78·5	78·3	78·1	77·9	77·7	77·4	77·2	77·0	76·8	67
68	80·4	80·2	80·0	79·8	79·6	79·4	79·2	79·0	78·8	78·6	78·4	78·2	77·9	77·7	77·5	77·3	68
Lat.																	Lat.
A ± B =	·45′	·46′	·47′	·48′	·49′	·50′	·51′	·52′	·53′	·54′	·55′	·56′	·57′	·58′	·59′	60′ =	A ± B

A & B take **S**ame Names (add), A & B take **D**ifferent names (Sub.) } RULE TO FIND **C** CORRECTION

C CORRECTION, (A ± B) is named the same as the greater of these quantities.

AZIMUTH takes combined names of **C** Correction and Hour Angle

C

TABLE C

A ± B =	·60′	·62′	·64′	·66′	·68′	·70′	·72′	·74′	·76′	·78′	·80′	·82′	·84′	·86′	·88′	·90′ = A ± B
	A & B CORRECTION															
Lat.	AZIMUTHS															Lat.
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	59·0	58·2	57·4	56·6	55·8	55·0	54·2	53·5	52·8	52·0	51·3	50·6	50·0	49·3	48·7	48·0	0
5	59·1	58·3	57·5	56·7	55·9	55·1	54·3	53·6	52·9	52·2	51·5	50·8	50·1	49·4	48·8	48·1	5
10	59·4	58·6	57·8	57·0	56·2	55·4	54·7	53·9	53·2	52·5	51·8	51·1	50·4	49·7	49·1	48·4	10
14	59·8	59·0	58·2	57·4	56·6	55·8	55·1	54·3	53·6	52·9	52·2	51·5	50·8	50·2	49·5	48·9	14
18	60·3	59·5	58·7	57·9	57·1	56·3	55·6	54·9	54·1	53·4	52·7	52·1	51·4	50·7	50·1	49·4	18
20	60·6	59·8	59·0	58·2	57·4	56·7	55·9	55·2	54·5	53·8	53·1	52·4	51·7	51·1	50·4	49·8	20
22	60·9	60·1	59·3	58·5	57·8	57·0	56·3	55·5	54·8	54·1	53·4	52·8	52·1	51·4	50·8	50·2	22
24	61·3	60·5	59·7	58·9	58·2	57·4	56·7	55·9	55·2	54·5	53·8	53·2	52·5	51·8	51·2	50·6	24
26	61·7	60·9	60·1	59·3	58·6	57·8	57·1	56·4	55·7	55·0	54·3	53·6	52·9	52·3	51·7	51·0	26
28	62·1	61·3	60·5	59·8	59·0	58·3	57·6	56·8	56·1	55·4	54·8	54·1	53·4	52·8	52·2	51·5	28
30	62·5	61·8	61·0	60·2	59·5	58·8	58·1	57·3	56·6	56·0	55·3	54·6	54·0	53·3	52·7	52·1	30
31	62·8	62·0	61·3	60·5	59·8	59·0	58·3	57·6	56·9	56·2	55·6	54·9	54·2	53·6	53·0	52·4	31
32	63·0	62·3	61·5	60·8	60·0	59·3	58·6	57·9	57·2	56·5	55·8	55·2	54·5	53·9	53·3	52·7	32
33	63·3	62·5	61·8	61·0	60·3	59·6	58·9	58·2	57·5	56·8	56·1	55·5	54·8	54·2	53·6	53·0	33
34	63·6	62·8	62·1	61·3	60·6	59·9	59·2	58·5	57·8	57·1	56·4	55·8	55·1	54·5	53·9	53·3	34
35	63·8	63·1	62·3	61·6	60·9	60·2	59·5	58·8	58·1	57·4	56·8	56·1	55·5	54·8	54·2	53·6	35
36	64·1	63·4	62·6	61·9	61·2	60·5	59·8	59·1	58·4	57·7	57·1	56·4	55·8	55·2	54·6	53·9	36
37	64·4	63·7	62·9	62·2	61·5	60·8	60·1	59·4	58·7	58·1	57·4	56·8	56·1	55·5	54·9	54·3	37
38	64·7	64·0	63·2	62·5	61·8	61·1	60·4	59·8	59·1	58·4	57·8	57·1	56·5	55·9	55·3	54·7	38
39	65·0	64·3	63·6	62·8	62·1	61·5	60·8	60·1	59·4	58·8	58·1	57·5	56·9	56·2	55·6	55·0	39
40	65·3	64·6	63·9	63·2	62·5	61·8	61·1	60·5	59·8	59·1	58·5	57·9	57·2	56·6	56·0	55·4	40
41	65·6	64·9	64·2	63·5	62·8	62·2	61·5	60·8	60·2	59·5	58·9	58·2	57·6	57·0	56·4	55·8	41
42	66·0	65·3	64·6	63·9	63·2	62·5	61·9	61·2	60·5	59·9	59·3	58·6	58·0	57·4	56·8	56·2	42
43	66·3	65·6	64·9	64·2	63·6	62·9	62·2	61·6	60·9	60·3	59·7	59·0	58·4	57·8	57·2	56·6	43
44	66·7	66·0	65·3	64·6	63·9	63·3	62·6	62·0	61·3	60·7	60·1	59·5	58·9	58·3	57·7	57·1	44
45	67·0	66·3	65·7	65·0	64·3	63·7	63·0	62·4	61·7	61·1	60·5	59·9	59·3	58·7	58·1	57·6	45
46	67·4	66·7	66·0	65·4	64·7	64·1	63·4	62·8	62·2	61·5	60·9	60·3	59·7	59·1	58·6	58·0	46
47	67·7	67·1	66·4	65·8	65·1	64·5	63·8	63·2	62·6	62·0	61·4	60·8	60·2	59·6	59·0	58·5	47
48	68·1	67·5	66·8	66·2	65·5	64·9	64·3	63·7	63·0	62·4	61·8	61·2	60·7	60·1	59·5	58·9	48
49	68·5	67·9	67·2	66·6	66·0	65·3	64·7	64·1	63·5	62·9	62·3	61·7	61·1	60·6	60·0	59·4	49
50	68·9	68·3	67·6	67·0	66·4	65·8	65·2	64·6	64·0	63·4	62·8	62·2	61·6	61·1	60·5	60·0	50
51	69·3	68·7	68·1	67·4	66·8	66·2	65·6	65·0	64·4	63·9	63·3	62·7	62·1	61·6	61·0	60·5	51
52	69·7	69·1	68·5	67·9	67·3	66·7	66·1	65·5	64·9	64·4	63·8	63·2	62·7	62·1	61·6	61·0	52
53	70·1	69·5	68·9	68·3	67·7	67·2	66·6	66·0	65·4	64·9	64·3	63·7	63·2	62·6	62·1	61·6	53
54	70·6	70·0	69·4	68·8	68·2	67·6	67·1	66·5	65·9	65·4	64·8	64·3	63·7	63·2	62·6	62·1	54
55	71·0	70·4	69·8	69·3	68·7	68·1	67·6	67·0	66·4	65·9	65·4	64·8	64·3	63·7	63·2	62·7	55
56	71·5	70·9	70·3	69·7	69·2	68·6	68·1	67·5	67·0	66·4	65·9	65·4	64·9	64·3	63·8	63·3	56
57	71·9	71·3	70·8	70·2	69·7	69·1	68·6	68·0	67·5	67·0	66·5	65·9	65·4	64·9	64·4	63·9	57
58	72·4	71·8	71·3	70·7	70·2	69·6	69·1	68·6	68·1	67·5	67·0	66·5	66·0	65·5	65·0	64·5	58
59	72·8	72·3	71·8	71·2	70·7	70·2	69·7	69·1	68·6	68·1	67·6	67·1	66·6	66·1	65·6	65·1	59
60	73·3	72·8	72·3	71·7	71·2	70·7	70·2	69·7	69·2	68·7	68·2	67·7	67·2	66·7	66·3	65·8	60
61	73·8	73·3	72·8	72·3	71·8	71·3	70·8	70·3	69·8	69·3	68·8	68·3	67·8	67·4	66·9	66·4	61
62	74·3	73·8	73·3	72·8	72·3	71·8	71·3	70·8	70·4	69·9	69·4	68·9	68·5	68·0	67·6	67·1	62
63	74·8	74·3	73·8	73·3	72·8	72·4	71·9	71·4	71·0	70·5	70·0	69·6	69·1	68·7	68·2	67·8	63
64	75·3	74·8	74·3	73·9	73·4	72·9	72·5	72·0	71·6	71·1	70·7	70·2	69·8	69·3	68·9	68·5	64
65	75·8	75·3	74·9	74·4	74·0	73·5	73·1	72·6	72·2	71·8	71·3	70·9	70·5	70·0	69·6	69·2	65
66	76·3	75·8	75·4	75·0	74·5	74·1	73·7	73·2	72·8	72·4	72·0	71·6	71·1	70·7	70·3	69·9	66
67	76·8	76·4	76·0	75·5	75·1	74·7	74·3	73·9	73·5	73·1	72·6	72·2	71·8	71·4	71·0	70·6	67
68	77·3	76·9	76·5	76·1	75·7	75·3	74·9	74·5	74·1	73·7	73·3	72·9	72·5	72·1	71·8	71·4	68
Lat.																	Lat.
A ± B =	·60′	·62′	·64′	·66′	·68′	·70′	·72′	·74′	·76′	·78′	·80′	·82′	·84′	·86′	·88′	90′ = A ± B

A & B take **S**ame Names (add) } RULE TO FIND **C** CORRECTION { A & B take **D**ifferent names (Sub.)

C CORRECTION, (A ± B) is named the same as the greater of these quantities.

AZIMUTH takes combined names of **C** Correction and Hour Angle

C

TABLE C

A±B=	·90′	·92′	·94′	·96′	·98′	1·00′	1·02	1·04	1·06	1·08	1·10′	1·12	1·14′	1·16	1·18′	1·20′	=A±B
Lat.							A & B CORRECTION.										Lat.
							AZIMUTHS										
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°		°
0	48·0	47·4	46·8	46·2	45·6	45·0	44·4	43·9	43·3	42·8	42·3	41·8	41·3	40·8	40·3	39·8	0
5	48·1	47·5	46·9	46·3	45·7	45·1	44·5	44·0	43·4	42·9	42·4	41·9	41·4	40·9	40·4	39·9	5
10	48·4	47·8	47·2	46·6	46·0	45·4	44·9	44·3	43·8	43·2	42·7	42·2	41·7	41·2	40·7	40·2	10
14	48·9	48·3	47·7	47·1	46·5	45·9	45·3	44·7	44·2	43·7	43·1	42·6	42·1	41·6	41·2	40·7	14
18	49·4	48·8	48·2	47·6	47·0	46·4	45·9	45·3	44·8	44·2	43·7	43·2	42·7	42·2	41·7	41·2	18
20	49·8	49·2	48·5	47·9	47·4	46·8	46·2	45·7	45·1	44·6	44·1	43·5	43 0	42·5	42·0	41·6	20
22	50·2	49·5	48·9	48·3	47·7	47·2	46·6	46 0	45·5	45·0	44·4	43·9	43·4	42·9	42·4	41·9	22
24	50·6	50·0	49·3	48·7	48·2	47·6	47·0	46·5	45·9	45·4	44·9	44·3	43·8	43·3	42·9	42·4	24
26	51·0	50·4	49·8	49·2	48·6	48·1	47·5	46·9	46·4	45·9	45·3	44·8	44·3	43·8	43·3	42·8	26
28	51·5	50·9	50·3	49·7	49·1	48·6	48·0	47·4	46·9	46·4	45 8	45·3	44·8	44·3	43·8	43·3	28
30	52·1	51·5	50·9	50·3	49·7	49·1	48·5	48·0	47·4	46·9	46·4	45·9	45·4	44·9	44·4	43·9	30
31	52·4	51·7	51·1	50·6	50·0	49·4	48·8	48·3	47·7	47·2	46·7	46·2	45·7	45·2	44·7	44·2	31
32	52·7	52·0	51·4	50·9	50·3	49·7	49·1	48·6	48·0	47·5	47·0	46·5	46·0	45·5	45·0	44·5	32
33	53·0	52·3	51·7	51·2	50·6	50·0	49·5	48·9	48·4	47·8	47·3	46·8	46·3	45·8	45·3	44·8	33
34	53·3	52·7	52·1	51·5	50·9	50·3	49·8	49·2	48·7	48·2	47·6	47·1	46·6	46 1	45·6	45·1	34
35	53·6	53·0	52·4	51·8	51·2	50·7	50·1	49·6	49·0	48·5	48·0	47·5	47·0	46·5	46·0	45·5	35
36	53·9	53·3	52·7	52·2	51·6	51·0	50·5	49·9	49·4	48·9	48·3	47·8	47·3	46·8	46·3	45·8	36
37	54·3	53·7	53·1	52·5	52·0	51·4	50·8	50·3	49·8	49·2	48·7	48·2	47·7	47·2	46·7	46·2	37
38	54·7	54·1	53·5	52·9	52·3	51·8	51·2	50·7	50·1	49·6	49·1	48·6	48·1	47·6	47·1	46·6	38
39	55·0	54·4	53·9	53·3	52·7	52·1	51·6	51·1	50·5	50·0	49·5	49·0	48·5	48·0	47·5	47·0	39
40	55·4	54·8	54·2	53·7	53·1	52·5	52·0	51·5	50·9	50·4	49·9	49·4	48·9	48·4	47·9	47·4	40
41	55·8	55·2	54·6	54·1	53·5	53·0	52·4	51·9	51·3	50·8	50·3	49·8	49·3	48·8	48·3	47·8	41
42	56·2	55·6	55·1	54·5	53·9	53·4	52·8	52·3	51·8	51·2	50·7	50·2	49·7	49·2	48·8	48·3	42
43	56·6	56·1	55·5	54·9	54·4	53·8	53·3	52·7	52·2	51·7	51·2	50·7	50·2	49·7	49·2	48·7	43
44	57·1	56·5	55·9	55·4	54·8	54·3	53·7	53·2	52·7	52·2	51·6	51·1	50·6	50·2	49·7	49·2	44
45	57·5	57·0	56·4	55·8	55·3	54·7	54·2	53·7	53·1	52·6	52·1	51·6	51·1	50·6	50·2	49·7	45
46	58·0	57·4	56·9	56·3	55·8	55·2	54·7	54·2	53·6	53·1	52·6	52·1	51·6	51·1	50·7	50·2	46
47	58·5	57·9	57·3	56·8	56·2	55·7	55·2	54·7	54·1	53·6	53·1	52 6	52·1	51·7	51·2	50·7	47
48	58·9	58·4	57·8	57·3	56·7	56·2	55·7	55·2	54·7	54·1	53·6	53·2	52·7	52·2	51·7	51·2	48
49	59·4	58·9	58·3	57·8	57·3	56·7	56·2	55·7	55·2	54·7	54·2	53·7	53·2	52·7	52·3	51·8	49
50	60·0	59·4	58·9	58·3	57·8	57·3	56·7	56·2	55·7	55·2	54·7	54·2	53·8	53·3	52·8	52·4	50
51	60·5	59·9	59·4	58·9	58·3	57·8	57·3	56·8	56·3	55·8	55·3	54·8	54·3	53·9	53·4	52·9	51
52	61·0	60·5	59·9	59·4	58·9	58·4	57·9	57·4	56·9	56·4	55·9	55·4	54·9	54·5	54·0	53·5	52
53	61·6	61·0	60·5	60 0	59·5	59·0	58·5	58·0	57·5	57·0	56·5	56·0	55·5	55·1	54·6	54·2	53
54	62·1	61·6	61·1	60·6	60·1	59·6	59·1	58·6	58·1	57·6	57·1	56·6	56·2	55·7	55·3	54·8	54
55	62·7	62·2	61·7	61·2	60·7	60·2	59·7	59·2	58·7	58·2	57·8	57·3	56·8	56·4	55·9	55·5	55
56	63·3	62·8	62·3	61·8	61·3	60·8	60·3	59·8	59·3	58·9	58·4	57·9	57·5	57·0	56·6	56·1	56
57	63·9	63·4	62·9	62·4	61·9	61·4	60·9	60·5	60·0	59·5	59·1	58·6	58·2	57·7	57·3	56·8	57
58	64·5	64·0	63·5	63 0	62·6	62·1	61·6	61·1	60·7	60·2	59·8	59·3	58·9	58·4	58·0	57·5	58
59	65·1	64·6	64·2	63·7	63·2	62·7	62·3	61·8	61·4	60·9	60·5	60·0	59·6	59·1	58·7	58·3	59
60	65·8	65·3	64·8	64·4	63·9	63·4	63·0	62·5	62·1	61·6	61·2	60·8	60·3	59·9	59·5	59·0	60
61	66·4	66·0	65·5	65·0	64·6	64·1	63·7	63·2	62·8	62·4	61·9	61·5	61·1	60·6	60·2	59·8	61
62	67·1	66·6	66·2	65·7	65·3	64·9	64·4	64·0	63·5	63·1	62·7	62·3	61·8	61·4	61·0	60·6	62
63	67·8	67·3	66·9	66·5	66·0	65·6	65·2	64·7	64·3	63·9	63·5	63·0	62·6	62·2	61·8	61·4	63
64	68·5	68·0	67·6	67·2	66·8	66·3	65·9	65·5	65·1	64·7	64·3	63·9	63·4	63·0	62·6	62·3	64
65	69·2	68·8	68·3	67·9	67·5	67·1	66·7	66·3	65·9	65·5	65·1	64·7	64·3	63·9	63·5	63·1	65
66	69·9	69·5	69·1	68·7	68·3	67·9	67·5	67·1	66·7	66·3	65·9	65·5	65·1	64·7	64·4	64·0	66
67	70·6	70·2	69·8	69·4	69·0	68·7	68·3	67·9	67·5	67 1	66·7	66·4	66·0	65·6	65·2	64·9	67
68	71·4	71·0	70·6	70·2	69·8	69·5	69·1	68·7	68·3	68·0	67·6	67·2	66·9	66·5	66·2	65·8	68
Lat.																	Lat.
A±B=	·90′	·92′	·94′	·96′	·98′	1·00′	1·02′	1·04′	1·06′	1·08′	1·10′	1·12′	1·14′	1·16′	1·18′	1·20′	=A±B

A & B take **S**ame Names (add). } RULE TO FIND **C** CORRECTION { A & B take **D**ifferent names (Sub.)

C CORRECTION, (A ± B) is named the same as the greater of these quantities.

AZIMUTH takes combined names of **C** Correction and Hour Angle

TABLE C

A ± B =	1°20′	1°24′	1°28′	1°32′	1°36′	1°40′	A & B CORRECTION. 1°44′	1°48′	1°52′	1°56′	2°00′	2°04′	2°08′	2°12′	2°16′	2°20′	= A ± B
Lat. °	°	°	°	°	°	°	AZIMUTHS °	°	°	°	°	°	°	°	°	°	Lat. °
0	39·8	38·9	38·0	37·1	36·3	35·5	34·8	34·0	33·3	32·7	32·0	31·4	30·8	30·2	29·6	29·1	0
5	39·9	39·0	38·1	37·3	36·4	35·6	34·9	34·1	33·4	32·8	32·1	31·5	30·9	30·3	29·7	29·2	5
10	40·2	39·3	38·4	37·6	36·8	36·0	35·2	34·5	33·8	33·1	32·4	31·8	31·2	30·6	30·0	29·4	10
14	40·7	39·7	38·8	38·0	37·2	36·4	35·6	34·9	34·2	33·5	32·8	32·1	31·5	30·9	30·4	29·8	14
18	41·2	40·3	39·4	38·5	37·7	36·9	36·1	35·4	34·7	34·0	33·3	32·7	32·0	31·4	30·9	30·3	18
20	41·6	40·6	39·7	38·9	38·0	37·2	36·5	35·7	35·0	34·3	33·6	33·0	32·4	31·8	31·2	30·6	20
22	42·0	41·0	40·1	39·3	38·4	37·6	36·8	36·1	35·4	34·7	34·0	33·3	32·7	32·1	31·5	30·9	22
24	42·4	41·4	40·5	39·7	38·8	38·0	37·2	36·5	35·8	35·1	34·4	33·7	33·1	32·5	31·9	31·3	24
26	42·8	41·9	41·0	40·1	39·3	38·5	37·7	36·9	36·2	35·5	34·8	34·2	33·5	32·9	32·3	31·7	26
28	43·3	42·4	41·5	40·6	39·8	39·0	38·2	37·4	36·7	36·0	35·3	34·6	34·0	33·4	32·8	32·2	28
30	43·9	43·0	42·1	41·2	40·3	39·5	38·7	38·0	37·2	36·5	35·8	35·1	34·5	33·9	33·3	32·7	30
31	44·2	43·3	42·4	41·5	40·6	39·8	39·0	38·2	37·5	36·8	36·1	35·4	34·8	34·1	33·5	32·9	31
32	44·5	43·6	42·7	41·8	40·9	40·1	39·3	38·5	37·8	37·1	36·4	35·7	35·1	34·4	33·8	33·2	32
33	44·8	43·9	43·0	42·1	41·2	40·4	39·6	38·9	38·1	37·4	36·7	36·0	35·4	34·7	34·1	33·5	33
34	45·1	44·2	43·3	42·4	41·6	40·7	39·9	39·2	38·4	37·7	37·0	36·3	35·7	35·0	34·4	33·8	34
35	45·5	44·6	43·7	42·8	41·9	41·1	40·3	39·5	38·8	38·0	37·3	36·7	36·0	35·4	34·7	34·1	35
36	45·8	44·9	44·0	43·1	42·3	41·4	40·6	39·9	39·1	38·4	37·7	37·0	36·3	35·7	35·1	34·5	36
37	46·2	45·3	44·4	43·5	42·6	41·8	41·0	40·2	39·5	38·8	38·1	37·4	36·7	36·1	35·4	34·8	37
38	46·6	45·7	44·8	43·9	43·0	42·2	41·4	40·6	39·9	39·1	38·4	37·7	37·1	36·4	35·8	35·2	38
39	47·0	46·1	45·2	44·3	43·4	42·6	41·8	41·0	40·3	39·5	38·8	38·1	37·4	36·8	36·2	35·6	39
40	47·4	46·5	45·6	44·7	43·8	43·0	42·2	41·4	40·7	39·9	39·2	38·5	37·8	37·2	36·6	36·0	40
41	47·8	46·9	46·0	45·1	44·3	43·4	42·6	41·8	41·1	40·3	39·6	33·9	38·3	37·6	37·0	36·4	41
42	48·3	47·3	46·4	45·6	44·7	43·9	43·1	42·3	41·5	40·8	40·1	39·4	38·7	38·0	37·4	36·8	42
43	48·7	47·8	46·9	46·0	45·2	44·3	43·5	42·7	42·0	41·2	40·5	39·8	39·1	38·5	37·8	37·2	43
44	49·2	48·3	47·4	46·5	45·6	44·8	44·0	43·2	42·4	41·7	41·0	40·3	39·6	38·9	38·3	37·7	44
45	49·7	48·8	47·9	47·0	46·1	45·3	44·5	43·7	42·9	42·2	41·5	40·8	40·1	39·4	38·8	38·2	45
46	50·2	49·3	48·4	47·5	46·6	45·8	45·0	44·2	43·4	42·7	42·0	41·3	40·6	39·9	39·3	38·7	46
47	50·7	49·8	48·9	48·0	47·2	46·3	45·5	44·7	44·0	43·2	42·5	41·8	41·1	40·4	39·8	39·2	47
48	51·2	50·3	49·4	48·5	47·7	46·9	46·1	45·3	44·5	43·8	43·0	42·3	41·7	41·0	40·3	39·7	48
49	51·8	50·9	50·0	49·1	48·3	47·4	46·6	45·8	45·1	44·3	43·6	42·9	42·2	41·5	40·9	40·3	49
50	52·4	51·5	50·6	49·7	48·8	48·0	47·2	46·4	45·7	44·9	44·2	43·5	42·8	42·1	41·5	40·8	50
51	52·9	52·0	51·2	50·3	49·4	48·6	47·8	47·0	46·3	45·5	44·8	44·1	43·4	42·7	42·1	41·4	51
52	53·5	52·6	51·8	50·9	50·1	49·2	48·4	47·7	46·9	46·2	45·4	44·7	44·0	43·4	42·7	42·1	52
53	54·2	53·3	52·4	51·5	50·7	49·9	49·1	48·3	47·5	46·8	46·1	45·4	44·7	44·0	43·4	42·7	53
54	54·8	53·9	53·0	52·2	51·4	50·6	49·8	49·0	48·2	47·5	46·8	46·1	45·4	44·7	44·0	43·4	54
55	55·5	54·6	53·7	52·9	52·0	51·2	50·5	49·7	48·9	48·2	47·5	46·8	46·1	45·4	44·7	44·1	55
56	56·1	55·3	54·4	53·6	52·7	51·9	51·2	50·4	49·6	48·9	48·2	47·5	46·8	46·1	45·5	44·8	56
57	56·8	56·0	55·1	54·3	53·5	52·7	51·9	51·1	50·4	49·7	48·9	48·2	47·5	46·9	46·2	45·6	57
58	57·5	56·7	55·9	55·0	54·2	53·4	52·7	51·9	51·1	50·4	49·7	49·0	48·3	47·7	47·0	46·4	58
59	58·3	57·4	56·6	55·8	55·0	54·2	53·4	52·7	51·9	51·2	50·5	49·8	49·1	48·5	47·8	47·2	59
60	59·0	58·2	57·4	56·6	55·8	55·0	54·2	53·5	52·8	52·0	51·3	50·6	50·0	49·3	48·7	48·0	60
61	59·8	59·0	58·2	57·4	56·6	55·8	55·1	54·3	53·6	52·9	52·2	51·5	50·8	50·2	49·5	48·9	61
62	60·6	59·8	59·0	58·2	57·4	56·7	55·9	55·2	54·5	53·8	53·1	52·4	51·7	51·1	50·4	49·8	62
63	61·4	60·6	59·8	59·1	58·3	57·6	56·8	56·1	55·4	54·7	54·0	53·3	52·7	52·0	51·4	50·7	63
64	62·3	61·5	60·7	59·9	59·2	58·5	57·7	57·0	56·3	55·6	55·0	54·3	53·6	53·0	52·4	51·7	64
65	63·1	62·3	61·6	60·8	60·1	59·4	58·7	58·0	57·3	56·6	55·9	55·3	54·6	54·0	53·4	52·7	65
66	64·0	63·2	62·5	61·8	61·1	60·3	59·6	59·0	58·3	57·6	56·9	56·3	55·7	55·0	54·4	53·8	66
67	64·9	64·1	63·4	62·7	62·0	61·3	60·6	60·0	59·3	58·6	58·0	57·3	56·7	56·1	55·5	54·9	67
68	65·8	65·1	64·4	63·7	63·0	62·3	61·7	61·0	60·3	59·7	59·1	58·4	57·8	57·2	56·6	56·0	68
Lat.																	Lat.
A ± B =	1°20′	1°24′	1°28′	1°32′	1°36′	1°40′	1°44′	1°48′	1°52′	1°56′	2°00′	2°04′	2°08′	2°12′	2°16′	2°20′	= A ± B

A & B take **S**ame Names (add) } RULE TO FIND **C** CORRECTION { A & B take **D**ifferent names (Sub.)

C CORRECTION, (A ± B) is named the same as the greater of these quantities.

AZIMUTH takes combined names of **C** Correction and Hour Angle

C

TABLE C

A ± B =	1·80′	1·84′	1·88′	1·92′	1·96′	2·00′	A & B CORRECTION. 2·04′	2·08′	2·12′	2·16′	2·20′	2·24′	2·28′	2·32′	2·36′	2·40′ = A ± B
Lat.	AZIMUTHS															Lat.
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	29·1	28·5	28·0	27·5	27·0	26·6	26·1	25·7	25·2	24·8	24·4	24·0	23·7	23·3	23·0	22·6	0
5	29·1	28·6	28·1	27·6	27·1	26·7	26·2	25·8	25·3	24·9	24·5	24·1	23·8	23·4	23·0	22·7	5
10	29·4	28·9	28·4	27·9	27·4	26·9	26·5	26·0	25·6	25·2	24·8	24·4	24·0	23·6	23·3	22·9	10
14	29·8	29·3	28·7	28·2	27·7	27·3	26·8	26·4	25·9	25·5	25·1	24·7	24·3	24·0	23·6	23·2	14
18	30·3	29·7	29·2	28·7	28·2	27·7	27·3	26·8	26·4	26·0	25·6	25·2	24·8	24·4	24·0	23·7	18
20	30·6	30 0	29·5	29 0	28·5	28·0	27·6	27·1	26·7	26·2	25·8	25·4	25·0	24·6	24·3	23·9	20
22	30·9	30·4	29·8	29·3	28·8	28·3	27·9	27·4	27·0	26·5	26·1	25·7	25·3	24·9	24·6	24·2	22
24	31·3	30·8	30·2	29·7	29·2	28·7	28·2	27·8	27·3	26·9	26·5	26·1	25·7	25·3	24·9	24·5	24
26	31·7	31·2	30·6	30·1	29·6	29·1	28·6	28·2	27·7	27·3	26·8	26·4	26·0	25·6	25·2	24·9	26
28	32·2	31·6	31·1	30 5	30 0	29·5	29·0	28·6	28·1	27·7	27·2	26·8	26·4	26·0	25·6	25·3	28
30	32·7	32·1	31·6	31·0	30·5	30·0	29·5	29·0	28·6	28·1	27·7	27·3	26·9	26·5	26·1	25·7	30
31	32·9	32·4	31·8	31·3	30·8	30·3	29·8	29·3	28·8	28·4	27·9	27·5	27·1	26·7	26·3	25·9	31
32	33·2	32·7	32·1	31·6	31·0	30·5	30·0	29·6	29·1	28·6	28·2	27·8	27·3	26 9	26·5	26·2	32
33	33·5	32·9	32·4	31·8	31·3	30·8	30·3	29·8	29·4	28 9	28·5	28·0	27·6	27·2	26·8	26·4	33
34	33 8	33·2	32·7	32·1	31·6	31 1	30·6	30·1	29·6	29·2	28·7	28·3	27·9	27·5	27·1	26·7	34
35	34·1	33·6	33·0	32·4	31·9	31·4	30·9	30·4	29 9	29·5	29 0	28·6	28·2	27·8	27·4	27·0	35
36	34·5	33·9	33·3	32·8	32·2	31·7	31·2	30·7	30·3	29·8	29·3	28·9	28·5	28·1	27·7	27·3	36
37	34·8	34·2	33·7	33·1	32·6	32·1	31·6	31·1	30·6	30·1	29·6	29·2	28·8	28·4	28·0	27·6	37
38	35·2	34·6	34·0	33·5	32·9	32·4	31·9	31·4	30·9	30·4	30·0	29·5	29·1	28·7	28·3	27·9	38
39	35 6	35·0	34·4	33·8	33·3	32·8	32·3	31·8	31·3	30·8	30·3	29·9	29·4	29·0	28·6	28·2	39
40	36·0	35·4	34·8	34·2	33·7	33 1	32·6	32·1	31·6	31·2	30·7	30·2	29·8	29·4	28·9	28·5	40
41	36·4	35·8	35·2	34·6	34·1	33·5	33·0	32·5	32·0	31·5	31·1	30·6	30·2	29·7	29·3	28·9	41
42	36·8	36·2	35·6	35·0	34·5	33·9	33·4	32·9	32·4	31·9	31·5	31·0	30·5	30·1	29·7	29·3	42
43	37·2	36·6	36·0	35·5	34·9	34·4	33·8	33·3	32·8	32·3	31·9	31·4	31·0	30·5	30·1	29·7	43
44	37·7	37·1	36·5	35·9	35·3	34·8	34·3	33·8	33·3	32·8	32·3	31·8	31·4	30·9	30·5	30·1	44
45	38·2	37·6	37·0	36·4	35·8	35·3	34·7	34·2	33·7	33·2	32·7	32·3	31·8	31·4	30·9	30·5	45
46	38·7	38·1	37·5	36·9	36·3	35·7	35·2	34·7	34·2	33·7	33·2	32·7	32·3	31·8	31·4	31·0	46
47	39·2	38·6	38 0	37·4	36·8	36·2	35·7	35·2	34·7	34·2	33·7	33·2	32·7	32·3	31·9	31·4	47
48	39·7	39·1	38·5	37·9	37·3	36·8	36·2	35·7	35·2	34·7	34·2	33·7	33·2	32·8	32·4	31·9	48
49	40·3	39·6	39·0	38·4	37·9	37·3	36·8	36·2	35·7	35·2	34·7	34·2	33·8	33·3	32·9	32·4	49
50	40·8	40 2	39·6	39·0	38·4	37·9	37·3	36·8	36·3	35·8	35·3	34·8	34·3	33·8	33·4	33·0	50
51	41·4	40·8	40·2	39·6	39·0	38·5	37·9	37·4	36·9	36·3	35·8	35·3	34·9	34·4	34·0	33·5	51
52	42·1	41·4	40·8	40·2	39·6	39·1	38·5	38·0	37·5	36·9	36·4	35·9	35·5	35·0	34·5	34·1	52
53	42·7	42·1	41·5	40·9	40·3	39·7	39·2	38·6	38·1	37·6	37·1	36·6	36·1	35·6	35·1	34·7	53
54	43·4	42·8	42·1	41·5	41·0	40·4	39·8	39·3	38·7	38·2	37·7	37·2	36·7	36·3	35·8	35·3	54
55	44·1	43·5	42·8	42·2	41·7	41·1	40·5	40·0	39·4	38·9	38·4	37·9	37·4	36·9	36·5	36·0	55
56	44·8	44·2	43·6	43·0	42·4	41·8	41·2	40·7	40·1	39·6	39·1	38·6	38·1	37·6	37·2	36·7	56
57	45·6	44·9	44·3	43·7	43·1	42·6	42·0	41·4	40·9	40·4	39·8	39·3	38·8	38·4	37·9	37·4	57
58	46·4	45·7	45 1	44·5	43·9	43 4	42·8	42·2	41·7	41·2	40·6	40·1	39·6	39·1	38·6	38·2	58
59	47·2	46·5	45·9	45·3	44·7	44·2	43·6	43·0	42·5	42·0	41·4	40·9	40·4	39·9	39·4	39·0	59
60	48·0	47·4	46·8	46·2	45·6	45·0	44·4	43·9	43·3	42·8	42·3	41·8	41·3	40·8	40·3	39·8	60
61	48·9	48·3	47·7	47·1	46·5	45·9	45·3	44·8	44·2	43·7	43·2	42·7	42·2	41·7	41·2	40·7	61
62	49·8	49·2	48·6	48·0	47·4	46·8	46·2	45·7	45·1	44·6	44·1	43·6	43·1	42·6	42·1	41·6	62
63	50·7	50·1	49·5	48·9	48·3	47·8	47·2	46·6	46·1	45·6	45·0	44·5	44·0	43·5	43·0	42·5	63
64	51·7	51·1	50·5	49·9	49·3	48·8	48·2	47·6	47·1	46·6	46·0	45·5	45·0	44·5	44·0	43·5	64
65	52·7	52·1	51·5	50·9	50·4	49·8	49·2	48·7	48·1	47·6	47·1	46·6	46·1	45·6	45·1	44·6	65
66	53·8	53·2	52·6	52·0	51·4	50·9	50·3	49·8	49·2	48·7	48·2	47·7	47·2	46·7	46·2	45·7	66
67	54·9	54·3	53·7	53·1	52·6	52·0	51·4	50·9	50·4	49·8	49·3	48·8	48·3	47·8	47·3	46·8	67
68	56·0	55·4	54·8	54·3	53·7	53·2	52·6	52·1	51·5	51·0	50·5	50 0	49·5	49·0	48·5	48·0	68
Lat.																	Lat.
A ± B =	1·80′	1·84′	1·88′	1·92′	1·96′	2·00′	2·04′	2·08′	2·12′	2·16′	2·20′	2·24′	2·28′	2·32′	2·36′	2·40′ = A ± B

A & B take **S**ame Names (add) } RULE TO FIND **C** CORRECTION { A & B take **D**ifferent names (Sub.)

C CORRECTION, (A ± B) is named the same as the greater of these quantities.

AZIMUTH takes combined names of **C** Correction and Hour Angle

C

TABLE C

A ± B =	2·40′	2·45	2·50′	2·55	2·60′	2·65	A & B CORRECTION. 2·70′	2·75	2·80′	2·90	3·00′	3·10	3·20′	3·30	3·40′	3·50	= A ± B
Lat.	AZIMUTHS																Lat.
°	°	°	′	′	′	′	′	′	°	°	°	′	′	′	′	′	°
0	22·6	22·2	21·8	21·4	21·0	20·7	20·3	20·0	19·7	19·0	18·4	17·9	17·4	16·9	16·4	15·9	0
5	22·7	22·3	21·9	21·5	21·1	20·8	20·4	20·1	19·7	19·1	18·5	17·9	17·4	16·9	16·4	16·0	5
10	22·9	22·5	22·1	21·7	21·3	21·0	20·6	20·3	19·9	19·3	18·7	18·1	17·6	17·1	16·6	16·2	10
14	23·2	22·8	22·4	22·0	21·6	21·3	20·9	20·5	20·2	19·6	19·0	18·4	17·9	17·4	16·9	16·4	14
18	23·7	23·2	22·8	22·4	22·0	21·6	21·3	20·9	20·6	19·9	19·3	18·7	18·2	17·7	17·2	16·7	18
20	23·9	23·5	23·1	22·7	22·3	21·9	21·5	21·2	20·8	20·2	19·5	18·9	18·4	17·9	17·4	16·9	20
22	24·2	23·8	23·3	22·9	22·5	22·2	21·8	21·4	21·1	20·4	19·8	19·2	18·6	18·1	17·6	17·1	22
24	24·5	24·1	23·6	23·2	22·8	22·5	22·1	21·7	21·4	20·7	20·0	19·4	18·9	18·4	17·8	17·4	24
26	24·9	24·4	24·0	23·6	23·2	22·8	22·4	22·0	21·7	21·0	20·3	19·7	19·2	18·6	18·1	17·6	26
28	25·3	24·8	24·4	23·9	23·5	23·1	22·8	22·4	22·0	21·3	20·7	20·1	19·5	18·9	18·4	17·9	28
30	25·7	25·2	24·8	24·4	23·9	23·5	23·2	22·8	22·4	21·7	21·1	20·4	19·8	19·3	18·8	18·3	30
31	25·9	25·5	25·0	24·6	24·2	23·8	23·4	23·0	22·6	21·9	21·2	20·6	20·0	19·5	18·9	18·4	31
32	26·2	25·7	25·3	24·8	24·4	24·0	23·6	23·2	22·8	22·1	21·5	20·8	20·2	19·7	19·1	18·6	32
33	26·4	26·0	25·5	25·1	24·6	24·2	23·8	23·4	23·1	22·4	21·7	21·0	20·4	19·9	19·3	18·8	33
34	26·7	26·2	25·8	25·3	24·9	24·5	24·1	23·7	23·3	22·6	21·9	21·3	20·7	20·1	19·5	19·0	34
35	27·0	26·5	26·0	25·6	25·2	24·7	24·3	23·9	23·6	22·8	22·1	21·5	20·9	20·3	19·8	19·2	35
36	27·3	26·8	26·3	25·9	25·4	25·0	24·6	24·2	23·8	23·1	22·4	21·7	21·1	20·5	20·0	19·5	36
37	27·6	27·1	26·6	26·2	25·7	25·3	24·9	24·5	24·1	23·4	22·7	22·0	21·4	20·8	20·2	19·7	37
38	27·9	27·4	26·9	26·5	26·0	25·6	25·2	24·8	24·4	23·6	22·9	22·3	21·6	21·0	20·5	19·9	38
39	28·2	27·7	27·2	26·8	26·3	25·9	25·5	25·1	24·7	23·9	23·2	22·5	21·9	21·3	20·7	20·2	39
40	28·5	28·1	27·6	27·1	26·7	26·2	25·8	25·4	25·0	24·2	23·5	22·8	22·2	21·6	21·0	20·5	40
41	28·9	28·4	27·9	27·5	27·0	26·6	26·1	25·7	25·3	24·6	23·8	23·1	22·5	21·9	21·3	20·7	41
42	29·3	28·8	28·3	27·8	27·4	26·9	26·5	26·1	25·7	24·9	24·2	23·5	22·8	22·2	21·6	21·0	42
43	29·7	29·2	28·7	28·2	27·7	27·3	26·9	26·4	26·0	25·2	24·5	23·8	23·1	22·5	21·9	21·3	43
44	30·1	29·6	29·1	28·6	28·1	27·7	27·2	26·8	26·4	25·6	24·9	24·2	23·5	22·8	22·2	21·7	44
45	30·5	30·0	29·5	29·0	28·5	28·1	27·6	27·2	26·8	26·0	25·2	24·5	23·8	23·2	22·6	22·0	45
46	31·0	30·4	29·9	29·5	29·0	28·6	28·1	27·6	27·2	26·4	25·6	24·9	24·2	23·6	22·9	22·4	46
47	31·4	30·9	30·4	29·9	29·4	29·0	28·5	28·1	27·6	26·8	26·0	25·3	24·6	24·0	23·3	22·7	47
48	31·9	31·4	30·9	30·4	29·9	29·4	29·0	28·5	28·1	27·3	26·5	25·7	25·0	24·4	23·7	23·1	48
49	32·4	31·9	31·4	30·9	30·4	29·9	29·4	29·0	28·6	27·7	26·9	26·2	25·5	24·8	24·1	23·5	49
50	33·0	32·4	31·9	31·4	30·9	30·4	30·0	29·5	29·1	28·2	27·4	26·6	25·9	25·2	24·6	24·0	50
51	33·5	33·0	32·4	31·9	31·4	30·9	30·5	30·0	29·6	28·7	27·9	27·1	26·4	25·7	25·0	24·4	51
52	34·1	33·5	33·0	32·5	32·0	31·5	31·0	30·6	30·1	29·3	28·5	27·7	26·9	26·2	25·5	24·9	52
53	34·7	34·1	33·6	33·1	32·6	32·1	31·6	31·1	30·7	29·8	29·0	28·2	27·4	26·7	26·0	25·4	53
54	35·3	34·8	34·2	33·7	33·2	32·7	32·2	31·7	31·3	30·4	29·6	28·8	28·0	27·3	26·6	25·9	54
55	36·0	35·4	34·9	34·4	33·8	33·4	32·9	32·4	31·9	31·0	30·2	29·4	28·6	27·9	27·1	26·5	55
56	36·7	36·1	35·6	35·1	34·5	34·0	33·5	33·1	32·6	31·7	30·8	30·0	29·2	28·5	27·7	27·1	56
57	37·4	36·8	36·3	35·8	35·2	34·7	34·2	33·8	33·3	32·4	31·5	30·6	29·8	29·1	28·4	27·7	57
58	38·2	37·6	37·0	36·5	36·0	35·5	35·0	34·5	34·0	33·1	32·2	31·3	30·5	29·8	29·0	28·3	58
59	39·0	38·4	37·8	37·3	36·8	36·3	35·7	35·2	34·7	33·8	32·9	32·1	31·2	30·5	29·7	29·0	59
60	39·8	39·2	38·7	38·1	37·6	37·1	36·5	36·0	35·5	34·6	33·7	32·8	32·0	31·2	30·5	29·8	60
61	40·7	40·1	39·5	39·0	38·4	37·9	37·4	36·9	36·4	35·4	34·5	33·6	32·8	32·0	31·2	30·5	61
62	41·6	41·0	40·4	39·9	39·3	38·8	38·3	37·8	37·3	36·3	35·4	34·5	33·6	32·8	32·1	31·3	62
63	42·5	42·0	41·4	40·8	40·3	39·7	39·2	38·7	38·2	37·2	36·3	35·4	34·5	33·7	32·9	32·2	63
64	43·5	43·0	42·4	41·8	41·3	40·7	40·2	39·7	39·2	38·2	37·3	36·4	35·5	34·7	33·9	33·1	64
65	44·6	44·0	43·4	42·9	42·3	41·8	41·2	40·7	40·2	39·2	38·3	37·4	36·5	35·7	34·9	34·1	65
66	45·7	45·1	44·5	44·0	43·4	42·9	42·3	41·8	41·3	40·3	39·3	38·4	37·6	36·7	35·9	35·1	66
67	46·8	46·2	45·7	45·1	44·6	44·0	43·5	42·9	42·4	41·4	40·5	39·5	38·7	37·8	37·0	36·2	67
68	48·0	47·4	46·9	46·3	45·8	45·2	44·7	44·1	43·6	42·6	41·7	40·7	39·8	39·0	38·1	37·3	68
Lat.																	Lat.
A ± B =	2·40′	2·45	2·50′	2·55	2·60′	2·65	2·70′	2·75	2·80′	2·90	3·00′	3·10	3·20′	3·30	3·40′	3·50′	= A ± B

A & B take **S**ame Names } RULE TO FIND **C** CORRECTION { A & B take **D**ifferent names

C CORRECTION, (A ± B) is named the same as the greater of these quantities.

AZIMUTH takes combined names of **C** Correction and Hour Angle

C

TABLE C

A±B=	3·50′	3·60′	3·70′	3·80′	3·90′	4·00′	A & B CORRECTION. 4·10′	4·20′	4·30′	4·40′	4·50′	4·60′	4·70′	4·80′	4·90′	5·00′	=A±B
Lat.	AZIMUTHS																Lat.
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	15·9	15·5	15·1	14·7	14·4	14·0	13·7	13·4	13·1	12·8	12·5	12·3	12·0	11·8	11·5	11·3	0
5	16·0	15·6	15·2	14·8	14·4	14·1	13·8	13·5	13·2	12·9	12·6	12·3	12·1	11·8	11·6	11·4	5
10	16·2	15·8	15·4	15·0	14·6	14·2	13·9	13·6	13·3	13·0	12·7	12·4	12·2	11·9	11·7	11·5	10
14	16·4	16·0	15·6	15·2	14·8	14·4	14·1	13·8	13·5	13·2	12·9	12·6	12·4	12·1	11·9	11·6	14
18	16·7	16·3	15·9	15·5	15·1	14·7	14·4	14·1	13·7	13·4	13·1	12·9	12·6	12·4	12·1	11·9	18
20	16·9	16·5	16·0	15·6	15·3	14·9	14·6	14·2	13·9	13·6	13·3	13·0	12·8	12·5	12·3	12·0	20
22	17·1	16·7	16·3	15·8	15·5	15·1	14·7	14·4	14·1	13·8	13·5	13·2	12·9	12·7	12·4	12·2	22
24	17·4	16·9	16·5	16·1	15·7	15·3	14·9	14·6	14·3	14·0	13·7	13·4	13·1	12·8	12·6	12·3	24
26	17·6	17·2	16·7	16·3	15·9	15·5	15·2	14·8	14·5	14·2	13·9	13·6	13·3	13·1	12·8	12·5	26
28	17·9	17·5	17·0	16·6	16·2	15·8	15·4	15·1	14·8	14·4	14·1	13·8	13·5	13·3	13·0	12·8	28
30	18·3	17·8	17·3	16·9	16·5	16·1	15·7	15·4	15·0	14·7	14·4	14·1	13·8	13·5	13·3	13·0	30
31	18·4	18·0	17·5	17·1	16·7	16·3	15·9	15·5	15·2	14·9	14·5	14·2	13·9	13·7	13·4	13·1	31
32	18·6	18·1	17·7	17·2	16·8	16·4	16·0	15·7	15·3	15·0	14·7	14·4	14·1	13·8	13·5	13·3	32
33	18·8	18·3	17·9	17·4	17·0	16·6	16·2	15·8	15·5	15·2	14·9	14·5	14·2	14·0	13·7	13·4	33
34	19·0	18·5	18·1	17·6	17·2	16·8	16·4	16·0	15·7	15·3	15·0	14·7	14·4	14·1	13·8	13·6	34
35	19·2	18·7	18·3	17·8	17·4	17·0	16·6	16·2	15·9	15·5	15·2	14·9	14·6	14·3	14·0	13·7	35
36	19·5	19·0	18·5	18·0	17·6	17·2	16·8	16·4	16·1	15·7	15·4	15·0	14·7	14·4	14·2	13·9	36
37	19·7	19·2	18·7	18·2	17·8	17·4	17·0	16·6	16·3	15·9	15·6	15·2	14·9	14·6	14·3	14·1	37
38	19·9	19·4	18·9	18·5	18·0	17·6	17·2	16·8	16·5	16·1	15·8	15·4	15·1	14·8	14·5	14·2	38
39	20·2	19·7	19·2	18·7	18·3	17·8	17·4	17·0	16·7	16·3	16·0	15·6	15·3	15·0	14·7	14·4	39
40	20·5	19·9	19·4	19·0	18·5	18·1	17·7	17·3	16·9	16·5	16·2	15·8	15·5	15·2	14·9	14·6	40
41	20·7	20·2	19·7	19·2	18·8	18·3	17·9	17·5	17·1	16·8	16·4	16·1	15·7	15·4	15·1	14·8	41
42	21·0	20·5	20·0	19·5	19·0	18·6	18·2	17·8	17·4	17·0	16·7	16·3	16·0	15·7	15·4	15·1	42
43	21·3	20·8	20·3	19·8	19·3	18·9	18·4	18·0	17·6	17·3	16·9	16·6	16·2	15·9	15·6	15·3	43
44	21·7	21·1	20·6	20·1	19·6	19·2	18·7	18·3	17·9	17·5	17·2	16·8	16·5	16·2	15·8	15·5	44
45	22·0	21·4	20·9	20·4	19·9	19·5	19·0	18·6	18·2	17·8	17·5	17·1	16·8	16·4	16·1	15·8	45
46	22·4	21·8	21·3	20·8	20·3	19·8	19·3	18·9	18·5	18·1	17·8	17·4	17·1	16·7	16·4	16·1	46
47	22·7	22·2	21·6	21·1	20·6	20·1	19·7	19·2	18·8	18·4	18·1	17·7	17·4	17·0	16·7	16·3	47
48	23·1	22·5	22·0	21·5	21·0	20·5	20·0	19·6	19·2	18·8	18·4	18·0	17·7	17·3	17·0	16·6	48
49	23·5	22·9	22·4	21·9	21·4	20·9	20·4	19·9	19·5	19·1	18·7	18·3	18·0	17·6	17·3	17·0	49
50	24·0	23·4	22·8	22·3	21·8	21·3	20·8	20·3	19·9	19·5	19·1	18·7	18·3	18·0	17·6	17·3	50
51	24·4	23·8	23·3	22·7	22·2	21·7	21·2	20·7	20·3	19·9	19·5	19·1	18·7	18·3	18·0	17·6	51
52	24·9	24·3	23·7	23·1	22·6	22·1	21·6	21·1	20·7	20·3	19·9	19·5	19·1	18·7	18·3	18·0	52
53	25·4	24·8	24·2	23·6	23·1	22·6	22·1	21·6	21·2	20·7	20·3	19·9	19·5	19·1	18·7	18·4	53
54	25·9	25·3	24·7	24·1	23·6	23·1	22·6	22·1	21·6	21·1	20·7	20·3	19·9	19·5	19·1	18·8	54
55	26·5	25·8	25·2	24·6	24·1	23·6	23·1	22·6	22·1	21·6	21·2	20·8	20·4	20·0	19·6	19·2	55
56	27·1	26·4	25·8	25·2	24·6	24·1	23·6	23·1	22·6	22·1	21·7	21·3	20·8	20·4	20·1	19·7	56
57	27·7	27·0	26·4	25·8	25·2	24·7	24·1	23·6	23·1	22·7	22·2	21·8	21·3	20·9	20·6	20·2	57
58	28·3	27·7	27·0	26·4	25·8	25·3	24·7	24·2	23·7	23·2	22·8	22·3	21·9	21·5	21·1	20·7	58
59	29·0	23·4	27·7	27·1	26·5	25·9	25·3	24·8	24·3	23·8	23·4	22·9	22·5	22·0	21·6	21·2	59
60	29·8	29·1	28·4	27·8	27·2	26·6	26·0	25·5	24·9	24·4	24·0	23·5	23·1	22·6	22·2	21·8	60
61	30·5	29·8	29·1	28·5	27·9	27·3	26·7	26·2	25·6	25·1	24·6	24·2	23·7	23·3	22·8	22·4	61
62	31·3	30·6	29·9	29·3	28·7	28·0	27·5	26·9	26·4	25·8	25·3	24·8	24·4	23·9	23·5	23·1	62
63	32·2	31·5	30·8	30·1	29·5	28·8	28·2	27·7	27·1	26·6	26·1	25·6	25·1	24·6	24·2	23·8	63
64	33·1	32·4	31·7	31·0	30·3	29·7	29·1	28·5	27·9	27·4	26·9	26·4	25·9	25·4	25·0	24·5	64
65	34·1	33·3	32·6	31·9	31·2	30·6	30·0	29·4	28·8	28·3	27·8	27·2	26·7	26·2	25·8	25·3	65
66	35·1	34·3	33·6	32·9	32·2	31·6	30·9	30·3	29·8	29·2	28·7	28·1	27·6	27·1	26·7	26·2	66
67	36·2	35·4	34·7	34·0	33·3	32·6	32·0	31·4	30·8	30·2	29·6	29·1	28·6	28·1	27·6	27·1	67
68	37·3	36·6	35·8	35·1	34·4	33·7	33·1	32·4	31·8	31·2	30·7	30·1	29·6	29·1	28·6	28·1	68
Lat.																	Lat.
A±B=	3·50′	3·60′	3·70′	3·80′	3·90′	4·00′	4·10′	4·20′	4·30′	4·40′	4·50′	4·60′	4·70′	4·80′	4·90′	5·00′	=A±B

A & B take **S**ame Names, (add) } **C** CORRECTION { A & B take **D**ifferent names, (Sub.)

C CORRECTION, (A ± B) is named the same as the greater of these quantities.

AZIMUTH takes combined names of **C** Correction and Hour Angle

TABLE C

A±B =	5·00	5·20	5·40	5·60	5·80′	6·00	A & B CORRECTION. 6·20	6·40	6·60′	6·80′	7·00	7·20′	7·40′	7·60′	7·80′	8·00′ = A±B
Lat.	AZIMUTHS															Lat.
°	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°
0	11·3	10·9	10·5	10·1	9·8	9·5	9·2	8·9	8·6	8·4	8·1	7·9	7·7	7·5	7·3	7·1	0
5	11·4	10·9	10·5	10·2	9·8	9·5	9·2	8·9	8·6	8·4	8·2	7·9	7·7	7·5	7·3	7·2	5
10	11·5	11·0	10·6	10·3	9·9	9·6	9·3	9·0	8·7	8·5	8·3	8·0	7·8	7·6	7·4	7·2	10
14	11·6	11·2	10·8	10·4	10·1	9·7	9·4	9·1	8·9	8·7	8·4	8·1	7·9	7·7	7·5	7·3	14
18	11·9	11·4	11·0	10·6	10·3	9·9	9·6	9·3	9·1	8·8	8·5	8·3	8·1	7·9	7·7	7·5	18
20	12·0	11·6	11·1	10·8	10·4	10·1	9·7	9·4	9·2	8·9	8·6	8·4	8·2	8·0	7·8	7·6	20
22	12·2	11·7	11·3	10·9	10·5	10·2	9·9	9·6	9·3	9·0	8·8	8·5	8·3	8·1	7·9	7·7	22
24	12·3	11·9	11·5	11·1	10·7	10·3	10·0	9·7	9·4	9·1	8·9	8·6	8·4	8·2	8·0	7·8	24
26	12·5	12·1	11·6	11·2	10·9	10·5	10·2	9·9	9·6	9·3	9·0	8·8	8·6	8·3	8·1	7·9	26
28	12·8	12·3	11·8	11·4	11·0	10·7	10·4	10·0	9·7	9·5	9·2	8·9	8·7	8·5	8·3	8·1	28
30	13·0	12·5	12·1	11·7	11·3	10·9	10·5	10·2	9·9	9·6	9·4	9·1	8·9	8·6	8·4	8·2	30
31	13·1	12·6	12·2	11·8	11·4	11·0	10·7	10·3	10·0	9·7	9·5	9·2	9·0	8·7	8·5	8·3	31
32	13·3	12·8	12·3	11·9	11·5	11·1	10·8	10·4	10·1	9·8	9·6	9·3	9·1	8·8	8·6	8·4	32
33	13·4	12·9	12·5	12·0	11·6	11·2	10·9	10·6	10·2	9·9	9·7	9·4	9·2	8·9	8·7	8·5	33
34	13·6	13·1	12·6	12·2	11·7	11·4	11·0	10·7	10·4	10·1	9·8	9·5	9·3	9·0	8·8	8·6	34
35	13·7	13·2	12·7	12·3	11·9	11·5	11·1	10·8	10·5	10·2	9·9	9·6	9·4	9·1	8·9	8·7	35
36	13·9	13·4	12·9	12·4	12·0	11·6	11·3	10·9	10·6	10·3	10·0	9·7	9·5	9·2	9·0	8·8	36
37	14·1	13·5	13·1	12·6	12·2	11·8	11·4	11·1	10·7	10·4	10·1	9·9	9·6	9·4	9·1	8·9	37
38	14·2	13·7	13·2	12·8	12·3	11·9	11·6	11·2	10·9	10·6	10·3	10·0	9·7	9·5	9·2	9·0	38
39	14·4	13·9	13·4	12·9	12·5	12·1	11·7	11·4	11·0	10·7	10·4	10·1	9·9	9·6	9·4	9·1	39
40	14·6	14·1	13·6	13·1	12·7	12·3	11·9	11·5	11·2	10·9	10·6	10·3	10·0	9·7	9·5	9·3	40
41	14·8	14·3	13·8	13·3	12·9	12·5	12·1	11·7	11·4	11·0	10·7	10·4	10·2	9·9	9·6	9·4	41
42	15·1	14·5	14·0	13·5	13·1	12·6	12·2	11·9	11·5	11·2	10·9	10·6	10·3	10·0	9·8	9·5	42
43	15·3	14·7	14·2	13·7	13·3	12·8	12·4	12·1	11·7	11·4	11·1	10·8	10·5	10·2	9·9	9·7	43
44	15·5	15·0	14·4	13·9	13·5	13·0	12·6	12·3	11·9	11·6	11·2	10·9	10·6	10·4	10·1	9·9	44
45	15·8	15·2	14·7	14·2	13·7	13·3	12·8	12·5	12·1	11·7	11·4	11·1	10·8	10·5	10·3	10·0	45
46	16·1	15·5	14·9	14·4	13·9	13·5	13·1	12·7	12·3	12·0	11·6	11·3	11·0	10·7	10·5	10·2	46
47	16·3	15·7	15·2	14·7	14·2	13·7	13·3	12·9	12·5	12·2	11·8	11·5	11·2	10·9	10·6	10·4	47
48	16·6	16·0	15·5	14·9	14·4	14·0	13·6	13·1	12·8	12·4	12·1	11·7	11·4	11·1	10·8	10·6	48
49	17·0	16·3	15·8	15·2	14·7	14·3	13·8	13·4	13·0	12·6	12·3	12·0	11·6	11·3	11·1	10·8	49
50	17·3	16·7	16·1	15·5	15·0	14·5	14·1	13·7	13·3	12·9	12·5	12·2	11·9	11·6	11·3	11·0	50
51	17·6	17·0	16·4	15·8	15·3	14·8	14·4	13·9	13·5	13·2	12·8	12·4	12·1	11·8	11·5	11·2	51
52	18·0	17·3	16·7	16·2	15·6	15·1	14·7	14·2	13·8	13·4	13·1	12·7	12·4	12·1	11·8	11·5	52
53	18·4	17·7	17·1	16·5	16·0	15·5	15·0	14·6	14·1	13·7	13·4	13·0	12·7	12·3	12·0	11·7	53
54	18·8	18·1	17·5	16·9	16·3	15·8	15·3	14·9	14·5	14·1	13·7	13·3	13·0	12·6	12·3	12·0	54
55	19·2	18·5	17·9	17·3	16·7	16·2	15·7	15·2	14·8	14·4	14·0	13·6	13·3	12·9	12·6	12·3	55
56	19·7	19·0	18·3	17·7	17·1	16·6	16·1	15·6	15·2	14·7	14·3	13·9	13·6	13·2	12·9	12·6	56
57	20·2	19·5	18·8	18·2	17·6	17·0	16·5	16·0	15·5	15·1	14·7	14·3	13·9	13·6	13·2	12·9	57
58	20·7	20·0	19·3	18·6	18·0	17·5	16·9	16·4	16·0	15·5	15·1	14·7	14·3	13·9	13·6	13·3	58
59	21·2	20·5	19·8	19·1	18·5	17·9	17·4	16·9	16·4	15·9	15·5	15·1	14·7	14·3	14·0	13·6	59
60	21·8	21·0	20·3	19·7	19·0	18·4	17·9	17·4	16·9	16·4	15·9	15·5	15·1	14·7	14·4	14·0	60
61	22·4	21·6	20·9	20·2	19·6	19·0	18·4	17·9	17·4	16·9	16·4	16·0	15·6	15·2	14·8	14·5	61
62	23·1	22·3	21·5	20·8	20·2	19·6	19·0	18·4	17·9	17·4	16·9	16·5	16·1	15·7	15·3	14·9	62
63	23·8	23·0	22·2	21·5	20·8	20·2	19·6	19·0	18·5	18·0	17·5	17·0	16·6	16·2	15·8	15·4	63
64	24·5	23·7	22·9	22·2	21·5	20·8	20·2	19·6	19·1	18·6	18·1	17·6	17·1	16·7	16·3	15·9	64
65	25·3	24·5	23·7	23·0	22·2	21·5	20·9	20·3	19·7	19·2	18·7	18·2	17·7	17·3	16·9	16·5	65
66	26·2	25·3	24·5	23·7	23·0	22·3	21·6	21·0	20·4	19·9	19·4	18·9	18·4	17·9	17·5	17·1	66
67	27·1	26·2	25·4	24·6	23·8	23·1	22·4	21·8	21·2	20·6	20·1	19·6	19·1	18·6	18·2	17·8	67
68	28·1	27·2	26·3	25·5	24·7	24·0	23·3	22·6	22·0	21·4	20·9	20·3	19·8	19·4	18·9	18·5	68
Lat.																	Lat.
A±B =	5·00′	5·20	5·40′	5·60	5·80′	6·00	6·20	6·40′	6·60′	6·80′	7·00	7·20′	7·40′	7·60′	7·80′	8·00′ = A±B	

A & B take **S**ame Names (add) } RULE TO FIND **C** CORRECTION { A & B take **D**ifferent names ifference (Sub.)

C CORRECTION, (A ± B) is named the same as the greater of these quantities.

AZIMUTH takes combined names of **C** Correction and Hour Angle

C

TABLE C

A ± B =	8·00′	8·20′	8·40′	8·60′	8·80′	9·00′	A & B CORRECTION. 9·20′	9·40′	9·60′	9·80′	10·0′	10·3′	10·6′	11·0′	11·5	12·0′	= A ± B
Lat.	AZIMUTHS																Lat.
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	7·1	7·0	6·8	6·6	6·5	6·3	6·2	6·1	5·9	5·8	5·7	5·5	5·4	5·2	5·0	4·8	0
5	7·2	7·0	6·8	6·7	6·5	6·4	6·2	6·1	6·0	5·8	5·7	5·6	5·4	5·2	5·0	4·8	5
10	7·2	7·1	6·9	6·7	6·6	6·4	6·3	6·2	6·0	5·9	5·8	5·6	5·5	5·3	5·0	4·8	10
14	7·3	7·2	7·0	6·8	6·7	6·5	6·4	6·3	6·1	6·0	5·9	5·7	5·6	5·4	5·1	4·9	14
18	7·5	7·3	7·1	7·0	6·8	6·7	6·5	6·4	6·3	6·1	6·0	5·8	5·7	5·5	5·2	5·0	18
20	7·6	7·4	7·2	7·1	6·9	6·7	6·6	6·5	6·3	6·2	6·1	5·9	5·7	5·5	5·3	5·1	20
22	7·7	7·5	7·3	7·1	7·0	6·8	6·7	6·5	6·4	6·3	6·2	6·0	5·8	5·6	5·4	5·1	22
24	7·8	7·6	7·4	7·3	7·1	6·9	6·8	6·6	6·5	6·4	6·2	6·1	5·9	5·7	5·4	5·2	24
26	7·9	7·7	7·5	7·4	7·2	7·0	6·9	6·7	6·6	6·5	6·3	6·2	6·0	5·8	5·5	5·3	26
28	8·1	7·9	7·7	7·5	7·3	7·2	7·0	6·9	6·7	6·6	6·5	6·3	6·1	5·9	5·6	5·4	28
30	8·2	8·0	7·8	7·6	7·5	7·3	7·2	7·0	6·9	6·7	6·6	6·4	6·2	6·0	5·7	5·5	30
31	8·3	8·1	7·9	7·7	7·6	7·4	7·2	7·1	6·9	6·8	6·7	6·5	6·3	6·1	5·8	5·6	31
32	8·4	8·2	8·0	7·8	7·6	7·5	7·3	7·2	7·0	6·9	6·7	6·5	6·3	6·1	5·9	5·6	32
33	8·5	8·3	8·1	7·9	7·7	7·5	7·4	7·2	7·1	6·9	6·8	6·6	6·4	6·2	5·9	5·7	33
34	8·6	8·4	8·2	8·0	7·8	7·6	7·5	7·3	7·2	7·0	6·9	6·7	6·5	6·3	6·0	5·7	34
35	8·7	8·5	8·3	8·1	7·9	7·7	7·6	7·4	7·2	7·1	7·0	6·8	6·6	6·3	6·1	5·8	35
36	8·8	8·6	8·4	8·2	8·0	7·8	7·7	7·5	7·3	7·2	7·0	6·8	6·7	6·4	6·1	5·9	36
37	8·9	8·7	8·5	8·3	8·1	7·9	7·8	7·6	7·4	7·3	7·1	6·9	6·7	6·5	6·2	6·0	37
38	9·0	8·8	8·6	8·4	8·2	8·0	7·9	7·7	7·5	7·4	7·2	7·0	6·9	6·6	6·3	6·0	38
39	9·1	8·9	8·7	8·5	8·3	8·1	8·0	7·8	7·6	7·5	7·3	7·1	6·9	6·7	6·4	6·1	39
40	9·3	9·0	8·8	8·6	8·4	8·3	8·1	7·9	7·7	7·6	7·4	7·2	7·0	6·8	6·5	6·2	40
41	9·4	9·2	9·0	8·8	8·6	8·4	8·2	8·0	7·9	7·7	7·5	7·3	7·1	6·9	6·6	6·3	41
42	9·5	9·3	9·1	8·9	8·7	8·5	8·3	8·1	8·0	7·8	7·7	7·4	7·2	7·0	6·7	6·4	42
43	9·7	9·5	9·2	9·0	8·8	8·6	8·5	8·3	8·1	7·9	7·8	7·6	7·4	7·1	6·8	6·5	43
44	9·9	9·6	9·4	9·2	8·9	8·8	8·6	8·4	8·2	8·1	7·9	7·7	7·5	7·2	6·9	6·6	44
45	10·0	9·8	9·6	9·3	9·1	8·9	8·7	8·6	8·4	8·2	8·0	7·8	7·6	7·3	7·0	6·7	45
46	10·2	10·0	9·7	9·5	9·3	9·1	8·9	8·7	8·5	8·4	8·2	8·0	7·7	7·5	7·1	6·8	46
47	10·4	10·1	9·9	9·7	9·5	9·3	9·1	8·9	8·7	8·5	8·3	8·1	7·9	7·6	7·3	7·0	47
48	10·6	10·3	10·1	9·9	9·6	9·4	9·2	9·0	8·8	8·7	8·5	8·3	8·0	7·7	7·4	7·1	48
49	10·8	10·5	10·3	10·1	9·8	9·6	9·4	9·2	9·0	8·8	8·7	8·4	8·2	7·9	7·6	7·2	49
50	11·0	10·7	10·5	10·3	10·0	9·8	9·6	9·4	9·2	9·0	8·8	8·6	8·3	8·0	7·7	7·4	50
51	11·2	11·0	10·7	10·5	10·2	10·0	9·8	9·6	9·4	9·2	9·0	8·8	8·5	8·2	7·9	7·5	51
52	11·5	11·2	10·9	10·7	10·5	10·2	10·0	9·8	9·6	9·4	9·2	9·0	8·7	8·4	8·0	7·7	52
53	11·7	11·5	11·2	10·9	10·7	10·5	10·2	10·0	9·8	9·6	9·4	9·2	8·9	8·6	8·2	7·9	53
54	12·0	11·7	11·4	11·2	10·9	10·7	10·5	10·3	10·0	9·8	9·7	9·4	9·1	8·8	8·4	8·1	54
55	12·3	12·0	11·7	11·5	11·2	11·0	10·7	10·5	10·3	10·1	9·9	9·6	9·3	9·0	8·6	8·3	55
56	12·6	12·3	12·0	11·7	11·5	11·2	11·0	10·8	10·6	10·3	10·1	9·8	9·6	9·2	8·8	8·5	56
57	12·9	12·6	12·3	12·1	11·8	11·5	11·3	11·1	10·8	10·6	10·4	10·1	9·8	9·5	9·1	8·7	57
58	13·3	13·0	12·7	12·4	12·1	11·8	11·6	11·4	11·1	10·9	10·7	10·4	10·1	9·7	9·3	8·9	58
59	13·6	13·3	13·0	12·7	12·4	12·2	11·9	11·7	11·4	11·2	11·0	10·7	10·4	10·0	9·6	9·2	59
60	14·0	13·7	13·4	13·1	12·8	12·5	12·3	12·0	11·8	11·5	11·3	11·0	10·7	10·3	9·9	9·5	60
61	14·5	14·1	13·8	13·5	13·2	12·9	12·6	12·4	12·1	11·9	11·7	11·3	11·0	10·6	10·2	9·8	61
62	14·9	14·6	14·2	13·9	13·6	13·3	13·0	12·8	12·5	12·3	12·0	11·7	11·4	11·0	10·5	10·1	62
63	15·4	15·0	14·7	14·4	14·1	13·8	13·5	13·2	12·9	12·7	12·4	12·1	11·7	11·3	10·8	10·4	63
64	15·9	15·5	15·2	14·9	14·5	14·2	13·9	13·6	13·4	13·1	12·9	12·5	12·1	11·7	11·2	10·8	64
65	16·5	16·1	15·7	15·4	15·1	14·7	14·4	14·1	13·8	13·6	13·3	12·9	12·6	12·1	11·6	11·2	65
66	17·1	16·7	16·3	16·0	15·6	15·3	15·0	14·7	14·4	14·1	13·8	13·4	13·1	12·6	12·1	11·6	66
67	17·8	17·3	16·9	16·6	16·2	15·9	15·5	15·2	14·9	14·6	14·4	14·0	13·6	13·1	12·5	12·0	67
68	18·5	18·0	17·6	17·2	16·9	16·5	16·2	15·9	15·5	15·2	14·9	14·6	14·2	13·6	13·1	12·5	68
Lat.																	Lat.
A ± B =	8·00′	8·20′	8·40′	8·60′	8·80′	9·00′	9·20′	9·40′	9·60′	9·80′	10·0′	10·3′	10·6′	11·0′	11·5	12·0′	= A ± B

A & B take **S**ame Names (add) ⎫ RULE TO FIND ⎧ A & B take **D**ifferent names (Sub.)
⎭ **C** CORRECTION ⎩

C CORRECTION, (A ± B) is named the same as the greater of these quantities.

AZIMUTH takes combined names of **C** Correction and Hour Angle

TABLE C

A ± B =	12·0′	12·5′	13·0′	13·5′	14·0′	14·5′	A & B CORRECTION. 15·0′	16·0′	17·0′	18·0′	19·0′	20·0′	21·0′	22·0′	23·0′	25·0′	A ± B =
Lat.	AZIMUTHS																Lat.
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	
0	4·8	4·6	4·4	4·2	4·1	3·9	3·8	3·6	3·4	3·2	3·0	2·9	2·7	2·6	2·5	2·3	0
5	4·8	4·6	4·4	4·3	4·1	4·0	3·8	3·6	3·4	3·2	3·0	2·9	2·7	2·6	2·5	2·3	5
10	4·8	4·6	4·5	4·3	4·1	4·0	3·9	3·6	3·4	3·2	3·1	2·9	2·8	2·6	2·5	2·3	10
14	4·9	4·7	4·5	4·4	4·2	4·1	3·9	3·7	3·5	3·3	3·1	2·9	2·8	2·7	2·6	2·4	14
18	5·0	4·8	4·6	4·4	4·3	4·1	4·0	3·8	3·5	3·3	3·2	3·0	2·9	2·7	2·6	2·4	18
20	5·1	4·9	4·7	4·5	4·3	4·2	4·1	3·8	3·6	3·4	3·2	3·0	2·9	2·8	2·6	2·4	20
22	5·1	4·9	4·7	4·6	4·4	4·3	4·1	3·9	3·6	3·4	3·3	3·1	2·9	2·8	2·7	2·5	22
24	5·2	5·0	4·8	4·6	4·5	4·3	4·2	3·9	3·7	3·5	3·3	3·1	3·0	2·8	2·7	2·5	24
26	5·3	5·1	4·9	4·7	4·5	4·4	4·2	4·0	3·7	3·5	3·4	3·2	3·0	2·9	2·8	2·5	26
28	5·4	5·2	5·0	4·8	4·6	4·5	4·3	4·0	3·8	3·6	3·4	3·2	3·1	2·9	2·8	2·6	28
30	5·5	5·3	5·1	4·9	4·7	4·6	4·4	4·1	3·9	3·7	3·5	3·3	3·1	3·0	2·9	2·6	30
31	5·6	5·3	5·1	4·9	4·8	4·6	4·4	4·2	3·9	3·7	3·5	3·3	3·2	3·0	2·9	2·7	31
32	5·6	5·4	5·2	5·0	4·8	4·6	4·5	4·2	4·0	3·7	3·6	3·4	3·2	3·1	2·9	2·7	32
33	5·7	5·4	5·2	5·0	4·9	4·7	4·5	4·3	4·0	3·8	3·6	3·4	3·2	3·1	3·0	2·7	33
34	5·7	5·5	5·3	5·1	4·9	4·8	4·6	4·3	4·1	3·8	3·6	3·5	3·3	3·1	3·0	2·8	34
35	5·8	5·6	5·4	5·2	5·0	4·8	4·7	4·4	4·1	3·9	3·7	3·5	3·3	3·2	3·0	2·8	35
36	5·9	5·7	5·4	5·2	5·0	4·9	4·7	4·4	4·2	3·9	3·7	3·5	3·4	3·2	3·1	2·8	36
37	6·0	5·7	5·5	5·3	5·1	4·9	4·8	4·5	4·2	4·0	3·8	3·6	3·4	3·3	3·1	2·9	37
38	6·0	5·8	5·6	5·4	5·2	5·0	4·8	4·5	4·3	4·0	3·8	3·6	3·5	3·3	3·2	2·9	38
39	6·1	5·9	5·7	5·5	5·3	5·1	4·9	4·6	4·3	4·1	3·9	3·7	3·5	3·3	3·2	2·9	39
40	6·2	6·0	5·7	5·5	5·3	5·2	5·0	4·7	4·4	4·1	3·9	3·7	3·6	3·4	3·2	3·0	40
41	6·3	6·1	5·8	5·6	5·4	5·2	5·0	4·7	4·5	4·2	4·0	3·8	3·6	3·4	3·3	3·0	41
42	6·4	6·1	5·9	5·7	5·5	5·3	5·1	4·8	4·5	4·3	4·1	3·8	3·7	3·5	3·3	3·1	42
43	6·5	6·2	6·0	5·8	5·6	5·4	5·2	4·9	4·6	4·3	4·1	3·9	3·7	3·6	3·4	3·1	43
44	6·6	6·3	6·1	5·9	5·7	5·5	5·3	5·0	4·7	4·4	4·2	4·0	3·8	3·6	3·5	3·2	44
45	6·7	6·5	6·2	6·0	5·8	5·6	5·4	5·1	4·8	4·5	4·3	4·0	3·9	3·7	3·5	3·2	45
46	6·8	6·6	6·3	6·1	5·9	5·7	5·5	5·1	4·8	4·6	4·3	4·1	3·9	3·7	3·6	3·3	46
47	7·0	6·7	6·4	6·2	6·0	5·8	5·6	5·2	4·9	4·7	4·4	4·2	4·0	3·8	3·6	3·4	47
48	7·1	6·8	6·6	6·3	6·1	5·9	5·7	5·3	5·0	4·7	4·5	4·3	4·1	3·9	3·7	3·4	48
49	7·2	7·0	6·7	6·4	6·2	6·0	5·8	5·4	5·1	4·8	4·6	4·4	4·2	4·0	3·8	3·5	49
50	7·4	7·1	6·8	6·6	6·3	6·1	5·9	5·6	5·2	4·9	4·7	4·4	4·2	4·0	3·9	3·6	50
51	7·5	7·2	7·0	6·7	6·5	6·2	6·0	5·7	5·3	5·0	4·8	4·5	4·3	4·1	4·0	3·6	51
52	7·7	7·4	7·1	6·9	6·6	6·4	6·2	5·8	5·5	5·2	4·9	4·6	4·4	4·2	4·0	3·7	52
53	7·9	7·6	7·3	7·0	6·8	6·5	6·3	5·9	5·6	5·3	5·0	4·7	4·5	4·3	4·1	3·8	53
54	8·1	7·8	7·5	7·2	6·9	6·7	6·5	6·1	5·7	5·4	5·1	4·9	4·6	4·4	4·2	3·9	54
55	8·3	7·9	7·6	7·4	7·1	6·9	6·6	6·2	5·9	5·5	5·2	5·0	4·7	4·5	4·3	4·0	55
56	8·5	8·1	7·8	7·5	7·3	7·0	6·8	6·4	6·0	5·7	5·4	5·1	4·9	4·6	4·4	4·1	56
57	8·7	8·4	8·0	7·7	7·5	7·2	7·0	6·5	6·2	5·8	5·5	5·2	5·0	4·8	4·6	4·2	57
58	8·9	8·6	8·3	8·0	7·7	7·4	7·2	6·7	6·3	6·0	5·7	5·4	5·1	4·9	4·7	4·3	58
59	9·2	8·8	8·5	8·2	7·9	7·6	7·4	6·9	6·5	6·2	5·8	5·5	5·3	5·0	4·8	4·4	59
60	9·5	9·1	8·7	8·4	8·1	7·9	7·6	7·1	6·7	6·3	6·0	5·7	5·4	5·2	5·0	4·6	60
61	9·8	9·4	9·0	8·7	8·4	8·1	7·8	7·3	6·9	6·5	6·2	5·9	5·6	5·4	5·1	4·7	61
62	10·1	9·7	9·3	9·0	8·7	8·4	8·1	7·6	7·1	6·7	6·4	6·1	5·8	5·5	5·3	4·9	62
63	10·4	10·0	9·6	9·3	8·9	8·6	8·4	7·8	7·4	7·0	6·6	6·3	6·0	5·7	5·5	5·0	63
64	10·8	10·3	10·0	9·6	9·3	8·9	8·6	8·1	7·6	7·2	6·8	6·5	6·2	5·9	5·7	5·2	64
65	11·2	10·7	10·3	9·9	9·6	9·3	9·0	8·4	7·9	7·5	7·1	6·7	6·4	6·1	5·9	5·4	65
66	11·6	11·1	10·7	10·3	10·0	9·6	9·3	8·7	8·2	7·8	7·4	7·0	6·7	6·4	6·1	5·6	66
67	12·0	11·6	11·1	10·7	10·4	10·0	9·7	9·1	8·6	8·1	7·7	7·3	6·9	6·6	6·3	5·8	67
68	12·5	12·1	11·6	11·2	10·8	10·4	10·1	9·5	8·9	8·4	8·0	7·6	7·2	6·9	6·6	6·1	68
Lat.																	Lat.
A ± B =	12·0′	12·5′	13·0′	13·5′	14·0′	14·5′	15·0′	16·0′	17·0′	18·0′	19·0′	20·0′	21·0′	22·0′	23·0′	25·0′	A ± B =

A & B take **S**ame Names (add). } RULE TO FIND C CORRECTION { A & B take **D**ifferent names (Sub.)

C CORRECTION, (A ± B) is named the same as the greater of these quantities.

AZIMUTH takes combined names of **C** Correction and Hour Angle

C

TABLE C

A ± B	25·0′	27·0′	30·0′	33·0′	36·0′	40·0′	A & B CORRECTION. 45·0′	50·0′	60·0′	70·0′	80·0′	100′	150′	200′	400′	800′ - A ± B
Lat.	AZIMUTHS															Lat.
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
0	2·3	2·1	1·9	1·7	1·6	1·4	1·3	1·1	1·0	0·8	0·7	0·6	0·4	0·3	0·1	0
5	2·3	2·1	1·9	1·7	1·6	1·4	1·3	1·2	1·0	0·8	0·7	0·6	0·4	0·3	0·1	5
10	2·3	2·2	1·9	1·8	1·6	1·5	1·3	1·2	1·0	0·8	0·7	0·6	0·4	0·3	0·1	10
14	2·4	2·2	2·0	1·8	1·6	1·5	1·3	1·2	1·0	0·8	0·7	0·6	0·4	0·3	0·1	14
18	2·4	2·2	2·0	1·8	1·7	1·5	1·3	1·2	1·0	0·9	0·8	0·6	0·4	0·3	0·2	18
20	2·4	2·2	2·0	1·8	1·7	1·5	1·4	1·2	1·0	0·9	0·8	0·6	0·4	0·3	0·2	20
22	2·5	2·3	2·1	1·9	1·7	1·5	1·4	1·2	1·0	0·9	0·8	0·6	0·4	0·3	0·2	22
24	2·5	2·3	2·1	1·9	1·7	1·6	1·4	1·3	1·0	0·9	0·8	0·6	0·4	0·3	0·2	24
26	2·5	2·4	2·1	1·9	1·8	1·6	1·4	1·3	1·1	0·9	0·8	0·6	0·4	0·3	0·2	26
28	2·6	2·4	2·2	2·0	1·8	1·6	1·4	1·3	1·1	0·9	0·8	0·6	0·4	0·3	0·2	28
30	2·6	2·4	2·2	2·0	1·8	1·7	1·5	1·3	1·1	0·9	0·8	0·7	0·4	0·3	0·2	30
31	2·7	2·5	2·2	2·0	1·9	1·7	1·5	1·3	1·1	1·0	0·8	0·7	0·4	0·3	0·2	31
32	2·7	2·5	2·3	2·0	1·9	1·7	1·5	1·4	1·1	1·0	0·8	0·7	0·5	0·3	0·2	32
33	2·7	2·5	2·3	2·1	1·9	1·7	1·5	1·4	1·1	1·0	0·9	0·7	0·5	0·3	0·2	33
34	2·8	2·6	2·3	2·1	1·9	1·7	1·5	1·4	1·2	1·0	0·9	0·7	0·5	0·3	0·2	34
35	2·8	2·6	2·3	2·1	2·0	1·7	1·6	1·4	1·2	1·0	0·9	0·7	0·5	0·3	0·2	35
36	2·8	2·6	2·4	2·1	2·0	1·8	1·6	1·4	1·2	1·0	0·9	0·7	0·5	0·4	0·2	36
37	2·9	2·7	2·4	2·2	2·0	1·8	1·6	1·4	1·2	1·0	0·9	0·7	0·5	0·4	0·2	37
38	2·9	2·7	2·4	2·2	2·0	1·8	1·6	1·5	1·2	1·0	0·9	0·7	0·5	0·4	0·2	38
39	2·9	2·7	2·5	2·2	2·0	1·8	1·6	1·5	1·2	1·0	0·9	0·7	0·5	0·4	0·2	39
40	3·0	2·8	2·5	2·3	2·1	1·9	1·7	1·5	1·2	1·1	0·9	0·7	0·5	0·4	0·2	40
41	3·0	2·8	2·5	2·3	2·1	1·9	1·7	1·5	1·3	1·1	1·0	0·8	0·5	0·4	0·2	41
42	3·1	2·9	2·6	2·3	2·1	1·9	1·7	1·5	1·3	1·1	1·0	0·8	0·5	0·4	0·2	42
43	3·1	2·9	2·6	2·4	2·2	2·0	1·7	1·6	1·3	1·1	1·0	0·8	0·5	0·4	0·2	43
44	3·2	2·9	2·7	2·4	2·2	2·0	1·8	1·6	1·3	1·1	1·0	0·8	0·5	0·4	0·2	44
45	3·2	3·0	2·7	2·5	2·2	2·0	1·8	1·6	1·4	1·2	1·0	0·8	0·5	0·4	0·2	45
46	3·3	3·1	2·7	2·5	2·3	2·1	1·8	1·6	1·4	1·2	1·0	0·8	0·5	0·4	0·2	46
47	3·4	3·1	2·8	2·5	2·3	2·1	1·9	1·7	1·4	1·2	1·1	0·8	0·6	0·4	0·2	47
48	3·4	3·2	2·9	2·6	2·4	2·1	1·9	1·7	1·4	1·2	1·1	0·9	0·6	0·4	0·2	48
49	3·5	3·2	2·9	2·6	2·4	2·2	1·9	1·7	1·5	1·2	1·1	0·9	0·6	0·4	0·2	49
50	3·6	3·3	3·0	2·7	2·5	2·2	2·0	1·8	1·5	1·3	1·1	0·9	0·6	0·4	0·2	50
51	3·6	3·4	3·0	2·8	2·5	2·3	2·0	1·8	1·5	1·3	1·2	0·9	0·6	0·5	0·2	51
52	3·7	3·4	3·1	2·8	2·6	2·3	2·1	1·9	1·6	1·3	1·2	0·9	0·6	0·5	0·2	52
53	3·8	3·5	3·2	2·9	2·6	2·4	2·1	1·9	1·6	1·4	1·2	1·0	0·6	0·5	0·2	53
54	3·9	3·6	3·2	3·0	2·7	2·4	2·2	1·9	1·6	1·4	1·2	1·0	0·6	0·5	0·2	54
55	4·0	3·7	3·3	3·0	2·8	2·5	2·2	2·0	1·7	1·4	1·2	1·0	0·7	0·5	0·2	55
56	4·1	3·8	3·4	3·1	2·8	2·6	2·3	2·0	1·7	1·5	1·3	1·0	0·7	0·5	0·3	56
57	4·2	3·9	3·5	3·2	2·9	2·6	2·3	2·1	1·8	1·5	1·3	1·1	0·7	0·5	0·3	57
58	4·3	4·0	3·6	3·3	3·0	2·7	2·4	2·2	1·8	1·5	1·4	1·1	0·7	0·5	0·3	58
59	4·4	4·1	3·7	3·4	3·1	2·8	2·5	2·2	1·9	1·6	1·4	1·1	0·7	0·6	0·3	59
60	4·6	4·2	3·8	3·5	3·2	2·9	2·5	2·3	1·9	1·6	1·4	1·1	0·8	0·6	0·3	60
61	4·7	4·4	3·9	3·6	3·3	3·0	2·6	2·4	2·0	1·7	1·5	1·2	0·8	0·6	0·3	61
62	4·9	4·5	4·1	3·7	3·4	3·0	2·7	2·4	2·0	1·7	1·5	1·2	0·8	0·6	0·3	62
63	5·0	4·7	4·2	3·8	3·5	3·2	2·8	2·5	2·1	1·8	1·6	1·3	0·8	0·6	0·3	63
64	5·2	4·8	4·3	4·0	3·6	3·3	2·9	2·6	2·2	1·9	1·6	1·3	0·9	0·7	0·3	64
65	5·4	5·0	4·5	4·1	3·8	3·4	3·0	2·7	2·3	1·9	1·7	1·4	0·9	0·7	0·3	65
66	5·6	5·2	4·7	4·3	3·9	3·5	3·1	2·8	2·3	2·0	1·8	1·4	0·9	0·7	0·4	66
67	5·8	5·4	4·9	4·4	4·1	3·7	3·3	2·9	2·4	2·1	1·8	1·5	1·0	0·7	0·4	67
68	6·1	5·6	5·1	4·6	4·2	3·8	3·4	3·1	2·5	2·2	1·9	1·5	1·0	0·8	0·4	68
Lat.																Lat.
A ± B	25·0′	27·0′	30·0′	33·0′	36·0′	40·0′	45·0′	50·0′	60·0′	70·0′	80·0′	100′	150′	200′	400′	800′ - A ± B

A & B take **S**ame Names (add) / Sum, **C** CORRECTION / A & B take **D**ifferent names (Sub.) / Difference — RULE TO FIND

C CORRECTION, (A ± B) is named the same as the greater of these quantities.

AZIMUTH takes combined names of **C** Correction and Hour Angle

C

TABLE C

A ± B =	00′	01′	02′	03′	04′	05′	A & B CORRECTION 06′	07′	08′	09′	10′	11′	12′	13′	14′	15′ = A ± B
Lat. °	°	°	°	°	°	°	AZIMUTHS °	°	°	°	°	°	°	°	°	°
68	90·0	89·8	89·6	89·4	89·1	88·9	88·7	88·5	88·3	88·1	87·9	87·6	87·4	87·2	87·0	86·8
69	90·0	89·8	89·6	89·4	89·2	89·0	88·8	88·6	88·4	88·2	88·0	87·7	87·5	87·3	87·1	86·9
70	90·0	89·8	89·6	89·4	89·2	89·0	88·8	88·6	88·4	88·2	88·0	87·8	87·7	87·5	87·3	87·1
71	90·0	89·8	89·6	89·4	89·3	89·1	88·9	88·7	88·5	88·3	88·1	87·9	87·8	87·6	87·4	87·2
72	90·0	89·8	89·6	89·5	89·3	89·1	88·9	88·8	88·6	88·4	88·2	88·1	87·9	87·7	87·5	87·3
73	90·0	89·8	89·7	89·5	89·3	89·2	89·0	88·8	88·7	88·5	88·3	88·2	88·0	87·8	87·7	87·5
74	90·0	89·8	89·7	89·5	89·4	89·2	89·0	88·9	88·7	88·6	88·4	88·3	88·1	87·9	87·8	87·6
75	90·0	89·9	89·7	89·6	89·4	89·3	89·1	89·0	88·8	88·7	88·5	88·4	88·2	88·1	87·9	87·8
76	90·0	89·9	89·7	89·6	89·4	89·3	89·2	89·0	88·9	88·8	88·6	88·5	88·3	88·2	88·1	87·9
77	90·0	89·9	89·7	89·6	89·5	89·4	89·2	89·1	89·0	88·8	88·7	88·6	88·5	88·3	88·2	88·1
78	90·0	89·9	89·8	89·6	89·5	89·4	89·3	89·2	89·0	88·9	88·8	88·7	88·6	88·5	88·3	88·2
79	90·0	89·9	89·8	89·7	89·6	89·5	89·4	89·2	89·1	89·0	88·9	88·8	88·7	88·6	88·5	88·4
80	90·0	89·9	89·8	89·7	89·6	89·5	89·4	89·3	89·2	89·1	89·0	88·9	88·8	88·7	88·6	88·5

TABLE C

A ± B =	15′	16′	17′	18′	19′	20′	A & B CORRECTION 21′	22′	23′	24′	25′	26′	27′	28′	29′	30′ = A ± B
Lat. °	°	°	°	°	°	°	AZIMUTHS °	°	°	°	°	°	°	°	°	°
68	86·8	86·6	86·4	86·1	85·9	85·7	85·5	85·3	85·1	84·9	84·6	84·4	84·2	84·0	83·8	83·6
69	86·9	86·7	86·5	86·3	86·1	85·9	85·7	85·5	85·3	85·1	84·9	84·7	84·5	84·3	84·1	83·9
70	87·1	86·9	86·7	86·5	86·3	86·1	85·9	85·7	85·5	85·3	85·1	84·9	84·7	84·5	84·3	84·1
71	87·2	87·0	86·8	86·6	86·5	86·3	86·1	85·9	85·7	85·5	85·3	84·2	85·0	84·8	84·6	84·4
72	87·3	87·2	87·0	86·8	86·6	86·5	86·3	86·1	85·9	85·8	85·6	85·4	85·2	85·1	84·9	84·7
73	87·5	87·3	87·2	87·0	86·8	86·7	86·5	86·3	86·2	86·0	85·8	85·6	85·5	85·3	85·2	85·0
74	87·6	87·5	87·3	87·2	87·0	86·8	86·7	86·5	86·4	86·2	86·1	85·9	85·7	85·6	85·4	85·3
75	87·8	87·6	87·5	87·3	87·2	87·0	86·9	86·7	86·6	86·4	86·3	86·2	86·0	85·9	85·7	85·6
76	87·9	87·8	87·6	87·5	87·4	87·2	87·1	87·0	86·8	86·7	86·5	86·4	86·3	86·1	86·0	85·9
77	88·1	87·9	87·8	87·7	87·6	87·4	87·3	87·2	87·0	86·9	86·8	86·7	86·5	86·4	86·3	86·1
78	88·2	88·1	88·0	87·9	87·7	87·6	87·5	87·4	87·3	87·1	87·0	86·9	86·8	86·7	86·6	86·4
79	88·4	88·3	88·1	88·0	87·9	87·8	87·7	87·6	87·5	87·4	87·3	87·2	87·1	86·9	86·8	86·7
80	88·5	88·4	88·3	88·2	88·1	88·0	87·9	87·8	87·7	87·6	87·5	87·4	87·3	87·2	87·1	87·0

TABLE C

A ± B =	30′	31′	32′	33′	34′	35′	A & B CORRECTION 36′	37′	38′	39′	40′	41′	42′	43′	44′	45′ = A ± B
Lat °	°	°	°	°	°	°	AZIMUTHS °	°	°	°	°	°	°	°	°	°
68	83·6	83·4	83·2	83·0	82·7	82·5	82·3	82·1	81·9	81·7	81·5	81·3	81·1	80·8	80·6	80·4
69	83·9	83·7	83·5	83·3	83·1	82·9	82·7	82·5	82·3	82·0	81·8	81·6	81·4	81·2	81·0	80·8
70	84·1	83·9	83·7	83·6	83·4	83·2	83·0	82·8	82·6	82·4	82·2	82·0	81·8	81·6	81·4	81·3
71	84·4	84·2	84·0	83·9	83·7	83·5	83·3	83·1	83·0	82·8	82·6	82·4	82·2	82·0	81·9	81·7
72	84·7	84·5	84·4	84·2	84·0	83·8	83·7	83·5	83·3	83·1	83·0	82·8	82·6	82·4	82·3	82·1
73	85·0	84·8	84·7	84·5	84·3	84·2	84·0	83·8	83·7	83·5	83·3	83·2	83·0	82·8	82·7	82·5
74	85·3	85·1	85·0	84·8	84·6	84·5	84·3	84·2	84·0	83·9	83·7	83·6	83·4	83·2	83·1	82·9
75	85·6	85·4	85·3	85·1	85·0	84·8	84·7	84·5	84·4	84·2	84·1	83·9	83·8	83·7	83·5	83·4
76	85·9	85·7	85·6	85·4	85·3	85·2	85·0	84·9	84·8	84·6	84·5	84·3	84·2	84·1	83·9	83·8
77	86·1	86·0	85·9	85·8	85·6	85·5	85·4	85·2	85·1	85·0	84·9	84·7	84·6	84·5	84·4	84·2
78	86·4	85·3	86·2	86·1	86·0	85·8	85·7	85·6	85·5	85·4	85·3	85·1	85·0	84·9	84·8	84·7
79	86·7	86·6	86·5	86·4	86·3	86·2	86·1	86·0	85·9	85·7	85·6	85·5	85·4	85·3	85·2	85·1
80	87·0	86·9	86·8	86·7	86·6	86·5	86·4	86·3	86·2	86·1	86·0	85·9	85·8	85·7	85·6	85·5

TABLE C

A±B = 45′	46′	47′	48′	49′	50′	A & B CORRECTION 51′	52′	53′	54′	55′	56′	57′	58′	59′	60′ = A±B
Lat.						AZIMUTHS									Lat.
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
68	80·4	80·2	80·0	79·8	79·6	79·4	79·2	79·0	78·8	78·6	78·4	78·2	77·9	77·7	77·5	77·3	68
69	80·8	80·6	80·4	80·2	80·0	79·8	79·6	79·5	79·3	79·1	78·9	78·7	78·5	78·3	78·1	77·9	69
70	81·3	81·1	80·9	80·7	80·5	80·3	80·1	79·9	79·7	79·5	79·4	79·2	79·0	78·8	78·6	78·4	70
71	81·7	81·5	81·3	81·1	80·9	80·8	80·6	80·4	80·2	80·0	79·9	79·7	79·5	79·3	79·1	79·0	71
72	82·1	81·9	81·7	81·6	81·4	81·2	81·0	80·9	80·7	80·5	80·4	80·2	80·0	79·8	79·7	79·5	72
73	82·5	82·3	82·2	82·0	81·9	81·7	81·5	81·4	81·2	81·0	80·9	80·7	80·5	80·4	80·2	80·1	73
74	82·9	82·8	82·6	82·5	82·3	82·2	82·0	81·9	81·7	81·5	81·4	81·2	81·1	80·9	80·8	80·6	74
75	83·4	83·2	83·1	82·9	82·8	82·6	82·5	82·3	82·2	82·1	81·9	81·8	81·6	81·5	81·3	81·2	75
76	83·8	83·7	83·5	83·4	83·2	83·1	83·0	82·8	82·7	82·6	82·4	82·3	82·2	82·0	81·9	81·8	76
77	84·2	84·1	84·0	83·8	83·7	83·6	83·5	83·3	83·2	83·1	83·0	82·8	82·7	82·6	82·4	82·3	77
78	84·7	84·5	84·4	84·3	84·2	84·1	84·0	83·8	83·7	83·6	83·5	83·4	83·2	83·1	83·0	82·9	78
79	85·1	85·0	84·9	84·8	84·7	84·6	84·5	84·3	84·2	84·1	84·0	83·9	83·8	83·7	83·6	83·5	79
80	85·5	85·4	85·3	85·2	85·1	85·0	84·9	84·8	84·7	84·6	84·5	84·5	84·4	84·3	84·2	84·1	80

TABLE C

A±B = 60′	62′	64′	66′	68′	70′	A & B CORRECTION 72′	74′	76′	78′	80′	82′	84′	86′	88′	90′ = A±B
Lat						AZIMUTHS									Lat.
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
68	77·3	76·9	76·5	76·1	75·7	75·3	74·9	74·5	74·1	73·7	73·3	72·9	72·5	72·1	71·8	71·4	68
69	77·9	77·5	77·1	76·7	76·3	75·9	75·5	75·2	74·8	74·4	74·0	73·6	73·3	72·9	72·5	72·1	69
70	78·4	78·0	77·7	77·3	76·9	76·5	76·2	75·8	75·4	75·1	74·7	74·3	74·0	73·6	73·3	72·9	70
71	79·0	78·6	78·2	77·9	77·5	77·2	76·8	76·5	76·1	75·8	75·4	75·1	74·7	74·4	74·0	73·7	71
72	79·5	79·2	78·8	78·5	78·1	77·8	77·5	77·1	76·8	76·5	76·1	75·8	75·5	75·1	74·8	74·5	72
73	80·1	79·7	79·4	79·1	78·8	78·4	78·1	77·8	77·5	77·2	76·8	76·5	76·2	75·9	75·6	75·3	73
74	80·6	80·3	80·0	79·7	79·4	79·1	78·8	78·5	78·2	77·9	77·6	77·3	77·0	76·7	76·4	76·1	74
75	81·2	80·9	80·6	80·3	80·0	79·7	79·4	79·2	78·9	78·6	78·3	78·0	77·7	77·5	77·2	76·9	75
76	81·8	81·5	81·2	80·9	80·7	80·4	80·1	79·9	79·6	79·3	79·0	78·8	78·5	78·3	78·0	77·7	76
77	82·3	82·1	81·8	81·6	81·3	81·1	80·8	80·6	80·3	80·1	79·8	79·6	79·3	79·1	78·8	78·5	77
78	82·9	82·7	82·4	82·2	82·0	81·7	81·5	81·3	81·0	80·8	80·6	80·3	80·1	79·9	79·6	79·4	78
79	83·5	83·3	83·0	82·8	82·6	82·4	82·2	82·0	81·8	81·5	81·3	81·1	80·9	80·7	80·5	80·3	79
80	84·1	83·9	83·7	83·5	83·3	83·1	82·9	82·7	82·5	82·3	82·1	81·9	81·7	81·5	81·3	81·1	80

TABLE C

A±B = 90′	92′	94′	96′	98′	1·00′	A & B CORRECTION 1·02′	1·04′	1·06′	1·08′	1·10′	1·12′	1·14′	1·16′	1·18′	1·20′ = A±B
Lat.						AZIMUTHS									Lat
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
68	71·4	71·0	70·6	70·2	69·8	69·5	69·1	68·7	68·3	68·0	67·6	67·2	66·9	66·5	66·2	65·8	68
69	72·1	71·8	71·4	71·0	70·6	70·3	69·9	69·5	69·2	68·9	68·5	68·1	67·8	67·4	67·1	66·7	69
70	72·9	72·5	72·2	71·8	71·5	71·1	70·8	70·4	70·1	69·7	69·4	69·0	68·7	68·4	68·0	67·7	70
71	73·7	73·3	73·0	72·6	72·3	72·0	71·6	71·3	71·0	70·6	70·3	70·0	69·6	69·3	69·0	68·7	71
72	74·5	74·1	73·8	73·5	73·2	72·8	72·5	72·2	71·9	71·5	71·2	70·9	70·6	70·3	70·0	69·7	72
73	75·3	74·9	74·6	74·3	74·0	73·7	73·4	73·1	72·8	72·5	72·2	71·9	71·6	71·3	71·0	70·7	73
74	76·1	75·8	75·5	75·2	74·9	74·6	74·3	74·0	73·7	73·4	73·1	72·8	72·6	72·3	72·0	71·7	74
75	76·9	76·6	76·3	76·0	75·8	75·5	75·2	74·9	74·7	74·4	74·1	73·8	73·6	73·3	73·0	72·7	75
76	77·7	77·5	77·2	76·9	76·7	76·4	76·1	75·9	75·6	75·4	75·1	74·8	74·6	74·3	74·1	73·8	76
77	78·5	78·3	78·1	77·8	77·6	77·3	77·1	76·8	76·6	76·4	76·1	75·9	75·6	75·4	75·1	74·9	77
78	79·4	79·2	78·9	78·7	78·5	78·3	78·0	77·8	77·6	77·4	77·1	76·9	76·7	76·4	76·2	76·0	78
79	80·3	80·0	79·8	79·6	79·4	79·2	79·0	78·8	78·6	78·4	78·1	77·9	77·7	77·5	77·3	77·1	79
80	81·1	80·9	80·7	80·5	80·3	80·1	80·0	79·8	79·6	79·4	79·2	79·0	78·8	78·6	78·4	78·2	80

C

TABLE C

A ± B =	1 20′	1 24′	1 28′	1 32′	1 36′	1 40′	A & B CORRECTION 1 44′	1 48′	1 52′	1 56′	1 60′	1 64′	1 68′	1 72′	1 76′	1 80′ = A ± B
Lat. °	°	°	°	°	°	°	AZIMUTHS °	°	°	°	°	°	°	°	°	°
68	65·8	65·1	64·4	63·7	63·0	62·3	61·7	61·0	60·3	59·7	59·1	58·4	57·8	57·2	56·6	56·0
69	66·7	66·0	65·4	64·7	64·0	63·4	62·7	62·1	61·4	60·8	60·2	59·6	59·0	58·4	57·8	57·2
70	67·7	67·0	66·4	65·7	65·0	64·4	63·8	63·2	62·5	61·9	61·3	60·7	60·1	59·5	58·9	58·4
71	68·7	68·0	67·4	66·7	66·1	65·5	64·9	64·3	63·7	63·1	62·5	61·9	61·3	60·7	60·2	59·6
72	69·7	69·0	68·4	67·8	67·2	66·6	66·0	65·4	64·9	64·3	63·7	63·1	62·6	62·0	61·4	60·9
73	70·7	70·1	69·5	68·9	68·3	67·7	67·2	66·6	66·0	65·5	64·9	64·4	63·8	63·3	62·8	62·2
74	71·7	71·1	70·6	70·0	69·5	68·9	68·4	67·8	67·2	66·7	66·2	65·7	65·2	64·6	64·1	63·6
75	72·7	72·2	71·7	71·1	70·6	70·1	69·6	69·0	68·5	68·0	67·5	67·0	66·5	66·0	65·5	65·0
76	73·8	73·3	72·8	72·3	71·8	71·3	70·8	70·3	69·8	69·3	68·8	68·4	67·9	67·4	66·9	66·5
77	74·9	74·4	73·9	73·5	73·0	72·5	72·0	71·6	71·1	70·7	70·2	69·8	69·3	68·8	68·4	68·0
78	76·0	75·5	75·1	74·7	74·2	73·8	73·3	72·9	72·5	72·0	71·6	71·2	70·7	70·3	69·9	69·5
79	77·1	76·7	76·3	75·9	75·5	75·1	74·6	74·2	73·8	73·4	73·0	72·6	72·2	71·8	71·4	71·0
80	78·2	77·9	77·5	77·1	76·7	76·4	75·9	75·6	75·2	74·8	74·5	74·1	73·7	73·4	73·0	72·6

TABLE C

A ± B =	1 80′	1·84′	1 88′	1 92′	1 96′	2 00′	A & B CORRECTION 2 04′	2 08′	2 12′	2 16′	2 20′	2 24′	2 28′	2 32′	2 36′	2 40′ = A ± B
Lat. °	°	°	°	°	°	°	AZIMUTHS °	°	°	°	°	°	°	°	°	°
68	56·0	55·4	54·8	54·3	53·7	53·2	52·6	52·1	51·5	51·0	50·5	50·0	49·5	49·0	48·5	48·0
69	57·2	56·6	56·0	55·5	54·9	54·4	53·8	53·3	52·8	52·2	51·8	51·3	50·8	50·3	49·8	49·3
70	58·4	57·8	57·2	56·7	56·2	55·6	55·1	54·6	54·0	53·5	53·0	52·6	52·1	51·6	51·1	50·5
71	59·6	59·1	58·5	58·0	57·5	56·9	56·4	55·9	55·4	54·9	54·4	53·9	53·4	52·9	52·5	52·0
72	60·9	60·4	59·8	59·3	58·8	58·3	57·8	57·3	56·8	56·3	55·8	55·3	54·8	54·4	53·9	53·4
73	62·2	61·7	61·2	60·7	60·2	59·7	59·2	58·7	58·2	57·7	57·3	56·8	56·3	55·9	55·4	54·9
74	63·6	63·1	62·6	62·1	61·6	61·1	60·6	60·2	59·7	59·2	58·8	58·3	57·9	57·4	56·9	56·5
75	65·0	64·5	64·0	63·6	63·1	62·6	62·2	61·7	61·2	60·8	60·3	59·9	59·5	59·0	58·6	58·1
76	66·5	66·0	65·6	65·1	64·6	64·2	63·7	63·3	62·8	62·4	62·0	61·6	61·1	60·7	60·3	59·8
77	68·0	67·5	67·1	66·6	66·2	65·8	65·4	64·9	64·5	64·1	63·7	63·2	62·8	62·5	62·0	61·6
78	69·5	69·1	68·7	68·2	67·8	67·4	67·0	66·6	66·2	65·8	65·4	65·0	64·6	64·3	63·9	63·5
79	71·0	70·7	70·3	69·9	69·5	69·1	68·7	68·4	68·0	67·6	67·2	66·9	66·5	66·1	65·8	65·4
80	72·6	72·3	71·9	71·6	71·2	70·8	70·5	70·1	69·8	69·4	69·1	68·8	68·4	68·1	67·7	67·4

TABLE C

A ± B =	2 40′	2 45′	2 50′	2 55′	2 60′	2 65′	A & B CORRECTION 2 70′	2 75′	2 80′	2 90′	3 00′	3 10′	3 20′	3 30′	3 40′	3·50′ = A ± B
Lat °	°	°	°	°	°	°	AZIMUTHS °	°	°	°	°	°	°	°	°	°
68	48·0	47·4	46·9	46·3	45·8	45·2	44·7	44·1	43·6	42·6	41·7	40·7	39·8	39·0	38·1	37·3
69	49·3	48·7	48·2	47·6	47·0	46·5	45·9	45·4	44·9	43·9	42·9	42·0	41·1	40·2	39·4	38·6
70	50·5	50·0	49·5	48·9	48·4	47·8	47·3	46·8	46·2	45·2	44·3	43·3	42·4	41·5	40·7	39·9
71	52·0	51·4	50·9	50·3	49·8	49·2	48·8	48·3	47·7	46·7	45·7	44·7	43·8	42·9	42·1	41·3
72	53·4	52·9	52·4	51·8	51·2	50·7	50·2	49·7	49·2	48·2	47·2	46·2	45·3	44·4	43·6	42·7
73	54·9	54·4	53·9	53·3	52·8	52·2	51·7	51·2	50·7	49·7	48·8	47·8	46·9	46·0	45·2	44·3
74	56·5	56·0	55·5	54·9	54·4	53·9	53·4	52·8	52·3	51·4	50·4	49·5	48·6	47·7	46·9	46·0
75	58·1	57·6	57·1	56·6	56·1	55·6	55·1	54·6	54·1	53·1	52·2	51·3	50·4	49·5	48·7	47·8
76	59·8	59·3	58·8	58·3	57·8	57·3	56·8	56·4	55·9	54·9	54·0	53·1	52·3	51·4	50·6	49·8
77	61·6	61·1	60·7	60·2	59·7	59·2	58·7	58·3	57·8	56·9	56·0	55·1	54·3	53·4	52·6	51·8
78	63·5	63·0	62·5	62·1	61·6	61·1	60·7	60·3	59·8	58·9	58·1	57·2	56·4	55·5	54·7	53·9
79	65·4	64·9	64·5	64·1	63·6	63·2	62·7	62·3	61·9	61·0	60·2	59·4	58·6	57·8	57·0	56·3
80	67·4	67·0	66·6	66·1	65·7	65·3	64·9	64·5	64·1	63·3	62·5	61·7	60·9	60·2	59·5	58·8

TABLE C

A±B = 3·50′ 3·60′	3·70′ 3·80′	3·90′ 4·00′	A & B CORRECTION 4·10′ 4·20′	4·30′ 4·40′	4·50′ 4·60′	4·70′ 4·80′	4·90′ 5·00′ = A±B

Lat. °	°	°	°	°	°	°	AZIMUTHS °	°	°	°	°	°	°	°	Lat. °
68	37·3	36·6	35·8	35·1	34·4	33·7	33·1	32·4	31·8	31·2	30·7	30·1	29·6	29·1	28·6	28·1	**68**
69	38·6	37·8	37·0	36·3	35·6	34·9	34·2	33·6	32·9	32·4	31·8	31·2	30·7	30·2	29·7	29·2	**69**
70	39·9	39·1	38·3	37·6	36·8	36·2	35·5	34·8	34·2	33·6	33·0	32·4	31·8	31·3	30·8	30·3	**70**
71	41·3	40·5	39·8	38·9	38·2	37·5	36·8	36·2	35·5	34·9	34·3	33·7	33·2	32·6	32·1	31·5	**71**
72	42·7	41·9	41·2	40·4	39·7	38·9	38·3	37·6	36·9	36·3	35·7	35·1	34·5	33·9	33·4	32·9	**72**
73	44·3	43·4	42·7	41·9	41·2	40·5	39·8	39·2	38·5	37·8	37·2	36·6	36·0	35·5	34·9	34·4	**73**
74	46·0	45·2	44·4	43·7	42·9	42·2	41·5	40·8	40·1	39·5	38·9	38·3	37·7	37·1	36·5	35·9	**74**
75	47·8	47·0	46·2	45·5	44·8	44·0	43·3	42·6	41·9	41·3	40·6	40·0	39·4	38·8	38·2	37·7	**75**
76	49·8	48·9	48·2	47·4	46·7	45·9	45·2	44·6	43·9	43·2	42·6	41·9	41·3	40·7	40·1	39·6	**76**
77	51·8	51 0	50·2	49·5	48·7	48·0	47·3	46·6	45·9	45·3	44·6	44·0	43·4	42·8	42·2	41·6	**77**
78	53·9	53·2	52·4	51·7	50·9	50·2	49·5	48·9	48·2	47·6	46·9	46·3	45·7	45·1	44·5	43·9	**78**
79	56·3	55·5	54·8	54·1	53·3	52·6	51·9	51·3	50·6	49·9	49·3	48·7	48·1	47·5	46·9	46·3	**79**
80	58·8	58·0	57·3	56·6	55·9	55·2	54·5	53·9	53·2	52·6	52·0	51·4	50·8	50·2	49·6	49·0	**80**

TABLE C

A±B = 5·00′ 5·20′	5·40′ 5·60′	5·80′ 6·00′	A & B CORRECTION 6·20′ 6·40′	6·60′ 6·80′	7·00′ 7·20′	7·40′ 7·60′	7·80′ 8·00′ = A±B

Lat. °	°	°	°	°	°	°	AZIMUTHS °	°	°	°	°	°	°	°	Lat. °
68	28·1	27·2	26·3	25·5	24·7	24·0	23·3	22·6	22·0	21·4	20·9	20·3	19·8	19·4	18·9	18·5	**68**
69	29·2	28·2	27·3	26·5	25·7	24·9	24·2	23·5	22·9	22·3	21·7	21·2	20·7	20·2	19·7	19·2	**69**
70	30·3	29·3	28·4	27·6	26·8	25·9	25·2	24·5	23·9	23·3	22·7	22·1	21·6	21·0	20·5	20·1	**70**
71	31·5	30·6	29·6	28·7	27·9	27·1	26·3	25·6	24·9	24·3	23·7	23·1	22·5	22·0	21·5	21·0	**71**
72	32·9	31·9	30·9	30·0	29·1	28·3	27·5	26·8	26·1	25·4	24·8	24·2	23·6	23·1	22·6	22·0	**72**
73	34·4	33·3	32·3	31·4	30·5	29·7	28·9	28·1	27·4	26·7	26·1	25·4	24·8	24·2	23·7	23·1	**73**
74	35·9	34·9	33·9	32·9	32·0	31·2	30·3	29·6	28·8	28·1	27·4	26·7	26·1	25·5	25·0	24·4	**74**
75	37·7	36·6	35·6	34·6	33·7	32·8	31·9	31·1	30·3	29·6	28·9	28·2	27·6	27·0	26·4	25·8	**75**
76	39·6	38·5	37·4	36·4	35·5	34·6	33·7	32·8	32·1	31·3	30·6	29·8	29·2	28·5	27·9	27·3	**76**
77	41·6	40·5	39·4	38·4	37·5	36·5	35·6	34·8	33·9	33·2	32·4	31·7	30·9	30·3	29·7	29·0	**77**
78	43·9	42·8	41·7	40·7	39·7	38·7	37·8	36·9	36·1	35·3	34·5	33·7	33·0	32·3	31·6	31·0	**78**
79	46·3	45·2	44·1	43·1	42·1	41·1	40·2	39·3	38·4	37·6	36·8	36·1	35·3	34·6	33·9	33·2	**79**
80	49·0	47·9	46·8	45·8	44·8	43·8	42·9	41·9	41·1	40·3	39·4	38·6	37·9	37·2	36·5	35·8	**80**

TABLE C

A±B = 8·00′ 8·20′	8·40′ 8·60′	8·80′ 9·00	A & B CORRECTION 9·20′ 9·40′	9·60′ 9·80	10·0′ 10·3′	10·6′ 11·0′	11·5′ 12·0′ = A±B

Lat. °	°	°	°	°	°	°	AZIMUTHS °	°	°	°	°	°	°	°	Lat. °
68	18·5	18·0	17·6	17·2	16·9	16·5	16·2	15·9	15·5	15·2	14·9	14·6	14·2	13·6	13·1	12·5	**68**
69	19·2	18·8	18·4	18·0	17·6	17·2	16·9	16·5	16·2	15·8	15·5	15·2	14·8	14·2	13·6	13·1	**69**
70	20·1	19·6	19·2	18·8	18·4	18·0	17·6	17·2	16·9	16·6	16·3	15·9	15·5	14·9	14·2	13·7	**70**
71	21·0	20·5	20·1	19·6	19·2	18·8	18·5	18·1	17·8	17·4	17·1	16·6	16·1	15·6	15·0	14·4	**71**
72	22·0	21·5	21·1	20·6	20·2	19·8	19·4	19·0	18·6	18·2	17·9	17·5	17·0	16·4	15·7	15·1	**72**
73	23·1	22·6	22·2	21·7	21·2	20·8	20·4	20·0	19·6	19·2	18·9	18·4	17·9	17·3	16·6	15·9	**73**
74	24·4	23·9	23·4	22·9	22·4	21·9	21·5	21·1	20·7	20·3	19·9	19·4	18·9	18·3	17·5	16·8	**74**
75	25·8	25·2	24·7	24·2	23·7	23·2	22·8	22·3	21·9	21·5	21·1	20·6	20·1	19·4	18·6	17·9	**75**
76	27·3	26·7	26·2	25·7	25·2	24·7	24·2	23·7	23·3	22·9	22·5	21·9	21·3	20·6	19·8	19·0	**76**
77	29·0	28·4	27·9	27·3	26·8	26·3	25·8	25·3	24·8	24·4	24·0	23·4	22·8	22·0	21·1	20·3	**77**
78	31·0	30·4	29·8	29·2	28·7	28·1	27·6	27·1	26·6	26·1	25·7	25·0	24·3	23·6	22·7	21·9	**78**
79	33·2	32·5	31·9	31·3	30·8	30·2	29·7	29·1	28·6	28·1	27·7	27·0	26·3	25·5	24·5	23·7	**79**
80	35·8	35·1	34·4	33·8	33·2	32·6	32·0	31·5	31·0	30·4	29·9	29·2	28·5	27·6	26·6	25·7	**80**

TABLE C

A±B=	12·0′	12·5′	13·0′	13·5′	14·0′	14·5′	A & B CORRECTION 15·0′	16·0′	17·0′	18·0′	19·0′	20·0′	21·0′	22·0′	23·0′	25·0′	=A±B
Lat. °	°	°	°	°	°	°	AZIMUTHS °	°	°	°	°	°	°	°	°	°	Lat. °
68	12·5	12·1	11·6	11·2	10·8	10·4	10·1	9·5	8·9	8·4	8·0	7·6	7·2	6·9	6·6	6·1	**68**
69	13·1	12·6	12·1	11·7	11·3	10·9	10·5	9·9	9·4	8·8	8·4	7·9	7·6	7·2	6·9	6·4	**69**
70	13·7	13·2	12·7	12·2	11·8	11·4	11·0	10·4	9·8	9·2	8·7	8·3	7·9	7·6	7·3	6·7	**70**
71	14·4	13·8	13·3	12·8	12·4	12·0	11·6	10·9	10·2	9·7	9·2	8·7	8·3	7·9	7·6	7·0	**71**
72	15·1	14·5	14·0	13·5	13·0	12·6	12·2	11·4	10·8	10·2	9·7	9·2	8·8	8·4	8·0	7·4	**72**
73	15·9	15·3	14·7	14·2	13·7	13·3	12·8	12·1	11·4	10·8	10·2	9·7	9·3	8·8	8·5	7·8	**73**
74	16·8	16·2	15·6	15·0	14·5	14·1	13·6	12·8	12·1	11·4	10·8	10·3	9·8	9·4	9·0	8·3	**74**
75	17·9	17·2	16·6	16·0	15·4	14·9	14·5	13·6	12·8	12·1	11·5	10·9	10·4	10·0	9·6	8·8	**75**
76	19·0	18·3	17·6	17·0	16·3	15·6	15·4	14·5	13·7	12·9	12·3	11·7	11·1	10·7	10·2	9·4	**76**
77	20·3	19·6	18·9	18·2	17·6	17·0	16·5	15·5	14·7	13·9	13·2	12·5	11·9	11·4	10·9	10·1	**77**
78	21·9	21·1	20·3	19·6	19·0	18·4	17·8	16·7	15·8	15·0	14·2	13·5	12·9	12·3	11·9	10·9	**78**
79	23·7	22·8	22·0	21·2	20·5	19·9	19·7	18·1	17·1	16·2	15·4	14·7	14·0	13·4	12·9	11·8	**79**
80	25·7	24·7	23·9	23·1	22·4	21·7	21·0	19·8	18·7	17·8	16·9	16·1	15·3	14·7	14·0	13·0	**80**

TABLE C

A±B=	25·0′	27·0′	30·0′	33·0′	36·0	40·0′	A & B CORRECTION 45·0′	50·0′	60·0′	70·0′	80·0′	100′	150′	200′	400′	800′	=A±B
Lat. °	°	°	°	°	°	°	AZIMUTHS °	°	°	°	°	°	°	°	°	°	Lat. °
68	6·1	5·6	5·1	4·6	4·2	3·8	3·4	3·1	2·5	2·2	1·9	1·5	1·0	0·8	0·4	0·2	**68**
69	6·4	5·9	5·3	4·8	4·4	4·0	3·5	3·2	2·7	2·3	2·0	1·6	1·1	0·8	0·4	0·2	**69**
70	6·7	6·2	5·6	5·1	4·6	4·2	3·7	3·4	2·8	2·4	2·1	1·7	1·1	0·8	0·4	0·2	**70**
71	7·0	6·5	5·9	5·3	4·9	4·4	3·9	3·5	2·9	2·5	2·2	1·8	1·2	0·9	0·4	0·2	**71**
72	7·4	6·8	6·2	5·6	5·1	4·6	4·1	3·7	3·1	2·6	2·3	1·9	1·2	0·9	0·5	0·2	**72**
73	7·8	7·3	6·5	5·9	5·4	4·9	4·4	3·9	3·3	2·8	2·4	2·0	1·3	1·0	0·5	0·2	**73**
74	8·3	7·7	6·9	6·3	5·8	5·2	4·6	4·2	3·5	3·0	2·6	2·1	1·4	1·0	0·5	0·3	**74**
75	8·8	8·1	7·3	6·7	6·1	5·5	4·9	4·4	3·7	3·2	2·8	2·2	1·5	1·1	0·6	0·3	**75**
76	9·4	8·7	7·8	7·1	6·6	5·9	5·3	4·7	3·9	3·4	3·0	2·4	1·6	1·2	0·6	0·3	**76**
77	10·1	9·4	8·4	7·7	7·0	6·3	5·6	5·1	4·2	3·6	3·2	2·6	1·7	1·3	0·6	0·3	**77**
78	10·9	10·1	9·1	8·3	7·6	6·9	6·1	5·5	4·6	3·9	3·4	2·8	1·8	1·4	0·7	0·3	**78**
79	11·8	11·0	9·9	9·0	8·3	7·5	6·7	6·0	5·0	4·3	3·8	3·0	2·0	1·5	0·7	0·4	**79**
80	13·0	12·0	10·9	9·9	9·1	8·2	7·3	6·6	5·5	4·7	4·1	3·3	2·2	1·7	0·8	0·4	**80**

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