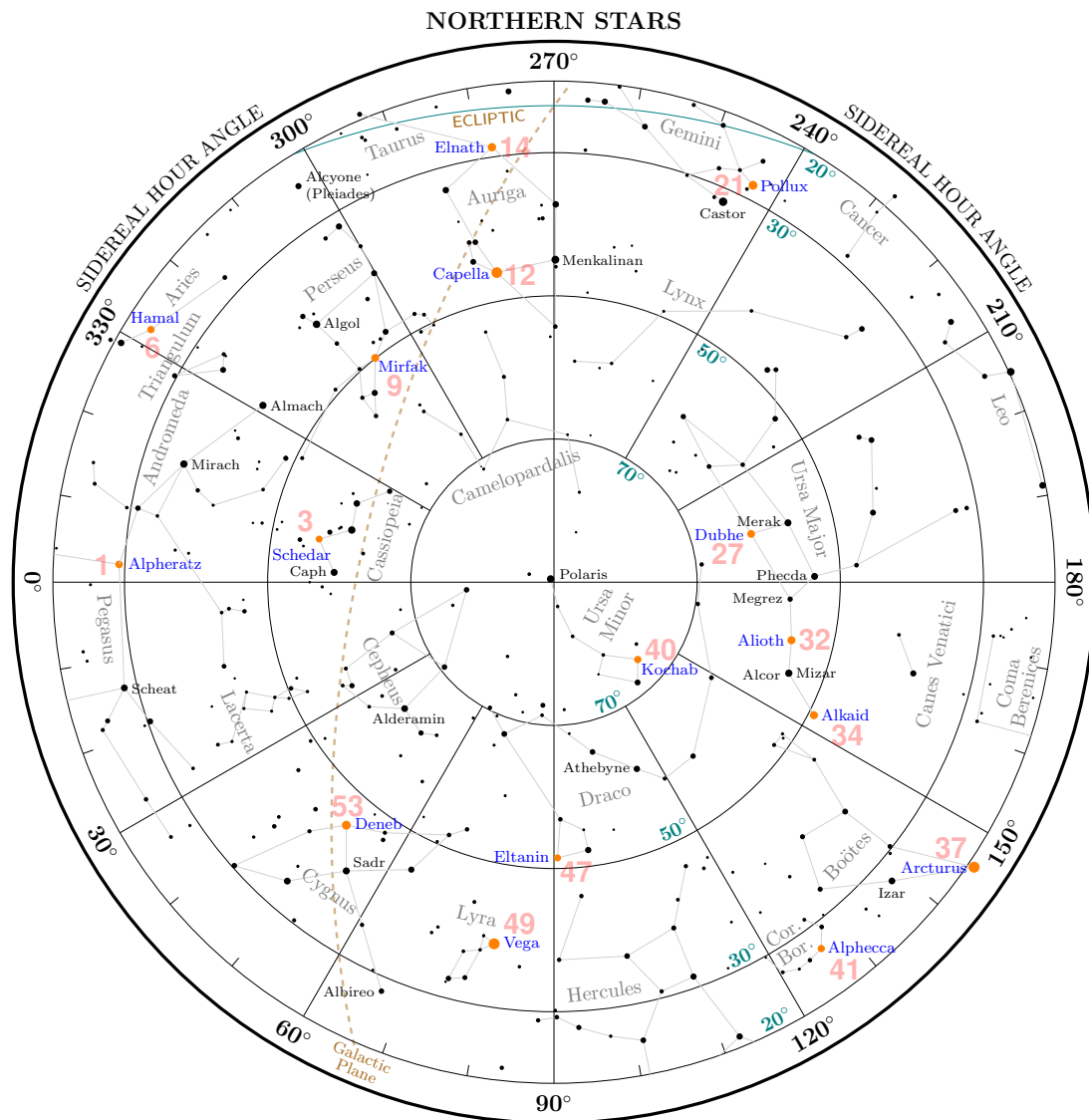


GENERATED USING EPHEM



THE NAUTICAL ALMANAC

29.05.2010

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Enhancements: Andrew BAUER

October 11, 2023

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May 29, 30, 31 (Sat., Sun., Mon.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	246°25.0	144°38.1	N24°48.2	98°21.5	N14°28.5	247°03.9	S01°31.3	67°26.0	N03°05.8	Alpheratz	357°46.0	29°08.8	
1	261°27.5	159°37.3	48.0	113°22.8	28.0	262°06.0	31.2	82°28.5	05.8	Ankaa	353°18.0	-42°14.7	
2	276°30.0	174°36.5	47.8	128°24.1	27.5	277°08.1	31.0	97°31.0	05.8	Schedar	349°43.5	56°35.5	
3	291°32.4	189°35.7	· · 47.6	143°25.3	· · 27.1	292°10.2	· · 30.9	112°33.4	· · 05.8	Diphda	348°58.3	-17°55.6	
4	306°34.9	204°34.9	47.4	158°26.6	26.6	307°12.3	30.7	127°35.9	05.8	Achernar	335°28.7	-57°10.8	
5	321°37.4	219°34.1	47.2	173°27.9	26.1	322°14.4	30.6	142°38.4	05.8	Hamal	328°03.6	23°30.6	
6	336°39.8	234°33.3	N24°47.1	188°29.1	N14°25.7	337°16.5	S01°30.4	157°40.9	N03°05.8	Polaris	319°17.0	89°18.5	
7	351°42.3	249°32.5	46.9	203°30.4	25.2	352°18.7	30.3	172°43.3	05.8	Acamar	315°20.4	-40°15.7	
8	6°44.8	264°31.7	46.7	218°31.7	24.7	7°20.8	30.1	187°45.8	05.8	Menkar	314°17.7	4°07.8	
9	21°47.2	279°30.9	· · 46.5	233°32.9	· · 24.3	22°22.9	· · 30.0	202°48.3	· · 05.8	Mirfak	308°44.1	49°53.8	
10	36°49.7	294°30.1	46.3	248°34.2	23.8	37°25.0	29.9	217°50.8	05.7	Aldebaran	290°52.3	16°31.8	
11	51°52.2	309°29.3	46.1	263°35.5	23.3	52°27.1	29.7	232°53.2	05.7	Rigel	281°14.5	-8°11.4	
12	66°54.6	324°28.5	N24°45.9	278°36.7	N14°22.9	67°29.2	S01°29.6	247°55.7	N03°05.7	Capella	280°38.2	46°00.5	
13	81°57.1	339°27.7	45.7	293°38.0	22.4	82°31.3	29.4	262°58.2	05.7	Bellatrix	278°34.7	6°21.5	
14	96°59.5	354°26.9	45.5	308°39.3	21.9	97°33.4	29.3	278°00.7	05.7	Elnath	278°15.8	28°37.0	
15	112°02.0	9°26.1	· · 45.3	323°40.5	· · 21.5	112°35.5	· · 29.1	293°03.1	· · 05.7	Alnilam	275°49.0	-1°11.8	
16	127°04.5	24°25.3	45.1	338°41.8	21.0	127°37.6	29.0	308°05.6	05.7	Betelgeuse	271°04.0	7°24.5	
17	142°06.9	39°24.5	44.9	353°43.1	20.5	142°39.7	28.9	323°08.1	05.7	Canopus	263°57.6	-52°42.2	
18	157°09.4	54°23.7	N24°44.7	8°44.3	N14°20.1	157°41.9	S01°28.7	338°10.5	N03°05.7	Sirius	258°36.0	-16°44.0	
19	172°11.9	69°22.9	44.5	23°45.6	19.6	172°44.0	28.6	353°13.0	05.7	Adhara	255°14.6	-28°59.3	
20	187°14.3	84°22.1	44.3	38°46.9	19.1	187°46.1	28.4	8°15.5	05.7	Procyon	245°02.3	5°11.8	
21	202°16.8	99°21.3	· · 44.1	53°48.1	· · 18.7	202°48.2	· · 28.3	23°18.0	· · 05.7	Pollux	243°30.7	28°00.1	
22	217°19.3	114°20.5	43.8	68°49.4	18.2	217°50.3	28.1	38°20.4	05.7	Avior	234°19.4	-59°32.9	
23	232°21.7	129°19.7	43.6	83°50.7	17.7	232°52.4	28.0	53°22.9	05.7	Suhail	222°54.3	-43°28.8	
Mer.pass. 07:33		ν -0.8' d -0.2' m -3.9		ν 1.3' d -0.5' m 1.1		ν 2.1' d 0.1' m -2.1		ν 2.5' d -0.0' m 1.0		Miaplacidus	221°40.7	-69°46.0	
										Alphard	217°58.4	-8°42.4	
										Regulus	207°45.9	11°54.9	
										Dubhe	193°54.1	61°41.9	
										Denebola	182°35.8	14°30.8	
										Gienah	175°54.5	-17°36.2	
										Acrux	173°11.7	-63°09.8	
										Gacrux	172°03.2	-57°10.7	
										Alioth	166°22.1	55°54.3	
										Spica	158°33.4	-11°13.1	
										Alkaid	153°00.1	49°15.7	
										Hadar	148°50.7	-60°25.7	
										Menkent	148°09.9	-36°25.5	
										Arcturus	145°57.4	19°07.6	
										Rigel Kent.	139°54.2	-60°52.9	
										Kochab	137°18.6	74°06.8	
										Zuben'ubi	137°07.6	-16°05.3	
										Alphecca	126°12.5	26°40.7	
										Antares	112°28.6	-26°27.4	
										Atria	107°31.9	-69°02.8	
										Sabik	102°14.7	-15°44.3	
										Shaula	96°24.5	-37°06.7	
										Rasalhague	96°08.2	12°33.1	
										Eltanin	90°46.7	51°29.1	
										Kaus Aust.	83°46.4	-34°22.7	
										Vega	80°40.1	38°47.5	
										Nunki	76°00.7	-26°16.9	
										Altair	62°10.2	8°53.7	
										Peacock	53°22.3	-56°41.8	
										Deneb	49°32.8	45°18.9	
										Enif	33°49.2	9°55.3	
										Al Na'ir	27°46.4	-46°54.3	
										Fomalhaut	15°26.4	-29°33.8	
										Scheat	13°55.6	28°08.3	
										Markab	13°40.6	15°15.6	
										May 29 Sat		SHA	Mer.pass
										Venus	258°13.0	14:22	
										Mars	211°56.5	17:25	
										Jupiter	0°38.8	07:31	
										Saturn	181°01.0	19:27	
										May 30 Sun		SHA	Mer.pass
										Venus	256°54.7	14:24	
										Mars	211°27.7	17:23	
										Jupiter	0°30.3	07:27	
										Saturn	181°01.2	19:23	
										May 31 Mon		SHA	Mer.pass
										Venus	255°36.6	14:25	
										Mars	210°58.9	17:21	
										Jupiter	0°22.0	07:24	
										Saturn	181°01.3	19:19	
										Horizontal parallax			
										Venus:	0.1		
										Mars:	0.1		
Mer.pass. 07:25		ν -0.8' d -0.2' m -3.9		ν 1.3' d -0.5' m 1.1		ν 2.1' d 0.1' m -2.1		ν 2.5' d -0.0' m 1.0					

h	Sun			Moon			
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°40.3	N21°34.0	347°24.6	7.9'	S25°01.4	0.3'	56.4'
1	195°40.2	34.4	1°51.5	7.9'	25°01.1	0.5'	56.3'
2	210°40.1	34.8	16°18.4	7.9'	25°00.7	0.6'	56.3'
3	225°40.0	· · 35.2	30°45.3	8.0'	25°00.0	0.7'	56.3'
4	240°39.9	35.6	45°12.3	8.0'	24°59.3	0.9'	56.3'
5	255°39.9	36.0	59°39.4	8.1'	24°58.4	1.0'	56.2'
6	270°39.8	N21°36.4	74°06.4	8.1'	S24°57.4	1.2'	56.2'
7	285°39.7	36.8	88°33.5	8.2'	24°56.2	1.3'	56.2'
8	300°39.6	37.2	103°00.7	8.2'	24°54.9	1.4'	56.2'
9	315°39.5	· · 37.5	117°27.9	8.2'	24°53.5	1.6'	56.1'
10	330°39.5	37.9	131°55.1	8.3'	24°51.9	1.7'	56.1'
11	345°39.4	38.3	146°22.4	8.3'	24°50.2	1.8'	56.1'
12	0°39.3	N21°38.7	160°49.8	8.4'	S24°48.3	2.0'	56.1'
13	15°39.2	39.1	175°17.2	8.4'	24°46.4	2.1'	56.0'
14	30°39.1	39.5	189°44.6	8.5'	24°44.2	2.3'	56.0'
15	45°39.0	· · 39.8	204°12.1	8.5'	24°42.0	2.4'	56.0'
16	60°39.0	40.2	218°39.7	8.6'	24°39.6	2.5'	56.0'
17	75°38.9	40.6	233°07.3	8.7'	24°37.1	2.6'	56.0'
18	90°38.8	N21°41.0	247°34.9	8.7'	S24°34.4	2.8'	55.9'
19	105°38.7	41.4	262°02.6	8.8'	24°31.7	2.9'	55.9'
20	120°38.6	41.7	276°30.4	8.8'	24°28.7	3.0'	55.9'
21	135°38.5	· · 42.1	290°58.2	8.9'	24°25.7	3.2'	55.9'
22	150°38.5	42.5	305°26.1	9.0'	24°22.5	3.3'	55.8'
23	165°38.4	42.9	319°54.1	9.0'	24°19.2	3.4'	55.8'
SD = 15.8'			SD = 15.4'				
$d = 0.4'$							

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°38.3	N21°43.3	334°22.1	9.1'	S24°15.8	3.5'	55.8'
1	195°38.2	43.6	348°50.2	9.1'	24°12.3	3.7'	55.8'
2	210°38.1	44.0	3°18.3	9.2'	24°08.6	3.8'	55.7'
3	225°38.0	· · 44.4	17°46.5	9.3'	24°04.8	3.9'	55.7'
4	240°38.0	44.8	32°14.8	9.3'	24°00.9	4.0'	55.7'
5	255°37.9	45.1	46°43.1	9.4'	23°56.8	4.2'	55.7'
6	270°37.8	N21°45.5	61°11.5	9.5'	S23°52.7	4.3'	55.6'
7	285°37.7	45.9	75°40.0	9.5'	23°48.4	4.4'	55.6'
8	300°37.6	46.2	90°08.5	9.6'	23°44.0	4.5'	55.6'
9	315°37.5	· · 46.6	104°37.1	9.7'	23°39.4	4.6'	55.6'
10	330°37.4	47.0	119°05.8	9.7'	23°34.8	4.8'	55.6'
11	345°37.4	47.4	133°34.5	9.8'	23°30.0	4.9'	55.5'
12	0°37.3	N21°47.7	148°03.3	9.9'	S23°25.1	5.0'	55.5'
13	15°37.2	48.1	162°32.2	10.0'	23°20.2	5.1'	55.5'
14	30°37.1	48.5	177°01.2	10.0'	23°15.0	5.2'	55.5'
15	45°37.0	· · 48.8	191°30.2	10.1'	23°09.8	5.3'	55.4'
16	60°36.9	49.2	205°59.3	10.2'	23°04.5	5.5'	55.4'
17	75°36.8	49.6	220°28.5	10.2'	22°59.0	5.6'	55.4'
18	90°36.7	N21°49.9	234°57.7	10.3'	S22°53.5	5.7'	55.4'
19	105°36.7	50.3	249°27.1	10.4'	22°47.8	5.8'	55.4'
20	120°36.6	50.7	263°56.5	10.5'	22°42.0	5.9'	55.3'
21	135°36.5	· · 51.0	278°25.9	10.5'	22°36.1	6.0'	55.3'
22	150°36.4	51.4	292°55.5	10.6'	22°30.1	6.1'	55.3'
23	165°36.3	51.7	307°25.1	10.7'	22°24.0	6.2'	55.3'
SD = 15.8'			SD = 15.2'				
$d = 0.4'$							

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°36.2	N21°52.1	321°54.8	10.8'	S22°17.8	6.3'	55.3'
1	195°36.1	52.5	336°24.6	10.8'	22°11.5	6.4'	55.2'
2	210°36.0	52.8	350°54.4	10.9'	22°05.1	6.5'	55.2'
3	225°36.0	· · 53.2	5°24.3	11.0'	21°58.6	6.6'	55.2'
4	240°35.9	53.5	19°54.3	11.1'	21°51.9	6.7'	55.2'
5	255°35.8	53.9	34°24.4	11.2'	21°45.2	6.8'	55.2'
6	270°35.7	N21°54.2	48°54.6	11.2'	S21°38.4	6.9'	55.1'
7	285°35.6	54.6	63°24.8	11.3'	21°31.5	7.0'	55.1'
8	300°35.5	55.0	77°55.1	11.4'	21°24.5	7.1'	55.1'
9	315°35.4	· · 55.3	92°25.5	11.5'	21°17.4	7.2'	55.1'
10	330°35.3	55.7	106°56.0	11.5'	21°10.1	7.3'	55.1'
11	345°35.2	56.0	121°26.5	11.6'	21°02.8	7.4'	55.0'
12	0°35.1	N21°56.4	135°57.1	11.7'	S20°55.4	7.5'	55.0'
13	15°35.1	56.7	150°27.8	11.8'	20°48.0	7.6'	55.0'
14	30°35.0	57.1	164°58.6	11.8'	20°40.4	7.7'	55.0'
15	45°34.9	· · 57.4	179°29.5	11.9'	20°32.7	7.8'	55.0'
16	60°34.8	57.8	194°00.4	12.0'	20°24.9	7.9'	54.9'
17	75°34.7	58.1	208°31.4	12.1'	20°17.1	7.9'	54.9'
18	90°34.6	N21°58.5	223°02.5	12.2'	S20°09.2	8.0'	54.9'
19	105°34.5	58.8	237°33.6	12.2'	20°01.1	8.1'	54.9'
20	120°34.4	59.2	252°04.9	12.3'	19°53.0	8.2'	54.9'
21	135°34.3	· · 59.5	266°36.2	12.4'	19°44.8	8.3'	54.9'
22	150°34.2	21°59.9	281°07.5	12.5'	19°36.5	8.4'	54.8'
23	165°34.1	22°00.2	295°39.0	12.5'	19°28.2	8.4'	54.8'
SD = 15.8'			SD = 15.1'				
$d = 0.4'$							

Lat.	Twilight		Sunrise	Sunset	Twilight	
	Naut.	Civil			Civil	Naut.
N 72°						
N 70°						
68°						
66°	—:—	—:—	01:22	22:37	—:—	—:—
64°	—:—	—:—	02:03	21:54	—:—	—:—
62°	—:—	00:32	02:31	21:25	23:34	—:—
60°	—:—	01:32	02:53	21:04	22:25	—:—
N 58°	—:—	02:05	03:10	20:46	21:52	—:—
56°	00:28	02:28	03:24	20:31	21:29	23:36
54°	01:24	02:46	03:37	20:19	21:10	22:33
52°	01:54	03:02	03:48	20:08	20:54	22:03
50°	02:16	03:15	03:58	19:58	20:41	21:40
45°	02:55	03:42	04:18	19:38	20:14	21:01
N 40°	03:22	04:02	04:34	19:21	19:53	20:33
35°	03:43	04:19	04:48	19:07	19:36	20:12
30°	04:00	04:33	05:00	18:55	19:22	19:55
20°	04:27	04:56	05:20	18:35	18:59	19:28
N 10°	04:48	05:15	05:38	18:17	18:40	19:07
0°	05:06	05:32	05:54	18:01	18:23	18:49
S 10°	05:21	05:47	06:10	17:45	18:08	18:34
20°	05:36	06:03	06:27	17:28	17:52	18:19
30°	05:51	06:21	06:47	17:08	17:34	18:04
35°	05:59	06:30	06:58	16:57	17:25	17:56
40°	06:07	06:41	07:11	16:44	17:14	17:48
45°	06:16	06:53	07:26	16:29	17:02	17:38
S 50°	06:27	07:08	07:45	16:10	16:47	17:28
52°	06:31	07:14	07:54	16:01	16:41	17:23
54°	06:36	07:21	08:04	15:51	16:33	17:18
56°	06:42	07:30	08:15	15:40	16:25	17:13
58°	06:48	07:39	08:28	15:27	16:16	17:07
S 60°	06:54	07:49	08:43	15:12	16:06	17:01

Lat.	Moonrise			Moonset		
	Sat	Sun	Mon	Sat	Sun	Mon
N 72°						
N 70°						
68°						
66°			01:03			04:22
64°	· · ·	00:16	00:23	01:58	03:22	05:01
62°	23:36	23:56	· · ·	02:49	04:02	05:28
60°	23:08	23:34	23:50	03:21	04:29	05:49
N 58°	22:47	23:17	23:37	03:44	04:50	06:06
56°	22:29	23:02	23:25	04:03	05:08	06:20
54°	22:14	22:49	23:15	04:19	05:22	06:33
52°	22:01	22:38	23:06	04:33	05:35	06:43
50°	21:50	22:28	22:58	04:45	05:46	06:53
45°	21:26	22:07	22:40	05:10	06:10	07:13
N 40°	21:07	21:50	22:26	05:30	06:29	07:30
35°	20:51	21:36	22:14	05:46	06:44	07:43
30°	20:37	21:23	22:04	06:01	06:58	07:55
20°	20:13	21:02	21:45	06:25	07:21	08:16
N 10°	19:53	20:43	21:29	06:46	07:40	08:33
0°	19:34	20:26	21:14	07:05	07:59	08:50
S 10°	19:14	20:08	20:59	07:25	08:17	09:06
20°	18:54	19:49	20:43	07:46	08:37	09:23
30°	18:30	19:28	20:25	08:10	09:00	09:43
35°	18:16	19:15	20:14	08:24	09:13	09:55
40°	18:00	19:00	20:02	08:40	09:28	10:08
45°	17:41	18:43	19:47	09:00	09:46	10:23
S 50°	17:17	18:21	19:29	09:24	10:08	10:42
52°	17:05	18:11	19:20	09:36	10:19	10:51
54°	16:52	17:59	19:11	09:49	10:31	11:01
56°	16:37	17:45	19:00	10:05	10:45	11:13
58°	16:18	17:30	18:47	10:23	11:01	11:26
S 60°	15:56	17:11	18:33	10:46	11:20	11:41

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time 00 ^h mm:ss	12 ^h mm:ss		Upper hh:mm	Lower hh:mm	
29	02:41	02:37	11:57	00:52	13:20	15(99%)
30	02:33	02:29	11:58	01:46	14:12	16(96%)
31	02:25	02:21	11:58	02:38	15:02	17(91%)

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