

AGETON TABLES

	A 40° B		A 41° B		A 42° B		A 43° B		X
	↓	B 130° A	B 131° A	B 132° A	B 133° A	B 133° A	B 133° A		
0	19193	11575	18306	12222	17449	12893	16622	13587	60
1	19178	11585	18291	12233	17435	12904	16608	13599	59
2	19163	11596	18277	12244	17421	12915	16595	13611	58
3	19148	11606	18262	12255	17407	12927	16581	13623	57
4	19133	11617	18248	12266	17393	12938	16568	13634	56
5	19118	11628	18233	12277	17379	12950	16554	13646	55
6	19103	11638	18219	12288	17365	12961	16541	13658	54
7	19088	11649	18204	12299	17351	12972	16527	13670	53
8	19073	11660	18190	12310	17337	12984	16514	13682	52
9	19058	11670	18175	12321	17323	12995	16500	13694	51
10	19043	11681	18161	12332	17309	13007	16487	13705	50
11	19028	11692	18146	12343	17295	13018	16473	13717	49
12	19013	11702	18132	12354	17281	13030	16460	13729	48
13	18998	11713	18118	12365	17267	13041	16446	13741	47
14	18983	11724	18103	12376	17253	13053	16433	13753	46
15	18968	11734	18089	12387	17239	13064	16419	13765	45
16	18953	11745	18074	12399	17225	13076	16406	13777	44
17	18939	11756	18060	12410	17212	13087	16392	13789	43
18	18924	11766	18045	12421	17198	13098	16379	13800	42
19	18909	11777	18031	12432	17184	13110	16366	13812	41
20	18894	11788	18017	12443	17170	13121	16352	13824	40
21	18879	11799	18002	12454	17156	13133	16339	13836	39
22	18864	11809	17988	12465	17142	13145	16326	13848	38
23	18849	11820	17974	12476	17128	13156	16312	13860	37
24	18834	11831	17959	12487	17115	13168	16299	13872	36
25	18820	11842	17945	12499	17101	13179	16285	13884	35
26	18805	11852	17931	12510	17087	13191	16272	13896	34
27	18790	11863	17916	12521	17073	13202	16259	13908	33
28	18775	11874	17902	12532	17059	13214	16245	13920	32
29	18760	11885	17888	12543	17045	13225	16232	13932	31
30	18746	11895	17874	12554	17032	13237	16219	13944	30
X	A 139° B	A 138° B	A 137° B	A 136° B	↑				
	B 49° A	B 48° A	B 47° A	B 46° A					

	A 0° B		A 1° B		A 2° B		A 3° B		X
	↓	B 90° A	B 91° A	B 92° A	B 93° A	B 93° A	B 93° A		
30	205916	1.7	158208	14.9	136032	41.4	121432	81.1	30
31	204492	1.8	157728	15.2	135744	41.9	121226	81.9	29
32	203113	1.9	157254	15.6	135457	42.5	121021	82.6	28
33	201777	2.0	156784	15.9	135173	43.0	120817	83.4	27
34	200480	2.1	156320	16.2	134890	43.6	120614	84.2	26
35	199221	2.3	155861	16.6	134609	44.2	120421	85.0	25
36	197998	2.4	155406	16.9	134330	44.7	120211	85.8	24
37	196808	2.5	154956	17.3	134053	45.3	120010	86.6	23
38	195650	2.7	154511	17.6	133777	45.9	119811	87.4	22
39	194522	2.8	154070	18.0	133503	46.5	119612	88.2	21
40	193422	2.9	153634	18.4	133231	47.1	119415	89.0	20
41	192350	3.1	153201	18.8	132961	47.6	119218	89.8	19
42	191304	3.2	152774	19.1	132692	48.2	119022	90.6	18
43	190282	3.4	152350	19.5	132425	48.8	118827	91.4	17
44	189283	3.6	151931	19.9	132159	49.4	118633	92.3	16
45	188307	3.7	151515	20.3	131896	50.0	118440	93.1	15
46	187353	3.9	151104	20.6	131637	50.7	118248	93.9	14
47	186419	4.1	150696	21.0	131373	51.3	118056	94.7	13
48	185505	4.2	150292	21.4	131114	51.9	117866	95.6	12
49	184609	4.4	149892	21.8	130856	52.5	117676	96.4	11
50	183732	4.6	149496	22.2	130600	53.1	117487	97.3	10
51	182879	4.8	149103	22.6	130346	53.7	117299	98.1	9
52	182029	5.0	148713	23.1	130093	54.4	117112	99.0	8
53	181202	5.2	148327	23.5	129841	55.0	116925	99.8	7
54	180399	5.4	147945	23.9	129591	55.7	116737	100.7	6
55	179593	5.6	147566	24.3	129342	56.3	116551	101.6	5
56	178815	5.8	147190	24.7	129095	56.9	116367	102.4	4
57	178042	6.0	146817	25.2	128849	57.6	116187	103.3	3
58	177276	6.2	146448	25.6	128605	58.2	116004	104.2	2
59	176544	6.4	146081	26.0	128362	58.9	115823	105.0	1
60	175841	6.6	145718	26.5	128120	59.6	115642	105.9	0
X	A 179° B	A 178° B	A 177° B	A 176° B	↑				
	B 89° A	B 88° A	B 87° A	B 86° A					

	A 32° B		A 33° B		A 34° B		A 35° B		X
	↓	B 122° A	B 123° A	B 124° A	B 125° A	B 125° A	B 125° A		
0	27579	7158.0	26389	7640.9	25244	8142.6	24141	8663.5	60
1	27559	7165.8	26370	7649.1	25225	8151.1	24123	8672.4	59
2	27539	7173.7	26350	7657.3	25206	8159.6	24105	8681.3	58
3	27518	7181.7	26331	7665.5	25188	8168.2	24087	8690.1	57
4	27498	7189.6	26311	7673.7	25169	8176.7	24069	8699.0	56
5	27478	7197.5	26292	7681.9	25150	8185.3	24051	8707.8	55
6	27458	7205.4	26273	7690.2	25132	8193.8	24033	8716.7	54
7	27438	7213.3	26253	7698.4	25113	8202.4	24015	8725.6	53
8	27418	7221.3	26234	7706.7	25094	8210.9	23997	8734.5	52
9	27398	7229.2	26215	7714.9	25076	8219.5	23979	8743.4	51
10	27378	7237.1	26195	7723.2	25057	8228.1	23961	8752.3	50
11	27357	7245.1	26176	7731.4	25039	8236.6	23943	8761.2	49
12	27337	7253.0	26157	7739.7	25020	8245.2	23925	8770.1	48
13	27317	7261.0	26137	7748.0	25001	8253.8	23907	8779.0	47
14	27297	7269.0	26118	7756.2	24983	8262.4	23889	8787.9	46
15	27277	7276.9	26099	7764.5	24964	8271.0	23871	8796.9	45
16	27257	7284.9	26079	7772.8	24946	8279.6	23854	8805.8	44
17	27237	7292.9	26060	7781.1	24927	8288.2	23836	8814.7	43
18	27217	7300.9	26041	7789.4	24909	8296.8	23818	8823.7	42
19	27197	7308.9	26022	7797.7	24890	8305.4	23800	8832.6	41
20	27177	7316.9	26003	7806.0	24872	8314.1	23782	8841.6	40
21	27157	7324.9	25983	7814.3	24853	8322.7	23764	8850.5	39
22	27137	7332.9	25964	7822.6	24835	8331.3	23747	8859.5	38
23	27117	7340.9	25945	7830.9	24816	8340.0	23729	8868.5	37
24	27098	7348.9	25926	7839.3	24798	8348.6	23711	8877.4	36
25	27078	7356.9	25907	7847.6	24779	8357.3	23693	8886.4	35
26	27058	7364.9	25887	7855.9	24761	8365.9	23676	8895.4	34
27	27038	7373.0	25868	7864.3	24742	8374.6	23658	8904.4	33
28	27018	7381.0	25849	7872.6	24724	8383.3	23640	8913.4	32
29	26998	7389.0	25830	7881.0	24706	8391.9	23622	8922.4	31
30	26978	7397.1	25811	7889.3	24687	8400.6	23605	8931.4	30
X	A 147° B	A 146° B	A 145° B	A 144° B	↑				
	B 57° A	B 56° A	B 55° A	B 54° A					

	A 8° B		A 9° B		A 10° B		A 11° B		X
	↓	B 98° A	B 99° A	B 100° A	B 101° A	B 101° A	B 101° A		
30	83030	479.7	78239	599.7	73937	733.4	70034	880.7	30
31	82945	481.6	78164	601.8	73869	735.7	69972	883.3	29
32	82861	483.5	78088	604.0	73801	738.1	69910	885.9	28
33	82777	485.4	78013	606.1	73733	740.4	69849	888.5	27
34	82693	487.3	77938	608.2	73665	742.8	69787	891.0	26
35	82609	489.2	77863	610.3	73597	745.1	69725	893.6	25
36	82526	491.1	77789	612.5	73530	747.5	69664	896.2	24
37	82442	493.0	77714	614.6	73462	749.9	69602	898.8	23
38	82359	494.9	77639	616.8	73395	752.2	69541	901.4	22
39	82276	496.8	77565	618.9	73328	754.6	69479	904.0	21
40	82193	498.7	77491	621.1	73261	757.0	69418	906.6	20
41	82110	500.7	77417	623.2	73194	759.4	69357	909.2	19
42	82027	502.6	77343	625.4	73127	761.8	69296	911.8	18
43	81945	504.5	77269	627.5	73060	764.1	69235	914.5	17
44	81863	506.5	77195	629.7	72993	766.5	69174	917.1	16
45	81780	508.4	77122	631.9	72927	768.9	69113	919.7	15
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↓	A 4° B B 94° A	A 5° B B 95° A	A 6° B B 96° A	A 7° B B 97° A	×				
0	115642	105.9	105970	165.6	98077	238.6	91411	324.9	60
1	115461	106.8	105826	166.7	97957	239.9	91308	326.5	59
2	115282	107.7	105683	167.8	97837	241.2	91205	328.0	58
3	115103	108.6	105539	168.9	97717	242.6	91103	329.6	57
4	114925	109.5	105397	170.0	97598	243.9	91001	331.2	56
5	114748	110.4	105254	171.1	97480	245.3	90899	332.7	55
6	114571	111.3	105113	172.3	97361	246.6	90798	334.3	54
7	114395	112.2	104971	173.4	97243	248.0	90696	335.9	53
8	114220	113.1	104830	174.5	97126	249.3	90595	337.5	52
9	114045	114.0	104690	175.7	97008	250.7	90494	339.0	51
10	113872	114.9	104550	176.8	96891	252.0	90394	340.6	50
11	113699	115.9	104411	178.0	96774	253.4	90293	342.2	49
12	113526	116.8	104272	179.1	96658	254.8	90193	343.8	48
13	113355	117.7	104133	180.3	96542	256.1	90093	345.4	47
14	113184	118.7	103995	181.4	96426	257.5	89993	347.0	46
15	113013	119.6	103857	182.6	96310	258.9	89894	348.6	45
16	112844	120.5	103720	183.7	96195	260.3	89795	350.2	44
17	112675	121.5	103583	184.9	96080	261.7	89696	351.8	43
18	112506	122.4	103447	186.1	95966	263.1	89598	353.4	42
19	112339	123.4	103311	187.2	95851	264.5	89499	355.1	41
20	112171	124.3	103175	188.4	95738	265.9	89401	356.7	40
21	112005	125.3	103040	189.6	95624	267.3	89303	358.3	39
22	111839	126.2	102905	190.8	95510	268.7	89205	360.0	38
23	111674	127.2	102771	192.0	95397	270.1	89107	361.6	37
24	111510	128.2	102637	193.2	95285	271.5	89010	363.2	36
25	111346	129.2	102504	194.4	95172	272.9	88913	364.9	35
26	111183	130.1	102371	195.6	95060	274.3	88816	366.5	34
27	111020	131.1	102238	196.8	94948	275.8	88719	368.2	33
28	110858	132.1	102106	198.0	94836	277.2	88623	369.8	32
29	110696	133.1	101974	199.2	94725	278.6	88526	371.5	31
30	110536	134.1	101843	200.4	94614	280.1	88430	373.1	30
×	A 175° B B 85° A	A 174° B B 84° A	A 173° B B 83° A	A 172° B B 82° A	↑	*			

↓	A 36° B B 126° A	A 37° B B 127° A	A 38° B B 128° A	A 39° B B 129° A	×				
30	22561	9482.1	21555	10053	20585	10646	19649	11259	30
31	22544	9491.5	21539	10063	20569	10656	19634	11270	29
32	22527	9500.8	21522	10073	20553	10666	19618	11280	28
33	22510	9510.2	21506	10082	20537	10676	19603	11291	27
34	22493	9519.6	21490	10092	20522	10686	19588	11301	26
35	22476	9528.9	21473	10102	20506	10696	19572	11312	25
36	22459	9538.3	21457	10112	20490	10706	19557	11322	24
37	22442	9547.7	21440	10121	20474	10716	19542	11332	23
38	22425	9557.1	21424	10131	20458	10726	19527	11343	22
39	22408	9566.5	21408	10141	20442	10736	19511	11353	21
40	22391	9575.9	21391	10151	20427	10746	19496	11364	20
41	22374	9585.3	21375	10160	20411	10756	19481	11374	19
42	22357	9594.7	21358	10170	20395	10767	19466	11385	18
43	22340	9604.1	21342	10180	20379	10777	19450	11395	17
44	22323	9613.6	21326	10190	20364	10787	19435	11406	16
45	22306	9623.0	21309	10199	20348	10797	19420	11416	15
46	22289	9632.4	21293	10209	20332	10807	19405	11427	14
47	22272	9641.9	21277	10219	20316	10817	19390	11437	13
48	22256	9651.3	21261	10229	20301	10827	19375	11448	12
49	22239	9660.8	21244	10239	20285	10838	19359	11458	11
50	22222	9670.2	21228	10248	20269	10848	19344	11469	10
51	22205	9679.7	21212	10258	20254	10858	19329	11479	9
52	22188	9689.2	21195	10268	20238	10868	19314	11490	8
53	22171	9698.6	21179	10278	20222	10878	19299	11501	7
54	22154	9708.1	21163	10288	20207	10888	19284	11511	6
55	22138	9717.6	21147	10298	20191	10899	19269	11522	5
56	22121	9727.1	21131	10307	20175	10909	19254	11532	4
57	22104	9736.6	21114	10317	20160	10919	19238	11543	3
58	22087	9746.1	21098	10327	20144	10929	19223	11553	2
59	22070	9755.6	21082	10337	20128	10940	19208	11564	1
60	22054	9765.1	21066	10347	20113	10950	19193	11575	0
×	A 143° B B 53° A	A 142° B B 52° A	A 141° B B 51° A	A 140° B B 50° A	↑	*			

The tables contain entries for the following 2 functions for the value of the angular argument ranging from 0° to 180°:

$$A(\alpha) = 10^5 \cdot \log \csc \alpha$$

$$B(\alpha) = 10^5 \cdot \log \sec \alpha$$

Instructions

Mark each angle (*Lat*, *Dec*, *t*) with its appropriate name (*N*, *S*, *W*, *E*). Treat all angles as absolute values.

$$A(R) = A(t) + B(Dec)$$

Note the *B(R)* value that corresponds to *A(R)*.

$$A(K) = A(Dec) - B(R)$$

Note the corresponding angle *K*. When *t* is greater than 90°, take *K* from the range 90°—180°, otherwise from 0°—90°. Give *K* the same name as *Dec* (*N* or *S*). Combine *K* and *Lat* (subtract smaller from larger if same name, add if contrary name). Find *B(K~LAT)*.

Find *A(Hc)*:

$$A(Hc) = B(R) + B(K~Lat)$$

Find closest tabulated value for *A(Hc)* and note corresponding *B(Hc)*.

Calculate *A(Z)*:

$$A(Z) = A(R) - B(Hc)$$

Always take *Z* from the range 90°—180°, unless *K* is same name and greater than *Lat*. Convert to true azimuth *Zn*:

$$Zn = \begin{cases} Z, & Lat > 0 (N) \text{ and } t < 0 (E) \\ 180^\circ - Z, & Lat < 0 (S) \text{ and } t < 0 (E) \\ 180^\circ + Z, & Lat < 0 (S) \text{ and } t > 0 (W) \\ 360^\circ - Z, & Lat > 0 (N) \text{ and } t > 0 (W) \end{cases}$$

↓	A 20° B B 110° A	A 21° B B 111° A	A 22° B B 112° A	A 23° B B 113° A	×				
0	46595	2701.4	44567	2984.8	42642	3283.4	40812	3597.4	60
1	46560	2706.0	44534	2989.7	42611	3288.5	40782	3602.8	59
2	46525	2710.6	44501	2994.5	42580	3293.6	40753	3618.0	58
3	46491	2715.2	44468	2999.4	42549	3298.7	40723	3633.5	57
4	46456	2719.8	44436	3004.3	42518	3303.9	40693	3648.9	56
5	46422	2724.5	44403	3009.1	42486	3309.0	40664	3664.3	55
6	46387	2729.1	44370	3014.0	42455	3314.1	40634	3679.6	54
7	46353	2733.7	44337	3018.9	42424	3319.2	40604	3695.0	53
8	46318	2738.3	44305	3023.8	42393	3324.4	40575	3710.4	52
9	46284	2743.0	44272	3028.6	42362	3329.5	40545	3725.8	51
10	46249	2747.6	44239	3033.5	42331	3334.7	40516	3741.2	50
11	46215	2752.2	44207	3038.4	42300	3339.8	40486	3756.6	49
12	46181	2756.9	44174	3043.3	42269	3345.0	40457	3772.0	48
13	46146	2761.5	44142	3048.2	42238	3350.1	40427	3787.5	47
14	46112	2766.2	44109	3053.1	42207	3355.3	40398	3802.9	46
15	46078	2770.9	44077	3058.0	42176	3360.5	40368	3818.3	45
16	46043	2775.5	44044	3063.0	42145	3365.6	40339	3833.7	44
17	46009	2780.2	44012	3067.9	42115	3370.8	40310	3849.2	43
18	45975	2784.9	43979	3072.8	42084	3376.0	40280	3864.6	42
19	45941	2789.5	43947	3077.7	42053	3381.2	40251	3700.1	41
20	45907	2794.2	43915	3082.7	42022	3386.4	40222	3705.5	40
21	45873	2798.9	43882	3087.6	41992	3391.5	40192	3711.0	39
22	45839	2803.6	43850	3092.5	41961	3396.7	40163	3716.4	38
23	45805	2808.3	43818	3097.5	41930	3401.9	40134	3721.9	37
24	45771	2813.0	43785	3102.4	41899	3407.1	40105	3727.3	36
25	45737	2817.7	43753	3107.4	41869	3412.4	40076	3732.8	35
26	45703	2822.4	43721	3112.3	41838	3417.6	40046	3738.3	34
27	45669	2827.1	43689	3117.3	41808	3422.8	40017	3743.8	33
28	45635	2831.8	43657	3122.3	41777	3428.0	39988	3749.2	32
29	45601	2836.5	43625	3127.2	41747	3433.2	39959	3754.7	31
30	45567	2841.2	43592	3132.2	41716	3438.5	39930	3760.2	30
×	A 159° B B 69° A	A 158° B B 68° A	A 157° B B 67° A	A 156° B B 66° A	↑	*			

↓	A 20° B B 110° A	A 21° B B 111° A	A 22° B B 112° A	A 23° B B 113° A	×				
30	45567	2841.2	43592	3132.2	41716	3438.5	39930	3760.2	30
31	45534	2846.0	43560	3137.2	41686	3443.7	39901	3775.7	29
32	45500	2850.7	43528	3142.2	41655	3448.9	39872	3791.2	28
33	45466	2855.4	43496	3147.2	41625	3454.2	39843	3776.7	27
34	45433	2860.2	43464	3152.1	41594	3459.4	39814	3782.2	26
35	45399	2864.9	43432	3157.1	41564	3464.7	39785	3787.7	25
36	45365	2869.7	43401	3162.1	41533	3469.9	39756	3793.3	24
37	45332	2874.4	43369	3167.1	41503	3475.2	39727	3798.8	23
38	45298	2879.2	43337	3172.2	41473	3480.5	39698	3804.3	2

↓	A 44° B		X
	B 134° A	A	
0	15823	14307	60
1	15810	14319	59
2	15797	14331	58
3	15784	14343	57
4	15771	14355	56
5	15758	14368	55
6	15745	14380	54
7	15731	14392	53
8	15718	14404	52
9	15705	14417	51
10	15692	14429	50
11	15679	14441	49
12	15666	14453	48
13	15653	14466	47
14	15640	14478	46
15	15627	14490	45
16	15615	14503	44
17	15602	14515	43
18	15589	14527	42
19	15576	14540	41
20	15563	14552	40
21	15550	14564	39
22	15537	14577	38
23	15524	14589	37
24	15511	14601	36
25	15498	14614	35
26	15485	14626	34
27	15472	14639	33
28	15460	14651	32
29	15447	14663	31
30	15434	14676	30
X	A 135° B		↑
	B 45° A	A	

↓	A 44° B		X
	B 134° A	A	
30	15434	14676	30
31	15421	14688	29
32	15408	14701	28
33	15395	14713	27
34	15382	14726	26
35	15370	14738	25
36	15357	14750	24
37	15344	14763	23
38	15331	14775	22
39	15318	14788	21
40	15306	14800	20
41	15293	14813	19
42	15280	14825	18
43	15267	14838	17
44	15255	14850	16
45	15242	14863	15
46	15229	14875	14
47	15216	14888	13
48	15204	14900	12
49	15191	14913	11
50	15178	14926	10
51	15165	14938	9
52	15153	14951	8
53	15140	14963	7
54	15127	14976	6
55	15115	14988	5
56	15102	15001	4
57	15089	15014	3
58	15077	15026	2
59	15064	15039	1
60	15051	15051	0
X	A 135° B		↑
	B 45° A	A	

Caution

The Ageton method has a few weak points which require the user's attention:

* * *

If a body is near the visible horizon, it may be below the celestial horizon due to the effects of dip and refraction, and the altitude may be negative. *Hc* is negative if *K* is of the same name as *Lat* and greater than 90° + *Lat*, or if *K* is of contrary name to *Lat* and greater than 90° − *Lat*. In the latter case, *Z* is less than 90° and should be taken from the top of the table if *K* > 180° − *Lat*.

* * *

If the azimuth angle, *Z*, is approximately 90°, the *A(Z)* may be a negative quantity if the tables have been used without interpolation (which is usually the case). This can be avoided by interpolating throughout or by substituting the nearest tabulated *A* value for the calculated *A(R)*, at the top of the azimuth column.

* * *

The Ageton method may give inaccurate results if *t* or *K* is near 90°. Therefore, values between 82° and 98° should be avoided and the respective sight discarded (forbidden range). The accuracy in this range can be improved by interpolating *B(R)* from *A(R)* or using the Ageton tables in combination with Sadler's sight reduction technique. (See A. E. Bayless, Compact Sight Reduction Table (modified H. O. 211 Table), Cornell Maritime Press)

↓	A 36° B		A 37° B		A 38° B		A 39° B		X
	B 126° A	A	B 127° A	A	B 128° A	A	B 129° A	A	
0	23078	9204.2	22054	9765.1	21066	10347	20113	10950	60
1	23061	9213.4	22037	9774.7	21050	10357	20097	10960	59
2	23043	9222.6	22020	9784.2	21033	10367	20082	10970	58
3	23026	9231.8	22003	9793.7	21017	10376	20066	10980	57
4	23009	9241.0	21987	9803.3	21001	10386	20050	10991	56
5	22991	9250.2	21970	9812.8	20985	10396	20035	11001	55
6	22974	9259.4	21953	9822.4	20969	10406	20019	11011	54
7	22957	9268.6	21937	9831.9	20953	10416	20004	11022	53
8	22939	9277.8	21920	9841.5	20937	10426	19988	11032	52
9	22922	9287.1	21903	9851.0	20921	10436	19973	11042	51
10	22905	9296.3	21887	9860.6	20905	10446	19957	11052	50
11	22888	9305.5	21870	9870.2	20889	10456	19942	11063	49
12	22870	9314.8	21853	9879.8	20872	10466	19926	11073	48
13	22853	9324.0	21837	9889.4	20856	10476	19911	11083	47
14	22836	9333.3	21820	9899.0	20840	10486	19895	11094	46
15	22819	9342.5	21803	9908.6	20824	10496	19880	11104	45
16	22801	9351.8	21787	9918.2	20808	10505	19864	11114	44
17	22784	9361.1	21770	9927.8	20792	10515	19849	11125	43
18	22767	9370.4	21754	9937.4	20776	10525	19834	11135	42
19	22750	9379.6	21737	9947.1	20760	10535	19818	11145	41
20	22732	9388.9	21720	9956.7	20744	10545	19803	11156	40
21	22715	9398.2	21704	9966.3	20728	10555	19787	11166	39
22	22698	9407.5	21687	9976.0	20712	10565	19772	11176	38
23	22681	9416.8	21671	9985.6	20696	10575	19756	11187	37
24	22664	9426.1	21654	9995.3	20681	10585	19741	11197	36
25	22647	9435.5	21638	10005	20665	10595	19726	11207	35
26	22630	9444.8	21621	10015	20649	10605	19710	11218	34
27	22613	9454.1	21605	10024	20633	10615	19695	11228	33
28	22595	9463.4	21588	10034	20617	10625	19680	11239	32
29	22578	9472.8	21572	10044	20601	10636	19664	11249	31
30	22561	9482.1	21555	10053	20585	10646	19649	11259	30
X	A 143° B		A 142° B		A 141° B		A 140° B		↑
	B 53° A	A	B 52° A	A	B 51° A	A	B 50° A	A	

↓	A 4° B		A 5° B		A 6° B		A 7° B		X
	B 94° A	A	B 95° A	A	B 96° A	A	B 97° A	A	
30	110536	134.1	101843	200.4	94614	280.1	88430	373.1	30
31	110375	135.1	101712	201.6	94503	281.5	88334	374.8	29
32	110216	136.1	101581	202.8	94393	283.0	88239	376.5	28
33	110057	137.1	101451	204.1	94283	284.4	88143	378.1	27
34	109898	138.1	101321	205.3	94173	285.9	88048	379.8	26
35	109740	139.1	101192	206.5	94063	287.3	87953	381.5	25
36	109583	140.1	101063	207.8	93954	288.8	87858	383.2	24
37	109426	141.1	100934	209.0	93845	290.2	87764	384.9	23
38	109270	142.2	100806	210.3	93736	291.7	87669	386.6	22
39	109115	143.2	100678	211.5	93628	293.2	87575	388.3	21
40	108960	144.2	100550	212.8	93519	294.7	87481	390.0	20
41	108805	145.2	100423	214.0	93411	296.1	87388	391.7	19
42	108651	146.3	100296	215.3	93304	297.6	87294	393.4	18
43	108498	147.3	100170	216.5	93196	299.1	87201	395.1	17
44	108345	148.4	100044	217.8	93089	300.6	87108	396.8	16
45	108193	149.4	99918	219.1	92982	302.1	87015	398.5	15
46	108041	150.5	99793	220.3	92876	303.6	86922	400.2	14
47	107890	151.5	99668	221.6	92769	305.1	86829	402.0	13
48	107739	152.6	99544	222.9	92663	306.6	86737	403.7	12
49	107589	153.6	99419	224.2	92558	308.1	86645	405.4	11
50	107439	154.7	99296	225.5	92452	309.6	86553	407.2	10
51	107290	155.8	99172	226.8	92347	311.1	86461	408.9	9
52	107141	156.9	99049	228.1	92242	312.6	86370	410.6	8
53	106993	157.9	98926	229.4	92137	314.2	86278	412.4	7
54	106846	159.0	98804	230.7	92032	315.7	86187	414.1	6
55	106699	160.1	98682	232.0	91928	317.2	86096	415.9	5
56	106552	161.2	98560	233.3	91824	318.8	86006	417.7	4
57	106406	162.3	98439	234.6	91720	320.3	85915	419.4	3
58	106260	163.4	98318	235.9	91617	321.8	85825	421.2	2
59	106115	164.5	98197	237.2	91514	323.4	85734	422.9	1
60	105970	165.6	98077	238.6	91411	324.9	85644	424.7	0
X	A 175° B		A 174° B		A 173° B		A 172° B		↑
	B 85° A	A	B 84° A	A	B 83° A	A	B 82° A	A	

↓	A 28° B		A 29° B		A 30° B		A 31° B		X
	B 118° A	A	B 119° A	A	B 120° A	A	B 121° A	A	
0	32839	5406.5	31443	5818.1	30103	6246.9	28816	6693.4	60
1	32815	5413.2	31420	5825.1	30081	6254.2	28795	6701.0	59
2	32792	5420.0	31397	5832.1	30059	6261.5	28774	6708.6	58
3	32768	5426.7	31375	5839.1	30037	6268.8	28753	6716.2	57
4	32744	5433.4	31352	5846.1	30016	6276.2	28732	6723.8	56
5	32720	5440.2	31329	5853.1	29994	6283.5	28711	6731.5	55
6	32697	5446.9	31306	5860.2	29972	6290.8	28690	6739.1	54
7	32673	5453.6	31284	5867.2	29950	6298.1	28669	6746.7	53
8	32650	5460.4	31261	5874.2	29928	6305.4	28648	6754.3	52
9	32626	5467.2	31238	5881.3	29907	6312.8	28627	6762.0	51
10	32602	5473.9	31216	5888.3	29885	6320.1	28607	6769.6	50
11	32579	5480.7	31193	5895.4	29863	6327.5	28586	6777.2	49
12	32555	5487.5	31171	5902.5	29841	6334.8	28565	6784.8	48
13	32532	5494.2	31148	5909.5	29820	6342.2	28544	6792.5	47
14	32508	5501.0	31125	5916.6	29798	6349.5	28523	6800.2	46
15	32485	5507.8	31103	5923.7	29776	6356.9	28502	6807.9	45
16	32461	5514.6	31080	5930.7	29755	6364.3	28481	6815.5	44</

	A 8° B	A 9° B	A 10° B	A 11° B					
↓	B 98° A	B 99° A	B 100° A	B 101° A	↑				
0	85644	424.7	80567	538.0	76033	664.9	71940	805.3	60
1	85555	426.5	80487	540.0	75961	667.1	71875	807.8	59
2	85465	428.3	80408	542.0	75890	669.3	71810	810.3	58
3	85376	430.1	80328	544.0	75819	671.6	71746	812.7	57
4	85286	431.9	80249	546.0	75747	673.8	71681	815.2	56
5	85197	433.6	80170	548.1	75676	676.0	71616	817.7	55
6	85109	435.4	80091	550.1	75605	678.3	71551	820.1	54
7	85020	437.2	80012	552.1	75534	680.5	71486	822.6	53
8	84931	439.0	79933	554.1	75464	682.8	71423	825.1	52
9	84843	440.9	79855	556.2	75393	685.1	71359	827.6	51
10	84755	442.7	79777	558.2	75323	687.3	71295	830.1	50
11	84667	444.5	79698	560.2	75252	689.6	71231	832.6	49
12	84579	446.3	79620	562.3	75182	691.9	71167	835.1	48
13	84492	448.1	79542	564.3	75112	694.1	71104	837.6	47
14	84404	449.9	79465	566.4	75042	696.4	71040	840.1	46
15	84317	451.8	79387	568.4	74972	698.7	70976	842.6	45
16	84230	453.6	79309	570.5	74902	701.0	70913	845.1	44
17	84143	455.4	79232	572.6	74832	703.3	70850	847.6	43
18	84056	457.3	79155	574.6	74763	705.6	70786	850.2	42
19	83970	459.1	79078	576.7	74693	707.9	70723	852.7	41
20	83884	461.0	79001	578.8	74624	710.2	70660	855.2	40
21	83797	462.8	78924	580.9	74555	712.5	70597	857.7	39
22	83711	464.7	78847	582.9	74486	714.8	70534	860.3	38
23	83626	466.6	78771	585.0	74417	717.1	70471	862.8	37
24	83540	468.4	78694	587.1	74348	719.4	70408	865.4	36
25	83455	470.3	78618	589.2	74279	721.7	70346	867.9	35
26	83369	472.2	78542	591.3	74210	724.1	70284	870.5	34
27	83284	474.0	78466	593.4	74142	726.4	70221	873.0	33
28	83199	475.9	78390	595.5	74073	728.7	70159	875.6	32
29	83114	477.8	78315	597.6	74005	731.0	70097	878.2	31
30	83030	479.7	78239	599.7	73937	733.4	70034	880.7	30
⊗	A 171° B	A 170° B	A 169° B	A 168° B	↑				↑
⊗	B 81° A	B 80° A	B 79° A	B 78° A	↓				↓

	A 32° B	A 33° B	A 34° B	A 35° B					
↓	B 122° A	B 123° A	B 124° A	B 125° A	↑				
30	26978	7397.1	25811	7889.3	24687	8400.6	23605	8931.4	30
31	26959	7405.1	25792	7897.7	24669	8409.3	23587	8940.4	29
32	26939	7413.2	25773	7906.1	24650	8418.0	23569	8949.4	28
33	26919	7421.2	25754	7914.4	24632	8426.7	23552	8958.5	27
34	26899	7429.3	25735	7922.8	24614	8435.4	23534	8967.5	26
35	26879	7437.4	25716	7931.2	24595	8444.1	23516	8976.5	25
36	26860	7445.5	25697	7939.6	24577	8452.8	23499	8985.6	24
37	26840	7453.5	25678	7948.0	24559	8461.5	23481	8994.6	23
38	26820	7461.6	25659	7956.4	24541	8470.3	23463	9003.7	22
39	26800	7469.7	25640	7964.8	24522	8479.0	23446	9012.7	21
40	26781	7477.8	25621	7973.2	24504	8487.7	23428	9021.8	20
41	26761	7485.9	25602	7981.6	24486	8496.5	23410	9030.9	19
42	26741	7494.0	25583	7990.1	24467	8505.2	23393	9039.9	18
43	26722	7502.1	25564	7998.5	24449	8514.0	23375	9048.0	17
44	26702	7510.3	25545	8006.9	24431	8522.7	23358	9058.1	16
45	26682	7518.4	25526	8015.4	24413	8531.5	23340	9067.2	15
46	26663	7526.5	25507	8023.8	24395	8540.2	23323	9076.3	14
47	26643	7534.6	25488	8032.3	24376	8549.0	23305	9085.4	13
48	26623	7542.8	25469	8040.7	24358	8557.8	23288	9094.5	12
49	26604	7550.9	25451	8049.2	24340	8566.6	23270	9103.6	11
50	26584	7559.1	25432	8057.6	24322	8575.4	23253	9112.7	10
51	26565	7567.2	25413	8066.1	24304	8584.2	23235	9121.9	9
52	26545	7575.4	25394	8074.6	24286	8593.0	23218	9131.0	8
53	26526	7583.6	25375	8083.1	24267	8601.8	23200	9140.1	7
54	26506	7591.7	25356	8091.5	24249	8610.6	23183	9149.3	6
55	26487	7599.9	25338	8100.0	24231	8619.4	23165	9158.4	5
56	26467	7608.1	25319	8108.5	24213	8628.2	23148	9167.6	4
57	26448	7616.3	25300	8117.0	24195	8637.0	23130	9176.7	3
58	26428	7624.5	25281	8125.5	24177	8645.9	23113	9185.9	2
59	26409	7632.7	25263	8134.1	24159	8654.7	23096	9195.1	1
60	26389	7640.9	25244	8142.6	24141	8663.5	23078	9204.2	0
⊗	A 147° B	A 146° B	A 145° B	A 144° B	↑				↑
⊗	B 57° A	B 56° A	B 55° A	B 54° A	↓				↓

	A 0° B	A 1° B	A 2° B	A 3° B					
↓	B 90° A	B 91° A	B 92° A	B 93° A	↑				
0	---	0.0	175814	6.6	145718	26.5	128120	59.6	60
1	353627	0.0	175097	6.8	145358	26.9	127880	60.2	59
2	323540	0.0	174391	7.1	145001	27.4	127641	60.9	58
3	305915	0.0	173696	7.3	144646	27.8	127403	61.6	57
4	293421	0.0	173012	7.5	144295	28.3	127166	62.2	56
5	283790	0.0	172339	7.8	143946	28.7	126931	62.9	55
6	275781	0.1	171676	8.0	143600	29.2	126697	63.6	54
7	269118	0.1	171023	8.2	143257	29.6	126465	64.3	53
8	263318	0.1	170379	8.5	142916	30.1	126233	65.0	52
9	258203	0.1	169745	8.7	142579	30.6	126003	65.7	51
10	253627	0.2	169121	9.0	142243	31.1	125774	66.4	50
11	249488	0.2	168505	9.3	141911	31.5	125546	67.1	49
12	245709	0.3	167897	9.5	141581	32.0	125320	67.8	48
13	242233	0.3	167298	9.8	141253	32.5	125094	68.5	47
14	239015	0.4	166708	10.1	140928	33.0	124870	69.2	46
15	236018	0.4	166125	10.3	140605	33.5	124647	69.9	45
16	233216	0.5	165550	10.6	140285	34.0	124425	70.6	44
17	230583	0.5	164982	10.9	139967	34.5	124205	71.3	43
18	228100	0.6	164422	11.2	139651	35.0	123985	72.1	42
19	225752	0.7	163869	11.5	139338	35.5	123766	72.8	41
20	223545	0.7	163322	11.8	139027	36.0	123549	73.5	40
21	221466	0.8	162783	12.1	138718	36.5	123333	74.3	39
22	219385	0.9	162250	12.4	138411	37.1	123117	75.0	38
23	217455	1.0	161724	12.7	138106	37.6	122903	75.8	37
24	215607	1.1	161204	13.0	137804	38.1	122690	76.5	36
25	213834	1.1	160690	13.3	137503	38.6	122478	77.3	35
26	212130	1.2	160182	13.6	137205	39.2	122267	78.0	34
27	210491	1.3	159680	13.9	136909	39.7	122057	78.8	33
28	208912	1.4	159184	14.2	136615	40.3	121848	79.5	32
29	207388	1.5	158693	14.6	136322	40.8	121640	80.3	31
30	205916	1.7	158203	14.9	136032	41.4	121432	81.1	30
⊗	A 179° B	A 178° B	A 177° B	A 176° B	↑				↑
⊗	B 89° A	B 88° A	B 87° A	B 86° A	↓				↓

	A 40° B	A 41° B	A 42° B	A 43° B					
↓	B 130° A	B 131° A	B 132° A	B 133° A	↑				
30	18746	11895	17874	12554	17032	13237	16219	13944	30
31	18731	11906	17859	12566	17018	13248	16205	13956	29
32	18716	11917	17845	12577	17004	13260	16192	13968	28
33	18701	11928	17831	12588	16990	13272	16179	13980	27
34	18686	11939	17816	12599	16977	13283	16166	13992	26
35	18672	11949	17802	12610	16963	13295	16152	14004	25
36	18657	11960	17788	12622	16949	13306	16139	14016	24
37	18642	11971	17774	12633	16935	13318	16126	14028	23
38	18628	11982	17760	12644	16922	13330	16113	14040	22
39	18613	11993	17745	12655	16908	13341	16099	14052	21
40	18598	12004	17731	12666	16894	13353	16086	14064	20
41	18583	12015	17717	12678	16880	13365	16073	14076	19
42	18569	12025	17703	12689	16867	13376	16060	14088	18
43	18554	12036	17689	12700	16853	13388	16046	14100	17
44	18539	12047	17674	12712	16839	13400	16033	14112	16
45	18525	12058	17660	12723	16826	13411	16020	14124	15
46	18510	12069	17646	12734	16812	13423	16007	14136	14
47	18495	12080	17632	12745	16798	13435	15994	14149	13
48	18481	12091	17618	12757	16785	13446	15980	14161	