Astronomical Navigation – Noon-Fix for Latitude and Longitude *(years 2020-2040)*

Ships position around noon (locally) by sextant and noon-fix for noon-sight latitude and noon-sight longitude.
Time needed about 2 hours. Precision only +- 3 naut.miles, in N/S and E/W-direction due to longtime prediction 2040.
The tabulated calculation followed Jean Meeus, Astron. Algorithms, p.165.: diff. +-10 arcseconds against VSOP87.
Equipment: Sextant, clock (running on UTC), this sheet of paper and a pencil. Ship should not change its position!
Example: **5. Apr. 2022**, estimated **position**: 39°10'N, -014°10' W, noon around 13 hours UTC (sun at highest altitude).

Measuring noon-sight longitude and noon-sight latitude.

In total three times **T1,T2,T3** must be measured, and two sextant-angles **S1,S2** noted.

About one hour before local noon: Take declination-value from **Tables DEC** for 5. April **2022 (note year!)**: **+6° 11'.**
Guess sextant-angle S1 like this: 90°- approx.Latitude + DEC=90°-39°+6°=57°. Adjust sextant to this angle. Search horizon, until the sun comes into mirrors sight. Turn drum of sextant until lower rim of sun touches horizon. Note the time **precisely** by second **(e.g. T1=UTC 12:12:41)**. Read sextant-angle S1 and **note it (e.g. S1= 54°53').**

Now adjust the drum about every 5 min to keep the sun touching the horizon. When no further changes occur, wait for 2 min (= noon Latitude-fix), read sextant-angle and note this as angle S2 **(culmination-angle S2= 56°52').**
Also note the time (**T2**= about 13:00h) to estimate, when approximately the sun again will sink down to the previous altitude-angle **S1** (in our case about 13:45h, as a guess).

Now reset the sextant back to angle **S1=54°53'.** Check the sun regularly at fixed sextant-angle **S1.** As soon as the sun touches the horizon again at this angle S1, **take notice** of the precise time **(T3= UTC 13:47:25).**
(Height correction, below: If height-of-eye is 10m instead of 2m, reduce the height-correction (13', etc.) below by 3'. Linear interpolation for different height-of-eye). Then calculation as follows:

CALCULATION for LATITUDE NOON-FIX:

Sextant-reading (angle **S2)**	**56°52'**	
Index-error of sextant (check individually!)	+ 02'	
Height-correction at **2m** height of eye	+ 13'	(for angle from: 20°=>11', 30°=>12', 50°=>13', until 80°=>13')
Sextant-altitude, cleaned, therefore:	**=57°07'**	
Zenith-height (Def.: 90°)	89°60'	
subtract sextant-altitude:	-57°07'	
Zenith-distance accordingly:	**=32°53'**	***)**
Declination on 5.April 22 **(Table DEC)**	**+ 6°11' N**	
Sum:	= 38°64' N	
LATITUDE noon-fix:	**= 39°04' Nord**	

CALCULATION for LONGITUDE NOON-FIX:

For two instances of time (T1=12:12:41) and (T3=13:47:25) we have the same sextant-reading (angle S1= 54°53'), before and after the sun reaches maximal height (=culmination). Time of culmination then must be in the middle:

First recording of time T1 (angle S1)	12h 12m 41s	
Time T3 (sextant angle again S1)	+13h 47m 25s	
simply added:	= 25h 59m 66s	
or better notation:	26h 00m 06s	*(Attention when adding secs or mins !)*
divide by 2 = culmination-time (exact)	**=13h 00m 03s**	
minus 12h (west of Greenwich [east: +12]!)	- 12h 00m 00s	
Time rel. to Greenwich:	**=01h 00m 03s**	
= different notation (!):	**00h 59m 63s**	*(1h = 60m)*
GHA-correction on 5.4. **(Table GHA)**	- **02m 41s**	*(Attention when subtracting sec or mins !)*
True time at ships position	**= 00h 57m 22s (West)**	

Conversion of this time into degrees of longitude: 1h=15°, 1m=15', 1s=15" [Time-min= m, Angle-min= ']

And so: 00h	=	00°	=	00°	(see also auxiliary table)
57m	=	855'	=	14° 15'	*(855 / 60 = 14,25)*
22s	=	330"	=	6'	*(330 / 60 = 5,5)*
LONGITUDE =				**14° 21' WEST**	

Resulting position of ship in Latitude and Longitude at 13:00:03 UTC accordingly:

⇨ **Latitude ϕ= 39°04' Nord,** **Longitude λ= -014°21' West**

*) Latitude and declination bear a sign. Adding a negative number to a positive number is a subtraction!
Southern hemisphere: Zenith-distance is to be taken negative!

GHA

Years = 2020 ... 2040
GHA - Greenwich Hour Angle, Zeitgleichung, 12.00 UTC
in Minutes M and Seconds S (=below the Minutes)

Day		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	M	-3	-13	-12	-3	2	2	-3	-6	0	10	16	10
	S	34	33	18	51	53	8	54	21	0	20	25	58
2	M	-4	-13	-12	-3	3	1	-4	-6	0	10	16	10
	S	2	40	6	33	0	58	6	17	18	39	26	35
3	M	-4	-13	-11	-3	3	1	-4	-6	0	10	16	10
	S	29	47	54	16	6	48	17	13	38	58	26	12
4	M	-4	-13	-11	-2	3	1	-4	-6	0	11	16	9
	S	57	53	41	58	12	38	27	7	58	17	25	48
5	M	-5	-13	-11	-2	3	1	-4	-6	1	11	16	9
	S	24	58	27	41	17	28	38	1	18	35	24	23
6	M	-5	-14	-11	-2	3	1	-4	-5	1	11	16	8
	S	50	2	13	24	22	17	48	55	38	53	22	58
7	M	-6	-14	-11	-2	3	1	-4	-5	1	12	16	8
	S	16	5	0	7	26	6	58	48	58	10	19	33
8	M	-6	-14	-10	-1	3	0	-5	-5	2	12	16	8
	S	41	8	45	50	29	54	7	40	19	27	15	7
9	M	-7	-14	-10	-1	3	0	-5	-5	2	12	16	7
	S	6	10	30	34	32	42	16	31	40	44	10	40
10	M	-7	-14	-10	-1	3	0	-5	-5	3	12	16	7
	S	31	11	14	18	35	31	25	23	1	60	5	13
11	M	-7	-14	-9	-1	3	0	-5	-5	3	13	15	6
	S	55	11	59	2	36	18	33	13	22	16	58	45
12	M	-8	-14	-9	0	3	0	-5	-5	3	13	15	6
	S	18	11	43	-46	38	6	41	3	43	31	51	18
13	M	-8	-14	-9	0	3	0	-5	-4	4	13	15	5
	S	41	10	27	-31	38	-6	48	52	4	45	43	49
14	M	-9	-14	-9	0	3	0	-5	-4	4	13	15	5
	S	3	8	10	-16	38	-18	55	41	26	60	34	21
15	M	-9	-14	-8	0	3	0	-6	-4	4	14	15	4
	S	24	5	53	-1	38	-31	1	30	47	13	24	52
16	M	-9	-14	-8	0	3	0	-6	-4	5	14	15	4
	S	45	2	37	12	37	-44	6	17	8	26	14	23
17	M	-10	-13	-8	0	3	0	-6	-4	5	14	15	3
	S	5	57	19	26	35	-57	12	5	30	39	2	54
18	M	-10	-13	-8	0	3	-1	-6	-3	5	14	14	3
	S	24	53	2	39	33	10	16	52	51	50	50	24
19	M	-10	-13	-7	0	3	-1	-6	-3	6	15	14	2
	S	42	47	44	52	30	23	20	38	13	2	37	55
20	M	-11	-13	-7	1	3	-1	-6	-3	6	15	14	2
	S	0	41	27	5	27	36	24	24	34	12	23	25
21	M	-11	-13	-7	1	3	-1	-6	-3	6	15	14	1
	S	17	34	9	17	23	49	27	9	55	22	8	55
22	M	-11	-13	-6	1	3	-2	-6	-2	7	15	13	1
	S	34	27	51	29	18	2	30	54	17	31	52	26
23	M	-11	-13	-6	1	3	-2	-6	-2	7	15	13	0
	S	49	19	33	40	13	15	31	38	38	40	36	56
24	M	-12	-13	-6	1	3	-2	-6	-2	7	15	13	0
	S	4	10	15	51	8	28	33	22	59	48	19	26
25	M	-12	-13	-5	2	3	-2	-6	-2	8	15	13	0
	S	18	1	57	1	2	41	33	6	20	55	1	-3
26	M	-12	-12	-5	2	2	-2	-6	-1	8	16	12	0
	S	31	51	39	11	56	54	33	49	40	2	42	-33
27	M	-12	-12	-5	2	2	-3	-6	-1	9	16	12	-1
	S	43	40	21	21	49	6	33	32	1	7	23	2
28	M	-12	-12	-5	2	2	-3	-6	-1	9	16	12	-1
	S	55	29	3	30	41	18	32	14	21	12	3	32
29	M	-13	-12	-4	2	2	-3	-6	0	9	16	11	-2
	S	6	18	45	38	34	31	30	-56	41	17	42	1
30	M	-13	##	-4	2	2	-3	-6	0	10	16	11	-2
	S	15	##	27	46	25	42	28	-38	1	20	20	30
31	M	-13	##	-4	##	2	##	-6	0	##	16	##	-2
	S	25	##	9	##	17	##	25	-19	##	23	##	58
Day		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

EXAMPLE: 5 April, 12.00 UTC <v.:2026>
Eq.-of-Time = Time-Minutes: -2 Time-Secs: 41

Umrechnung
Zeit (Stunden, Minuten)
in
Winkel (Grad, arcmin,arcsec)

h.	°	h.	°	m.,	°	′	m.	°	′	s.	′	″	s.	′	″
1 =	15	13 =	195	1 =	0	15	16 =	4	00	1 =	0	15	16 =	4	00
2	30	14	210	2	0	30	17	4	15	2	0	30	17	4	15
3	45	15	225	3	0	45	18	4	30	3	0	45	18	4	30
4	60	16	240	4	1	00	19	4	45	4	1	00	19	4	45
5	75	17	255	5	1	15	20	5	00	5	1	15	20	5	00
6	90	18	270	6	1	30	24	6	00	6	1	30	24	6	00
7	105	19	285	7	1	45	28	7	00	7	1	45	28	7	00
8	120	20	300	8	2	00	32	8	00	8	2	00	32	8	00
9	135	21	315	9	2	15	36	9	00	9	2	15	36	9	00
10	150	22	330	10	2	30	40	10	00	10	2	30	40	10	00
11	165	23	345	11	2	45	44	11	00	11	2	45	44	11	00
12	180	24	360	12	3	00	48	12	00	12	3	00	48	12	00
				13	3	15	52	13	00	13	3	15	52	13	00
				14	3	30	56	14	00	14	3	30	56	14	00
				15	3	45	60	15	00	15	3	45	60	15	00

DEC

YEARS= 2020 2024 2028 2032 2036 2040
DEC = Declination, 12.00 UTC
in degrees d and minutes(= below the degrees)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 d	-23	-17	-7	4	15	22	23	17	7	-3	-14	-21
m	1	10	17	50	19	10	3	49	59	29	40	55
2 d	-22	-16	-6	5	15	22	22	17	7	-3	-14	-22
m	56	53	54	14	37	17	59	33	38	53	59	4
3 d	-22	-16	-6	5	15	22	22	17	7	-4	-15	-22
m	51	35	31	37	54	24	54	18	16	16	18	12
4 d	-22	-16	-6	5	16	22	22	17	6	-4	-15	-22
m	45	17	8	59	12	31	48	2	53	39	36	20
5 d	-22	-15	-5	6	16	22	22	16	6	-5	-15	-22
m	38	59	45	22	29	38	42	45	31	2	55	28
6 d	-22	-15	-5	6	16	22	22	16	6	-5	-16	-22
m	31	41	22	45	45	44	36	29	9	25	13	35
7 d	-22	-15	-4	7	17	22	22	16	5	-5	-16	-22
m	24	23	58	7	2	50	30	12	46	48	30	41
8 d	-22	-15	-4	7	17	22	22	15	5	-6	-16	-22
m	16	4	35	30	18	55	23	55	24	11	48	48
9 d	-22	-14	-4	7	17	22	22	15	5	-6	-17	-22
m	8	45	12	52	34	60	16	37	1	34	5	53
10 d	-21	-14	-3	8	17	23	22	15	4	-6	-17	-22
m	59	25	48	14	50	4	8	20	38	56	21	59
11 d	-21	-14	-3	8	18	23	21	15	4	-7	-17	-23
m	50	6	24	36	5	8	60	2	15	19	38	3
12 d	-21	-13	-3	8	18	23	21	14	3	-7	-17	-23
m	41	46	1	58	20	12	51	44	53	41	54	8
13 d	-21	-13	-2	9	18	23	21	14	3	-8	-18	-23
m	31	26	37	20	35	15	42	25	30	4	10	12
14 d	-21	-13	-2	9	18	23	21	14	3	-8	-18	-23
m	21	6	13	41	49	18	33	7	7	26	25	15
15 d	-21	-12	-1	10	19	23	21	13	2	-8	-18	-23
m	10	45	50	3	3	20	24	48	43	48	41	18
16 d	-20	-12	-1	10	19	23	21	13	2	-9	-18	-23
m	59	25	26	24	17	22	14	29	20	10	56	21
17 d	-20	-12	-1	10	19	23	21	13	1	-9	-19	-23
m	47	4	2	45	30	24	4	10	57	32	10	23
18 d	-20	-11	0	11	19	23	20	12	1	-9	-19	-23
m	35	43	-39	6	43	25	53	50	34	54	24	24
19 d	-20	-11	0	11	19	23	20	12	1	-10	-19	-23
m	23	21	-15	27	56	26	42	31	11	15	38	25
20 d	-20	-10	0	11	20	23	20	12	0	-10	-19	-23
m	10	60	9	47	8	26	31	11	47	37	52	26
21 d	-19	-10	0	12	20	23	20	11	0	-10	-20	-23
m	57	38	33	7	21	26	19	51	24	58	5	26
22 d	-19	-10	0	12	20	23	20	11	0	-11	-20	-23
m	44	17	56	28	32	26	7	31	1	19	18	26
23 d	-19	-9	1	12	20	23	19	11	0	-11	-20	-23
m	30	55	20	48	44	25	54	10	-23	40	30	25
24 d	-19	-9	1	13	20	23	19	10	0	-12	-20	-23
m	16	33	43	7	55	24	42	50	-46	1	42	24
25 d	-19	-9	2	13	21	23	19	10	-1	-12	-20	-23
m	1	10	7	27	5	22	29	29	9	22	54	22
26 d	-18	-8	2	13	21	23	19	10	-1	-12	-21	-23
m	46	48	31	46	16	20	15	8	33	42	5	20
27 d	-18	-8	2	14	21	23	19	9	-1	-13	-21	-23
m	31	26	54	5	26	17	2	47	56	3	16	18
28 d	-18	-8	3	14	21	23	18	9	-2	-13	-21	-23
m	15	3	17	24	35	14	48	26	20	23	26	14
29 d	-17	-7	3	14	21	23	18	9	-2	-13	-21	-23
m	59	40	41	42	44	11	33	4	43	42	36	11
30 d	-17	##	4	15	21	23	18	8	-3	-14	-21	-23
m	43	##	4	1	53	7	19	43	6	2	46	7
31 d	-17	##	4	##	22	##	18	8	##	-14	##	-23
m	27	##	27	##	1	##	4	21	##	21	##	2

Day Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
EXAMPLE: 5. April, 12.00 UTC <v.:2024>
Declination = degrees: 6 minutes: 22

YEARS= 2021 2025 2029 2033 2037
DEC = Declination, 12.00 UTC
in degrees d and minutes(= below the degrees)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 d	-22	-16	-7	4	15	22	23	17	8	-3	-14	-21
m	57	57	23	45	14	8	4	52	5	24	36	53
2 d	-22	-16	-7	5	15	22	22	17	7	-3	-14	-22
m	52	39	0	8	32	15	60	37	43	47	55	2
3 d	-22	-16	-6	5	15	22	22	17	7	-4	-15	-22
m	46	22	37	31	50	23	55	21	21	10	14	10
4 d	-22	-16	-6	5	16	22	22	17	6	-4	-15	-22
m	40	4	14	54	7	30	50	5	59	33	32	18
5 d	-22	-15	-5	6	16	22	22	16	6	-4	-15	-22
m	33	46	51	17	24	36	44	49	36	56	50	26
6 d	-22	-15	-5	6	16	22	22	16	6	-5	-16	-22
m	26	27	27	39	41	42	38	33	14	19	8	33
7 d	-22	-15	-5	7	16	22	22	16	5	-5	-16	-22
m	18	8	4	2	58	48	31	16	52	42	26	40
8 d	-22	-14	-4	7	17	22	22	15	5	-6	-16	-22
m	10	49	41	24	14	54	25	59	29	5	43	46
9 d	-22	-14	-4	7	17	22	22	15	5	-6	-17	-22
m	1	30	17	47	30	59	17	41	6	28	0	52
10 d	-21	-14	-3	8	17	23	22	15	4	-6	-17	-22
m	52	10	54	9	46	3	10	24	44	51	17	57
11 d	-21	-13	-3	8	18	23	22	15	4	-7	-17	-23
m	43	51	30	31	1	7	2	6	21	13	34	2
12 d	-21	-13	-3	8	18	23	21	14	3	-7	-17	-23
m	33	31	7	53	16	11	53	48	58	36	50	7
13 d	-21	-13	-2	9	18	23	21	14	3	-7	-18	-23
m	23	11	43	15	31	14	45	30	35	58	6	11
14 d	-21	-12	-2	9	18	23	21	14	3	-8	-18	-23
m	12	50	19	36	46	17	36	11	12	21	22	14
15 d	-21	-12	-1	9	18	23	21	13	2	-8	-18	-23
m	1	30	56	58	60	20	26	53	49	43	37	17
16 d	-20	-12	-1	10	19	23	21	13	2	-9	-18	-23
m	50	9	32	19	14	22	16	34	26	5	52	20
17 d	-20	-11	-1	10	19	23	21	13	2	-9	-19	-23
m	38	48	8	40	27	24	6	14	3	27	7	22
18 d	-20	-11	0	11	19	23	20	12	1	-9	-19	-23
m	26	27	-44	1	40	25	55	55	39	49	21	24
19 d	-20	-11	0	11	19	23	20	12	1	-10	-19	-23
m	13	5	-21	22	53	26	45	35	16	10	35	25
20 d	-20	-10	0	11	20	23	20	12	0	-10	-19	-23
m	0	44	3	42	6	26	33	16	53	32	48	26
21 d	-19	-10	0	12	20	23	20	11	0	-10	-20	-23
m	47	22	27	3	18	26	22	56	30	53	2	26
22 d	-19	-9	0	12	20	23	20	11	0	-11	-20	-23
m	33	60	51	23	30	26	10	36	6	14	15	26
23 d	-19	-9	1	12	20	23	19	11	0	-11	-20	-23
m	19	38	14	43	41	25	57	15	-17	35	27	25
24 d	-19	-9	1	13	20	23	19	10	0	-11	-20	-23
m	5	16	38	2	52	24	45	55	-41	56	39	24
25 d	-18	-8	2	13	21	23	19	10	-1	-12	-20	-23
m	50	53	1	22	3	22	32	34	4	17	51	23
26 d	-18	-8	2	13	21	23	19	10	-1	-12	-21	-23
m	35	31	25	41	13	20	19	13	27	37	2	21
27 d	-18	-8	2	14	21	23	19	9	-1	-12	-21	-23
m	19	8	48	0	23	18	5	52	51	58	13	18
28 d	-18	-7	3	14	21	23	18	9	-2	-13	-21	-23
m	3	46	12	19	33	15	51	31	14	18	24	15
29 d	-17	-7	3	14	21	23	18	9	-2	-13	-21	-23
m	47	23	35	38	42	12	37	10	37	38	34	12
30 d	-17	##	3	14	21	23	18	8	-3	-13	-21	-23
m	31	##	59	56	51	8	22	48	1	57	44	8
31 d	-17	##	4	##	21	##	18	8	##	-14	##	-23
m	14	##	22	##	60	##	8	26	##	17	##	3

Day Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
EXAMPLE: 5. April, 12.00 UTC <v.:2025>
Declination = degrees: 6 minutes: 17

YEARS= 2022 2026 2030 2034 2038
DEC = Declination, 12.00 UTC
in degrees d and minutes(= below the degrees)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 d	-22	-17	-7	4	15	22	23	17	8	-3	-14	-21
m	59	1	28	39	10	6	5	56	10	18	31	51
2 d	-22	-16	-7	5	15	22	23	17	7	-3	-14	-21
m	53	44	6	2	28	14	1	41	48	41	50	60
3 d	-22	-16	-6	5	15	22	22	17	7	-4	-15	-22
m	48	26	43	25	46	21	56	25	26	5	9	8
4 d	-22	-16	-6	5	16	22	22	17	7	-4	-15	-22
m	41	8	19	48	3	28	51	9	4	28	28	16
5 d	-22	-15	-5	6	16	22	22	16	6	-4	-15	-22
m	35	50	56	11	20	35	45	53	42	51	46	24
6 d	-22	-15	-5	6	16	22	22	16	6	-5	-16	-22
m	28	32	33	34	37	41	39	37	19	14	4	31
7 d	-22	-15	-5	6	16	22	22	16	5	-5	-16	-22
m	20	13	10	56	54	47	33	20	57	37	22	38
8 d	-22	-14	-4	7	17	22	22	16	5	-5	-16	-22
m	12	54	46	19	10	52	26	3	35	60	39	45
9 d	-22	-14	-4	7	17	22	22	15	5	-6	-16	-22
m	4	35	23	41	26	57	19	46	12	23	56	51
10 d	-21	-14	-3	8	17	23	22	15	4	-6	-17	-22
m	55	15	59	3	42	2	12	28	49	45	13	56
11 d	-21	-13	-3	8	17	23	22	15	4	-7	-17	-23
m	45	56	36	26	58	6	4	10	26	8	30	1
12 d	-21	-13	-3	8	18	23	21	14	4	-7	-17	-23
m	36	36	12	48	13	10	55	52	4	31	46	6
13 d	-21	-13	-2	9	18	23	21	14	3	-7	-18	-23
m	26	15	49	9	28	14	47	34	41	53	2	10
14 d	-21	-12	-2	9	18	23	21	14	3	-8	-18	-23
m	15	55	25	31	42	17	38	16	18	15	18	14
15 d	-21	-12	-2	9	18	23	21	13	2	-8	-18	-23
m	4	35	1	52	56	19	28	57	55	37	33	17
16 d	-20	-12	-1	10	19	23	21	13	2	-8	-18	-23
m	53	14	38	14	10	21	19	38	31	60	48	20
17 d	-20	-11	-1	10	19	23	21	13	2	-9	-19	-23
m	41	53	14	35	24	23	8	19	8	22	3	22
18 d	-20	-11	0	10	19	23	20	12	1	-9	-19	-23
m	29	32	-50	56	37	25	58	60	45	43	17	24
19 d	-20	-11	0	11	19	23	20	12	1	-10	-19	-23
m	16	10	-26	17	50	26	47	40	22	5	31	25
20 d	-20	-10	0	11	20	23	20	12	0	-10	-19	-23
m	3	49	-3	37	3	26	36	20	58	27	45	26
21 d	-19	-10	0	11	20	23	20	12	0	-10	-19	-23
m	50	27	21	58	15	26	24	1	35	48	58	26
22 d	-19	-10	0	12	20	23	20	11	0	-11	-20	-23
m	36	5	45	18	27	26	13	40	12	9	11	26
23 d	-19	-9	1	12	20	23	20	11	0	-11	-20	-23
m	22	43	8	38	38	25	0	20	-12	30	24	26
24 d	-19	-9	1	12	20	23	19	10	0	-11	-20	-23
m	8	21	32	58	49	24	48	60	-35	51	36	25
25 d	-18	-8	1	13	21	23	19	10	0	-12	-20	-23
m	53	59	56	17	0	23	35	39	-58	12	48	23
26 d	-18	-8	2	13	21	23	19	10	-1	-12	-20	-23
m	38	36	19	37	11	21	22	18	22	32	59	21
27 d	-18	-8	2	13	21	23	19	9	-1	-12	-21	-23
m	23	14	43	56	21	18	8	57	45	53	10	19
28 d	-18	-7	3	14	21	23	18	9	-2	-13	-21	-23
m	7	51	6	15	31	16	54	36	8	13	21	16
29 d	-17	-7	3	14	21	23	18	9	-2	-13	-21	-23
m	51	28	30	33	40	13	40	15	32	33	31	13
30 d	-17	##	3	14	21	23	18	8	-2	-13	-21	-23
m	35	##	53	52	49	9	26	53	55	53	41	9
31 d	-17	##	4	##	21	##	18	8	##	-14	##	-23
m	18	##	16	##	57	##	11	32	##	12	##	4

Day Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
EXAMPLE: 5. April, 12.00 UTC <v.:2026>
Declination = degrees: 6 minutes: 11

YEARS= 2023 2027 2031 2035 2039
DEC = Declination, 12.00 UTC
in degrees d and minutes(= below the degrees)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 d	-22	-17	-7	4	15	22	23	17	8	-3	-14	-21
m	60	5	34	34	6	4	6	60	15	13	27	48
2 d	-22	-16	-7	4	15	22	23	17	7	-3	-14	-21
m	55	48	11	57	24	12	2	44	53	36	46	57
3 d	-22	-16	-6	5	15	22	22	17	7	-3	-15	-22
m	49	30	48	20	42	19	57	29	31	59	5	6
4 d	-22	-16	-6	5	15	22	22	17	7	-4	-15	-22
m	43	12	25	43	59	26	52	13	9	22	23	14
5 d	-22	-15	-6	6	16	22	22	16	6	-4	-15	-22
m	36	54	2	6	16	33	47	57	47	45	41	22
6 d	-22	-15	-5	6	16	22	22	16	6	-5	-15	-22
m	29	36	39	28	33	39	41	41	25	8	60	30
7 d	-22	-15	-5	6	16	22	22	16	6	-5	-16	-22
m	22	17	15	51	50	45	34	24	2	31	17	37
8 d	-22	-14	-4	7	17	22	22	16	5	-5	-16	-22
m	14	58	52	14	6	51	28	7	40	54	35	43
9 d	-22	-14	-4	7	17	22	22	15	5	-6	-16	-22
m	6	39	29	36	22	56	21	50	17	17	52	49
10 d	-21	-14	-4	7	17	23	22	15	4	-6	-17	-22
m	57	20	5	58	38	1	13	32	55	40	9	55
11 d	-21	-14	-3	8	17	23	22	15	4	-7	-17	-22
m	48	0	41	20	54	5	6	15	32	2	26	60
12 d	-21	-13	-3	8	18	23	21	14	4	-7	-17	-23
m	38	40	18	42	9	9	57	57	9	25	42	5
13 d	-21	-13	-2	9	18	23	21	14	3	-7	-17	-23
m	28	20	54	4	24	13	49	39	46	48	58	9
14 d	-21	-13	-2	9	18	23	21	14	3	-8	-18	-23
m	18	0	31	26	39	16	40	20	23	10	14	13
15 d	-21	-12	-2	9	18	23	21	14	3	-8	-18	-23
m	7	39	7	47	53	19	31	2	0	32	30	16
16 d	-20	-12	-1	10	19	23	21	13	2	-8	-18	-23
m	55	19	43	9	7	21	21	43	37	54	45	19
17 d	-20	-11	-1	10	19	23	21	13	2	-9	-18	-23
m	44	58	19	30	21	23	11	24	14	16	60	21
18 d	-20	-11	0	10	19	23	21	13	1	-9	-19	-23
m	32	37	-56	51	34	24	1	4	51	38	14	23
19 d	-20	-11	0	11	19	23	20	12	1	-9	-19	-23
m	19	15	-32	12	47	25	50	45	27	60	28	25
20 d	-20	-10	0	11	19	23	20	12	1	-10	-19	-23
m	7	54	-8	32	60	26	39	25	4	21	42	26
21 d	-19	-10	0	11	20	23	20	12	0	-10	-19	-23
m	53	32	15	53	12	26	27	5	41	43	55	26
22 d	-19	-10	0	12	20	23	20	11	0	-11	-20	-23
m	40	11	39	13	24	26	15	45	17	4	8	26
23 d	-19	-9	1	12	20	23	20	11	0	-11	-20	-23
m	26	49	3	33	35	25	3	25	-6	25	21	26
24 d	-19	-9	1	12	20	23	19	11	0	-11	-20	-23
m	12	26	26	53	47	24	51	5	-29	46	33	25
25 d	-18	-9	1	13	20	23	19	10	0	-12	-20	-23
m	57	4	50	13	58	23	38	44	-53	7	45	24
26 d	-18	-8	2	13	21	23	19	10	-1	-12	-20	-23
m	42	42	14	32	8	21	25	23	16	27	57	22
27 d	-18	-8	2	13	21	23	19	10	-1	-12	-21	-23
m	27	19	37	51	18	19	12	2	39	48	8	19
28 d	-18	-7	3	14	21	23	18	9	-2	-13	-21	-23
m	11	57	1	10	28	16	58	41	3	8	19	17
29 d	-17	-7	3	14	21	23	18	9	-2	-13	-21	-23
m	55	34	24	29	38	13	44	20	26	28	29	13
30 d	-17	##	3	14	21	23	18	8	-2	-13	-21	-23
m	39	##	47	48	47	10	29	58	49	48	39	10
31 d	-17	##	4	##	21	##	18	8	##	-14	##	-23
m	22	##	11	##	55	##	15	37	##	7	##	6

Day Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
EXAMPLE: 5. April, 12.00 UTC <v.:2027>
Declination = degrees: 6 minutes: 6