

# SUN'S DECLINATION AND EQUATION OF TIME AT APPARENT NOON

Use a date earlier or later than the date of observation, as indicated in the small table.

Day	January		February		March		April		May		June		
	Dec.	Eq.	Dec.	Eq.	Dec.	Eq.	Dec.	Eq.	Dec.	Eq.	Dec.	Eq.	
1	S23 02+	3.5	S17 11+	13.7	S7 43+	12.6	N 4 25	+4.1	N14 58	-2.9	N22 00	-2.4	To obtain the GCT of meridian passage at Greenwich, apply the equation of time with the sign given to 12h00m0.
2	22 57	4.0	16 54	13.8	7 20	12.4	4 48	3.8	15 16	3.0	22 09	2.2	
3	22 51	4.4	16 37	13.9	6 57	12.2	5 11	3.5	15 34	3.1	22 16	2.1	
4	22 45	4.9	16 19	14.0	6 34	11.9	5 34	3.2	15 52	3.2	22 24	1.9	
5	22 39	5.3	16 01	14.1	6 11	11.7	5 57	2.9	16 09	3.3	22 31	1.8	
6	S22 32+	5.8	S15 43+	14.2	S5 48+	11.5	N 6 19	+2.6	N16 26	-3.4	N22 37	-1.6	
7	22 25	6.2	15 24	14.2	5 24	11.3	6 42	2.3	16 43	3.5	22 43	1.4	
8	22 17	6.6	15 06	14.3	5 01	11.0	7 05	2.0	17 00	3.6	22 49	1.2	
9	22 09	7.1	14 47	14.3	4 38	10.8	7 27	1.7	17 16	3.6	22 54	1.0	
10	22 00	7.5	14 27	14.3	4 14	10.5	7 49	1.5	17 32	3.7	22 59	0.8	
11	S21 51+	7.9	S14 08+	14.4	S3 51+	10.2	N 8 11	+1.2	N17 47	-3.7	N23 04	-0.6	
12	21 42	8.3	13 48	14.3	3 27	10.0	8 33	0.9	18 03	3.7	23 08	0.4	
13	21 32	8.6	13 28	14.3	3 03	9.7	8 55	0.7	18 18	3.8	23 12	-0.2	
14	21 22	9.0	13 08	14.3	2 40	9.4	9 17	0.4	18 33	3.8	23 15	0.0	
15	21 11	9.4	12 47	14.3	2 16	9.1	9 39	+0.2	18 47	3.8	23 18	+0.2	
16	S21 00+	9.7	S12 27+	14.2	S1 52+	8.9	N10 00	-0.1	N19 01	-3.8	N23 20	+0.4	
17	20 48	10.1	12 06	14.1	1 29	8.6	10 21	0.3	19 15	3.7	23 22	0.6	
18	20 37	10.4	11 45	14.1	1 05	8.3	10 42	0.6	19 28	3.7	23 24	0.8	
19	20 24	10.7	11 24	14.0	0 41	8.0	11 03	0.8	19 42	3.7	23 25	1.0	
20	20 12	11.0	11 02	13.9	S0 18	7.7	11 24	1.0	19 54	3.6	23 26	1.3	
21	S19 58+	11.3	S10 41+	13.8	N0 06+	7.4	N11 44	-1.2	N20 07	-3.6	N23 27	+1.5	
22	19 45	11.6	10 19	13.7	0 30	7.1	12 05	1.4	20 19	3.5	23 27	1.7	
23	19 31	11.9	9 57	13.5	0 53	6.8	12 25	1.6	20 31	3.4	23 26	1.9	
24	19 17	12.1	9 35	13.4	1 17	6.5	12 45	1.8	20 42	3.3	23 25	2.1	
25	19 03	12.4	9 13	13.2	1 41	6.2	13 05	2.0	20 53	3.3	23 24	2.4	
26	S18 48+	12.6	S 8 50+	13.1	N2 04+	5.9	N13 24	-2.2	N21 04	-3.2	N23 23	+2.6	
27	18 32	12.8	S 8 28	12.9	2 28	5.6	13 43	2.3	21 14	3.0	23 21	2.8	
28	18 17	13.0	S 8 05+	12.7	2 51	5.3	14 03	2.5	21 24	2.9	23 18	3.0	
29	18 01	13.2	...	...	3 15	5.0	14 21	2.6	21 34	2.8	23 15	3.2	
30	17 45	13.4	...	...	3 38	4.7	N14 40	-2.8	21 43	2.7	N23 12	+3.4	
31	S17 28+	13.5	...	...	N4 01+	4.4	...	...	N21 52	-2.5	...	...	
Day	July		August		September		October		November		December		To find the GCT of (local) meridian passage (at any meridian), note the times before and after noon when the sun has the same altitude and take the average.
	Dec.	Eq.	Dec.	Eq.	Dec.	Eq.	Dec.	Eq.	Dec.	Eq.	Dec.	Eq.	
1	N23 08	+3.6	N18 07	+6.2	N8 25	+0.1	S 3 03	-10.2	S14 19	-16.3	S21 45	-11.1	
2	23 04	3.8	17 52	6.2	8 03	-0.2	3 28	10.5	14 39	16.4	21 55	10.7	
3	23 00	4.0	17 36	6.1	7 41	0.5	3 50	10.8	14 58	16.4	22 03	10.3	
4	22 55	4.1	17 21	6.0	7 19	0.9	4 13	11.1	15 16	16.4	22 12	9.9	
5	22 50	4.3	17 05	5.9	6 57	1.2	4 36	11.4	15 35	16.4	22 20	9.5	
6	N22 44	+4.5	N16 48	+5.8	N6 35	-1.5	S 4 59	-11.7	S15 53	-16.3	S22 27	-9.1	
7	22 38	4.7	16 32	5.7	6 12	1.9	5 22	12.0	16 11	16.3	22 35	8.7	
8	22 31	4.8	16 15	5.6	5 50	2.2	5 45	12.3	16 29	16.2	22 41	8.2	
9	22 24	5.0	15 58	5.5	5 27	2.5	6 08	12.6	16 46	16.2	22 47	7.8	
10	22 17	5.1	15 41	5.3	5 05	2.9	6 31	12.9	17 03	16.1	22 53	7.4	
11	N22 10	+5.3	N15 23	+5.2	N4 42	-3.2	S 6 53	-13.1	S17 20	-16.0	S22 59	-6.9	
12	22 02	5.4	15 05	5.0	4 19	3.6	7 16	13.4	17 36	15.9	23 03	6.4	
13	21 53	5.5	14 47	4.8	3 56	3.9	7 39	13.6	17 53	15.7	23 08	6.0	
14	21 44	5.6	14 29	4.7	3 33	4.3	8 01	13.9	18 09	15.6	23 12	5.5	
15	21 35	5.7	14 10	4.5	3 10	4.6	8 23	14.1	18 24	15.4	23 15	5.0	
16	N21 26	+5.8	N13 51	+4.3	N2 47	-5.0	S 8 46	-14.3	S18 39	-15.2	S23 18	-4.5	
17	21 16	5.9	13 33	4.1	2 24	5.4	9 08	14.5	18 54	15.1	23 21	4.0	
18	21 06	6.0	13 13	3.9	2 01	5.7	9 30	14.7	19 09	14.9	23 23	3.5	
19	20 55	6.1	12 54	3.6	1 37	6.1	9 51	14.9	19 23	14.6	23 25	3.0	
20	20 44	6.2	12 34	3.4	1 14	6.4	10 13	15.1	19 37	14.4	23 26	2.6	
21	N20 33	+6.2	N12 14	+3.2	N0 51	-6.8	S10 35	-15.2	S19 51	-14.2	S23 27	-2.1	
22	20 21	6.3	11 54	2.9	0 27	7.1	10 56	15.4	20 04	13.9	23 27	1.6	
23	20 09	6.3	11 34	2.7	N0 04	7.5	11 17	15.5	20 17	13.7	23 26	1.1	
24	19 57	6.4	11 14	2.4	S0 19	7.8	11 38	15.7	20 29	13.4	23 26	0.6	
25	19 44	6.4	10 53	2.2	0 43	8.2	11 59	15.8	20 41	13.1	23 25	-0.1	
26	N19 31	+6.4	N10 33	+1.9	S1 06	-8.5	S12 20	-15.9	S20 53	-12.8	S23 23	+0.4	
27	19 18	6.4	10 32	1.6	1 30	8.8	12 40	16.0	21 04	12.5	23 21	0.9	
28	19 04	6.4	9 51	1.3	1 53	9.2	13 00	16.1	21 15	12.1	23 18	1.4	
29	18 51	6.4	9 29	1.0	2 16	9.5	13 20	16.2	21 26	11.8	23 15	1.9	
30	18 36	6.3	9 08	0.7	S2 40	-9.8	13 40	16.3	S21 36	-11.4	23 12	2.4	
31	N18 22	+6.3	N 8 47	+0.4	...	...	S14 00	-16.3	...	...	S23 08	+2.9	

EXAMPLES OF LATITUDES OBTAINED FROM MERIDIAN ALTITUDES						Altitude @	Semi-diameter and Refraction
Year	Sun south of zenith			Sun north of zenith			
1944	Feb. 29	1945	Dec. 4	1947	May 1	1945	Aug. 1
1946	170°E	160°W	70°W	20°W	110°E	80°E	Nov. 16
Greatest altitude @	83° 21'	5° 30'	74° 50'	44° 45'	30° 2'	77° 00'	
Semidiameter and refraction	16	7	16	15	14	16	
Corrected altitude	83 37	5 37	75 06	45 00	30 34	77 16	
90° minus corrected altitude	6 23	84 23	14 54	45 00	59 26	12 44	
Declination	88 05	S22 18	N14 58	N18 03	0 00	S18 32	
Latitude	S1 42	N62 05	N29 52	S26 57	S59 26	S31 16	
Year	Long. 180°E.	Long. 90°E.	Greenwich	Long. 90°W.	Long. 180°W		
1944 Feb. 29-Dec.	Tabular value.	1/2 day late....	1/2 day late....	1/2 day late....	1 day late.		
1945	1/2 day early....	Tabular value.	1/2 day late....	1/2 day late....	1/2 day late.		
1946	1/2 day early....	1/2 day early....	Tabular value.	1/2 day late....	1/2 day late.		
1947	1/2 day early....	1/2 day early....	1/2 day early....	Tabular value.	1/2 day late.		
1948 Jan.-Feb. 28	1 day early....	1/2 day early....	1/2 day early....	1/2 day early....	Tabular value.		

To obtain the GCT of meridian passage at Greenwich, apply the equation of time with the sign given to 12h00m0.

To find the GCT of (local) meridian passage (at any meridian), note the times before and after noon when the sun has the same altitude and take the average.

The accuracy of longitude determination is limited by the error in Greenwich time. An error of four seconds in time will introduce an error of one minute of arc in longitude, which is equivalent to one nautical mile at the equator, and to one-half of a nautical mile at latitude 60 degrees. One minute of arc in latitude is equal to one nautical mile.

Without Greenwich time, only latitude can be determined. Data interpolated in accordance with this table are correct to two miles in latitude (two minutes in declination) and three miles in longitude (0.2 minutes in equation of time).