

Introduction to Reports Generated by Astronomy Lab 2

In all reports, times and dates are in standard time (not daylight savings time or summer time). Times are in 24 hour format.

Abbreviations used in reports:

AU	Astronomical Units
D	Degrees
DEC	Declination
DIST	Distance
DSO	December Solstice
E	East
FM	Full Moon
FQ	First Quarter Moon
H	Hours
ILL FR, ILLUM FRAC	Illuminated Fraction
JSO	June Solstice
KM	Kilometers
LE	Lunar Eclipse
LQ	Last Quarter Moon
M	Minutes
MEQ	March Equinox
MR	Moon Rise
MS	Moon Set
N	North
NM	New Moon
RA	Right Ascension
S	South, Seconds
SE	Solar Eclipse
SEQ	September Equinox
SR	Sunrise
SS	Sunset
UT	Universal Time
W	West
ZHR	Zenithal Hourly Rate

Calendar Report for 1/ 1/2019 to 12/31/2019

January                      2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
		SR: 7:49	SR: 7:49	SR: 7:49	SR: 7:49	SR: 7:49
		SS: 17:10	SS: 17:11	SS: 17:11	SS: 17:12	SS: 17:13
		MR: 3:35	MR: 4:38	MR: 5:38	MR: 6:35	MR: 7:28
		MS: 14:21	MS: 14:57	MS: 15:36	MS: 16:21	MS: 17:09
						NM: 18:30
						SE: 18:44
6	7	8	9	10	11	12
SR: 7:49	SR: 7:49	SR: 7:49	SR: 7:49	SR: 7:49	SR: 7:49	SR: 7:48
SS: 17:14	SS: 17:15	SS: 17:16	SS: 17:17	SS: 17:18	SS: 17:19	SS: 17:20
MR: 8:16	MR: 8:59	MR: 9:36	MR: 10:10	MR: 10:40	MR: 11:07	MR: 11:34
MS: 18:02	MS: 18:57	MS: 19:53	MS: 20:51	MS: 21:48	MS: 22:46	MS: 23:45
13	14	15	16	17	18	19
SR: 7:48	SR: 7:48	SR: 7:47	SR: 7:47	SR: 7:46	SR: 7:46	SR: 7:45
SS: 17:21	SS: 17:23	SS: 17:24	SS: 17:25	SS: 17:26	SS: 17:27	SS: 17:28
MR: 12:01	MR: 12:29	MR: 13:00	MR: 13:35	MR: 14:16	MR: 15:05	MR: 16:03
MS: None	MS: 0:45	MS: 1:47	MS: 2:52	MS: 3:59	MS: 5:07	MS: 6:14
FQ: 23:46						
20	21	22	23	24	25	26
SR: 7:45	SR: 7:44	SR: 7:44	SR: 7:43	SR: 7:42	SR: 7:41	SR: 7:41
SS: 17:29	SS: 17:31	SS: 17:32	SS: 17:33	SS: 17:34	SS: 17:35	SS: 17:36
MR: 17:10	MR: 18:23	MR: 19:39	MR: 20:54	MR: 22:06	MR: 23:16	MR: None
MS: 7:16	MS: 8:12	MS: 8:59	MS: 9:40	MS: 10:16	MS: 10:49	MS: 11:20
FM: 22:17						
LE: 22:12						
27	28	29	30	31		
SR: 7:40	SR: 7:39	SR: 7:38	SR: 7:37	SR: 7:36		
SS: 17:38	SS: 17:39	SS: 17:40	SS: 17:41	SS: 17:43		
MR: 0:23	MR: 1:28	MR: 2:31	MR: 3:32	MR: 4:30		
MS: 11:51	MS: 12:24	MS: 12:58	MS: 13:36	MS: 14:19		
LQ: 14:12						

February                      2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
					SR: 7:36	SR: 7:35
					SS: 17:44	SS: 17:45
					MR: 5:24	MR: 6:14
					MS: 15:05	MS: 15:56
3	4	5	6	7	8	9
SR: 7:34	SR: 7:33	SR: 7:31	SR: 7:30	SR: 7:29	SR: 7:28	SR: 7:27
SS: 17:46	SS: 17:48	SS: 17:49	SS: 17:50	SS: 17:51	SS: 17:52	SS: 17:54
MR: 6:58	MR: 7:37	MR: 8:11	MR: 8:42	MR: 9:11	MR: 9:37	MR: 10:04
MS: 16:50	MS: 17:47	MS: 18:44	MS: 19:42	MS: 20:39	MS: 21:37	MS: 22:36
	NM: 14:05					
10	11	12	13	14	15	16
SR: 7:26	SR: 7:25	SR: 7:23	SR: 7:22	SR: 7:21	SR: 7:20	SR: 7:18
SS: 17:55	SS: 17:56	SS: 17:57	SS: 17:58	SS: 18:00	SS: 18:01	SS: 18:02
MR: 10:31	MR: 11:00	MR: 11:31	MR: 12:08	MR: 12:52	MR: 13:44	MR: 14:45
MS: 23:36	MS: None	MS: 0:38	MS: 1:42	MS: 2:47	MS: 3:53	MS: 4:56
		FQ: 15:27				
17	18	19	20	21	22	23
SR: 7:17	SR: 7:16	SR: 7:14	SR: 7:13	SR: 7:12	SR: 7:10	SR: 7:09
SS: 18:03	SS: 18:04	SS: 18:06	SS: 18:07	SS: 18:08	SS: 18:09	SS: 18:10
MR: 15:54	MR: 17:09	MR: 18:25	MR: 19:41	MR: 20:55	MR: 22:06	MR: 23:15
MS: 5:54	MS: 6:45	MS: 7:30	MS: 8:09	MS: 8:44	MS: 9:17	MS: 9:50
		FM: 8:54				
24	25	26	27	28		
SR: 7:07	SR: 7:06	SR: 7:04	SR: 7:03	SR: 7:01		
SS: 18:11	SS: 18:13	SS: 18:14	SS: 18:15	SS: 18:16		
MR: None	MR: 0:21	MR: 1:24	MR: 2:24	MR: 3:20		
MS: 10:23	MS: 10:57	MS: 11:35	MS: 12:16	MS: 13:02		
		LQ: 4:30				

March                      2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
					SR: 7:00	SR: 6:58
					SS: 18:17	SS: 18:18
					MR: 4:11	MR: 4:57
					MS: 13:52	MS: 14:45
3	4	5	6	7	8	9
SR: 6:57	SR: 6:55	SR: 6:54	SR: 6:52	SR: 6:51	SR: 6:49	SR: 6:47
SS: 18:19	SS: 18:21	SS: 18:22	SS: 18:23	SS: 18:24	SS: 18:25	SS: 18:26
MR: 5:37	MR: 6:13	MR: 6:45	MR: 7:14	MR: 7:41	MR: 8:08	MR: 8:34
MS: 15:40	MS: 16:37	MS: 17:35	MS: 18:33	MS: 19:32	MS: 20:31	MS: 21:30
			NM: 9:05			
10	11	12	13	14	15	16
SR: 6:46	SR: 6:44	SR: 6:43	SR: 6:41	SR: 6:39	SR: 6:38	SR: 6:36
SS: 18:27	SS: 18:28	SS: 18:29	SS: 18:30	SS: 18:31	SS: 18:33	SS: 18:34
MR: 9:02	MR: 9:32	MR: 10:07	MR: 10:47	MR: 11:34	MR: 12:29	MR: 13:32
MS: 22:31	MS: 23:34	MS: None	MS: 0:38	MS: 1:41	MS: 2:43	MS: 3:41
				FQ: 3:27		
17	18	19	20	21	22	23
SR: 6:34	SR: 6:33	SR: 6:31	SR: 6:30	SR: 6:28	SR: 6:26	SR: 6:25
SS: 18:35	SS: 18:36	SS: 18:37	SS: 18:38	SS: 18:39	SS: 18:40	SS: 18:41
MR: 14:42	MR: 15:56	MR: 17:12	MR: 18:27	MR: 19:40	MR: 20:52	MR: 22:02
MS: 4:34	MS: 5:20	MS: 6:01	MS: 6:37	MS: 7:11	MS: 7:44	MS: 8:17
			FM: 18:43			
			MEQ:15:00			
24	25	26	27	28	29	30
SR: 6:23	SR: 6:21	SR: 6:20	SR: 6:18	SR: 6:16	SR: 6:15	SR: 6:13
SS: 18:42	SS: 18:43	SS: 18:44	SS: 18:45	SS: 18:46	SS: 18:47	SS: 18:48
MR: 23:10	MR: None	MR: 0:13	MR: 1:13	MR: 2:07	MR: 2:55	MR: 3:37
MS: 8:52	MS: 9:29	MS: 10:10	MS: 10:56	MS: 11:45	MS: 12:37	MS: 13:33
			LQ: 21:11			
31						
SR: 6:11						
SS: 18:49						
MR: 4:14						
MS: 14:29						



May                      2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
			SR: 5:25	SR: 5:24	SR: 5:23	SR: 5:21
			SS: 19:22	SS: 19:23	SS: 19:24	SS: 19:25
			MR: 4:14	MR: 4:40	MR: 5:07	MR: 5:36
			MS: 16:12	MS: 17:13	MS: 18:14	MS: 19:18
						NM: 15:47
5	6	7	8	9	10	11
SR: 5:20	SR: 5:19	SR: 5:18	SR: 5:17	SR: 5:16	SR: 5:15	SR: 5:13
SS: 19:26	SS: 19:27	SS: 19:28	SS: 19:29	SS: 19:30	SS: 19:31	SS: 19:32
MR: 6:07	MR: 6:44	MR: 7:27	MR: 8:17	MR: 9:14	MR: 10:18	MR: 11:27
MS: 20:23	MS: 21:28	MS: 22:32	MS: 23:33	MS: None	MS: 0:28	MS: 1:16
						FQ: 18:13
12	13	14	15	16	17	18
SR: 5:12	SR: 5:11	SR: 5:10	SR: 5:09	SR: 5:09	SR: 5:08	SR: 5:07
SS: 19:33	SS: 19:34	SS: 19:35	SS: 19:36	SS: 19:37	SS: 19:37	SS: 19:38
MR: 12:37	MR: 13:49	MR: 14:59	MR: 16:10	MR: 17:20	MR: 18:29	MR: 19:37
MS: 1:58	MS: 2:35	MS: 3:08	MS: 3:39	MS: 4:10	MS: 4:42	MS: 5:17
						FM: 14:12
19	20	21	22	23	24	25
SR: 5:06	SR: 5:05	SR: 5:04	SR: 5:04	SR: 5:03	SR: 5:02	SR: 5:01
SS: 19:39	SS: 19:40	SS: 19:41	SS: 19:42	SS: 19:43	SS: 19:44	SS: 19:45
MR: 20:43	MR: 21:45	MR: 22:40	MR: 23:29	MR: None	MR: 0:12	MR: 0:48
MS: 5:54	MS: 6:36	MS: 7:23	MS: 8:15	MS: 9:10	MS: 10:07	MS: 11:05
26	27	28	29	30	31	
SR: 5:01	SR: 5:00	SR: 5:00	SR: 4:59	SR: 4:59	SR: 4:58	
SS: 19:46	SS: 19:46	SS: 19:47	SS: 19:48	SS: 19:49	SS: 19:49	
MR: 1:20	MR: 1:49	MR: 2:16	MR: 2:42	MR: 3:08	MR: 3:36	
MS: 12:03	MS: 13:01	MS: 14:00	MS: 14:59	MS: 16:00	MS: 17:03	
LQ: 9:35						

June 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
						SR: 4:58
						SS: 19:50
						MR: 4:06
						MS: 18:07
2	3	4	5	6	7	8
SR: 4:57	SR: 4:57	SR: 4:56	SR: 4:56	SR: 4:56	SR: 4:56	SR: 4:55
SS: 19:51	SS: 19:52	SS: 19:52	SS: 19:53	SS: 19:54	SS: 19:54	SS: 19:55
MR: 4:41	MR: 5:21	MR: 6:09	MR: 7:05	MR: 8:09	MR: 9:17	MR: 10:28
MS: 19:14	MS: 20:21	MS: 21:24	MS: 22:23	MS: 23:15	MS: 23:59	MS: None
	NM: 3:03					
9	10	11	12	13	14	15
SR: 4:55	SR: 4:55	SR: 4:55	SR: 4:55	SR: 4:55	SR: 4:55	SR: 4:55
SS: 19:55	SS: 19:56	SS: 19:56	SS: 19:57	SS: 19:57	SS: 19:58	SS: 19:58
MR: 11:40	MR: 12:50	MR: 13:59	MR: 15:08	MR: 16:16	MR: 17:23	MR: 18:29
MS: 0:38	MS: 1:12	MS: 1:43	MS: 2:13	MS: 2:44	MS: 3:16	MS: 3:51
FQ: 23:01						
16	17	18	19	20	21	22
SR: 4:55	SR: 4:55	SR: 4:55	SR: 4:55	SR: 4:55	SR: 4:55	SR: 4:56
SS: 19:58	SS: 19:59	SS: 19:59	SS: 19:59	SS: 20:00	SS: 20:00	SS: 20:00
MR: 19:32	MR: 20:30	MR: 21:22	MR: 22:07	MR: 22:47	MR: 23:21	MR: 23:51
MS: 4:31	MS: 5:15	MS: 6:05	MS: 6:59	MS: 7:55	MS: 8:53	MS: 9:52
	FM: 1:31					
					JSO: 8:55	
23	24	25	26	27	28	29
SR: 4:56	SR: 4:56	SR: 4:57	SR: 4:57	SR: 4:57	SR: 4:58	SR: 4:58
SS: 20:00	SS: 20:00	SS: 20:00	SS: 20:00	SS: 20:01	SS: 20:01	SS: 20:00
MR: None	MR: 0:18	MR: 0:44	MR: 1:09	MR: 1:36	MR: 2:04	MR: 2:36
MS: 10:50	MS: 11:48	MS: 12:46	MS: 13:45	MS: 14:46	MS: 15:49	MS: 16:55
		LQ: 2:48				
30						
SR: 4:59						
SS: 20:00						
MR: 3:14						
MS: 18:02						

July                      2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
+-----+-----+-----+-----+-----+-----+-----+						
	1	2	3	4	5	6
	SR: 4:59	SR: 5:00	SR: 5:00	SR: 5:01	SR: 5:01	SR: 5:02
	SS: 20:00	SS: 20:00	SS: 20:00	SS: 20:00	SS: 20:00	SS: 19:59
	MR: 3:58	MR: 4:51	MR: 5:53	MR: 7:02	MR: 8:14	MR: 9:28
	MS: 19:08	MS: 20:11	MS: 21:07	MS: 21:56	MS: 22:37	MS: 23:14
		NM: 12:17				
		SE: 12:23				
+-----+-----+-----+-----+-----+-----+-----+						
7	8	9	10	11	12	13
SR: 5:02	SR: 5:03	SR: 5:04	SR: 5:04	SR: 5:05	SR: 5:06	SR: 5:07
SS: 19:59	SS: 19:59	SS: 19:58	SS: 19:58	SS: 19:57	SS: 19:57	SS: 19:56
MR: 10:40	MR: 11:51	MR: 13:00	MR: 14:08	MR: 15:15	MR: 16:20	MR: 17:23
MS: 23:46	MS: None	MS: 0:17	MS: 0:47	MS: 1:19	MS: 1:52	MS: 2:30
		FQ: 3:57				
+-----+-----+-----+-----+-----+-----+-----+						
14	15	16	17	18	19	20
SR: 5:07	SR: 5:08	SR: 5:09	SR: 5:10	SR: 5:10	SR: 5:11	SR: 5:12
SS: 19:56	SS: 19:55	SS: 19:55	SS: 19:54	SS: 19:53	SS: 19:53	SS: 19:52
MR: 18:22	MR: 19:16	MR: 20:03	MR: 20:45	MR: 21:21	MR: 21:52	MR: 22:20
MS: 3:11	MS: 3:58	MS: 4:50	MS: 5:46	MS: 6:44	MS: 7:42	MS: 8:40
		FM: 14:40				
		LE: 14:33				
+-----+-----+-----+-----+-----+-----+-----+						
21	22	23	24	25	26	27
SR: 5:13	SR: 5:14	SR: 5:15	SR: 5:16	SR: 5:16	SR: 5:17	SR: 5:18
SS: 19:51	SS: 19:50	SS: 19:50	SS: 19:49	SS: 19:48	SS: 19:47	SS: 19:46
MR: 22:46	MR: 23:12	MR: 23:37	MR: None	MR: 0:04	MR: 0:33	MR: 1:07
MS: 9:38	MS: 10:36	MS: 11:34	MS: 12:33	MS: 13:34	MS: 14:37	MS: 15:42
			LQ: 18:20			
+-----+-----+-----+-----+-----+-----+-----+						
28	29	30	31			
SR: 5:19	SR: 5:20	SR: 5:21	SR: 5:22			
SS: 19:45	SS: 19:44	SS: 19:43	SS: 19:42			
MR: 1:47	MR: 2:36	MR: 3:33	MR: 4:39			
MS: 16:48	MS: 17:52	MS: 18:52	MS: 19:45			
			NM: 20:13			
+-----+-----+-----+-----+-----+-----+-----+						



September                      2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
SR: 5:53	SR: 5:54	SR: 5:55	SR: 5:56	SR: 5:57	SR: 5:58	SR: 5:59
SS: 18:58	SS: 18:56	SS: 18:55	SS: 18:53	SS: 18:52	SS: 18:50	SS: 18:48
MR: 8:29	MR: 9:42	MR: 10:54	MR: 12:03	MR: 13:09	MR: 14:11	MR: 15:08
MS: 20:47	MS: 21:19	MS: 21:53	MS: 22:29	MS: 23:08	MS: 23:53	MS: None
				FQ: 20:12		
8	9	10	11	12	13	14
SR: 6:00	SR: 6:01	SR: 6:02	SR: 6:03	SR: 6:04	SR: 6:05	SR: 6:05
SS: 18:47	SS: 18:45	SS: 18:43	SS: 18:42	SS: 18:40	SS: 18:38	SS: 18:37
MR: 15:59	MR: 16:44	MR: 17:23	MR: 17:56	MR: 18:26	MR: 18:53	MR: 19:19
MS: 0:41	MS: 1:34	MS: 2:30	MS: 3:28	MS: 4:26	MS: 5:25	MS: 6:22
					FM: 21:35	
15	16	17	18	19	20	21
SR: 6:06	SR: 6:07	SR: 6:08	SR: 6:09	SR: 6:10	SR: 6:11	SR: 6:12
SS: 18:35	SS: 18:33	SS: 18:32	SS: 18:30	SS: 18:28	SS: 18:27	SS: 18:25
MR: 19:44	MR: 20:09	MR: 20:36	MR: 21:05	MR: 21:39	MR: 22:18	MR: 23:05
MS: 7:20	MS: 8:18	MS: 9:17	MS: 10:17	MS: 11:19	MS: 12:21	MS: 13:23
						LQ: 19:44
22	23	24	25	26	27	28
SR: 6:13	SR: 6:14	SR: 6:15	SR: 6:16	SR: 6:17	SR: 6:18	SR: 6:19
SS: 18:23	SS: 18:22	SS: 18:20	SS: 18:18	SS: 18:17	SS: 18:15	SS: 18:13
MR: 24:00	MR: None	MR: 1:03	MR: 2:14	MR: 3:28	MR: 4:45	MR: 6:01
MS: 14:23	MS: 15:19	MS: 16:09	MS: 16:54	MS: 17:33	MS: 18:08	MS: 18:42
						NM: 11:28
	SEQ: 0:50					
29	30					
SR: 6:20	SR: 6:21					
SS: 18:12	SS: 18:10					
MR: 7:17	MR: 8:31					
MS: 19:14	MS: 19:48					

October                      2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
		SR: 6:22	SR: 6:23	SR: 6:24	SR: 6:25	SR: 6:26
		SS: 18:08	SS: 18:07	SS: 18:05	SS: 18:03	SS: 18:02
		MR: 9:44	MR: 10:54	MR: 12:01	MR: 13:02	MR: 13:56
		MS: 20:23	MS: 21:03	MS: 21:46	MS: 22:35	MS: 23:27
						FQ: 9:48
6	7	8	9	10	11	12
SR: 6:27	SR: 6:28	SR: 6:29	SR: 6:30	SR: 6:31	SR: 6:32	SR: 6:33
SS: 18:00	SS: 17:58	SS: 17:57	SS: 17:55	SS: 17:54	SS: 17:52	SS: 17:51
MR: 14:43	MR: 15:24	MR: 15:59	MR: 16:30	MR: 16:58	MR: 17:23	MR: 17:48
MS: None	MS: 0:23	MS: 1:21	MS: 2:19	MS: 3:17	MS: 4:16	MS: 5:14
13	14	15	16	17	18	19
SR: 6:35	SR: 6:36	SR: 6:37	SR: 6:38	SR: 6:39	SR: 6:40	SR: 6:41
SS: 17:49	SS: 17:47	SS: 17:46	SS: 17:44	SS: 17:43	SS: 17:41	SS: 17:40
MR: 18:13	MR: 18:39	MR: 19:08	MR: 19:40	MR: 20:17	MR: 21:01	MR: 21:52
MS: 6:12	MS: 7:11	MS: 8:11	MS: 9:13	MS: 10:15	MS: 11:18	MS: 12:18
FM: 14:11						
20	21	22	23	24	25	26
SR: 6:42	SR: 6:43	SR: 6:44	SR: 6:45	SR: 6:47	SR: 6:48	SR: 6:49
SS: 17:39	SS: 17:37	SS: 17:36	SS: 17:34	SS: 17:33	SS: 17:32	SS: 17:30
MR: 22:51	MR: 23:57	MR: None	MR: 1:08	MR: 2:21	MR: 3:35	MR: 4:50
MS: 13:14	MS: 14:05	MS: 14:49	MS: 15:29	MS: 16:04	MS: 16:37	MS: 17:09
	LQ: 5:42					
27	28	29	30	31		
SR: 6:50	SR: 6:51	SR: 6:52	SR: 6:53	SR: 6:55		
SS: 17:29	SS: 17:28	SS: 17:26	SS: 17:25	SS: 17:24		
MR: 6:04	MR: 7:18	MR: 8:31	MR: 9:42	MR: 10:48		
MS: 17:42	MS: 18:16	MS: 18:54	MS: 19:36	MS: 20:23		
NM: 20:40						

November                      2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
					SR: 6:56	SR: 6:57
					SS: 17:23	SS: 17:21
					MR: 11:47	MR: 12:39
					MS: 21:16	MS: 22:12
3	4	5	6	7	8	9
SR: 6:58	SR: 6:59	SR: 7:00	SR: 7:02	SR: 7:03	SR: 7:04	SR: 7:05
SS: 17:20	SS: 17:19	SS: 17:18	SS: 17:17	SS: 17:16	SS: 17:15	SS: 17:14
MR: 13:23	MR: 14:00	MR: 14:32	MR: 15:01	MR: 15:27	MR: 15:52	MR: 16:17
MS: 23:10	MS: None	MS: 0:09	MS: 1:08	MS: 2:06	MS: 3:04	MS: 4:03
	FQ: 3:24					
10	11	12	13	14	15	16
SR: 7:06	SR: 7:07	SR: 7:09	SR: 7:10	SR: 7:11	SR: 7:12	SR: 7:13
SS: 17:13	SS: 17:12	SS: 17:11	SS: 17:10	SS: 17:09	SS: 17:08	SS: 17:08
MR: 16:42	MR: 17:10	MR: 17:41	MR: 18:16	MR: 18:58	MR: 19:48	MR: 20:44
MS: 5:02	MS: 6:02	MS: 7:04	MS: 8:08	MS: 9:11	MS: 10:13	MS: 11:11
		FM: 6:37				
17	18	19	20	21	22	23
SR: 7:14	SR: 7:16	SR: 7:17	SR: 7:18	SR: 7:19	SR: 7:20	SR: 7:21
SS: 17:07	SS: 17:06	SS: 17:05	SS: 17:05	SS: 17:04	SS: 17:04	SS: 17:03
MR: 21:48	MR: 22:56	MR: None	MR: 0:07	MR: 1:19	MR: 2:30	MR: 3:42
MS: 12:04	MS: 12:50	MS: 13:30	MS: 14:05	MS: 14:38	MS: 15:08	MS: 15:39
		LQ: 14:13				
24	25	26	27	28	29	30
SR: 7:22	SR: 7:23	SR: 7:25	SR: 7:26	SR: 7:27	SR: 7:28	SR: 7:29
SS: 17:02	SS: 17:02	SS: 17:01	SS: 17:01	SS: 17:01	SS: 17:00	SS: 17:00
MR: 4:55	MR: 6:07	MR: 7:19	MR: 8:28	MR: 9:32	MR: 10:28	MR: 11:17
MS: 16:11	MS: 16:46	MS: 17:26	MS: 18:11	MS: 19:01	MS: 19:57	MS: 20:56
		NM: 8:08				

December                      2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
SR: 7:30	SR: 7:31	SR: 7:32	SR: 7:33	SR: 7:34	SR: 7:35	SR: 7:36
SS: 17:00	SS: 16:59	SS: 16:59	SS: 16:59	SS: 16:59	SS: 16:59	SS: 16:59
MR: 11:58	MR: 12:33	MR: 13:03	MR: 13:30	MR: 13:55	MR: 14:19	MR: 14:44
MS: 21:56	MS: 22:56	MS: 23:55	MS: None	MS: 0:53	MS: 1:51	MS: 2:49
		FQ: 23:59				
8	9	10	11	12	13	14
SR: 7:36	SR: 7:37	SR: 7:38	SR: 7:39	SR: 7:40	SR: 7:41	SR: 7:41
SS: 16:59	SS: 16:59	SS: 16:59	SS: 16:59	SS: 16:59	SS: 16:59	SS: 17:00
MR: 15:10	MR: 15:40	MR: 16:13	MR: 16:53	MR: 17:41	MR: 18:36	MR: 19:39
MS: 3:49	MS: 4:50	MS: 5:54	MS: 6:58	MS: 8:02	MS: 9:04	MS: 10:00
			FM: 22:15			
15	16	17	18	19	20	21
SR: 7:42	SR: 7:43	SR: 7:43	SR: 7:44	SR: 7:45	SR: 7:45	SR: 7:46
SS: 17:00	SS: 17:00	SS: 17:00	SS: 17:01	SS: 17:01	SS: 17:02	SS: 17:02
MR: 20:47	MR: 21:58	MR: 23:09	MR: None	MR: 0:20	MR: 1:31	MR: 2:41
MS: 10:49	MS: 11:32	MS: 12:09	MS: 12:41	MS: 13:12	MS: 13:41	MS: 14:11
			LQ: 21:59			
						DSO:21:19
22	23	24	25	26	27	28
SR: 7:46	SR: 7:47	SR: 7:47	SR: 7:47	SR: 7:48	SR: 7:48	SR: 7:48
SS: 17:03	SS: 17:03	SS: 17:04	SS: 17:04	SS: 17:05	SS: 17:06	SS: 17:06
MR: 3:51	MR: 5:01	MR: 6:10	MR: 7:15	MR: 8:15	MR: 9:08	MR: 9:53
MS: 14:44	MS: 15:20	MS: 16:02	MS: 16:49	MS: 17:43	MS: 18:41	MS: 19:41
			NM: 22:16			
			SE: 22:21			
29	30	31				
SR: 7:49	SR: 7:49	SR: 7:49				
SS: 17:07	SS: 17:08	SS: 17:09				
MR: 10:31	MR: 11:03	MR: 11:31				
MS: 20:42	MS: 21:42	MS: 22:41				

Midway, UT (JMC)      Latitude: 40°30'53" N    Longitude: 111°27'50" W  
Local Time = UT - 7.00 hours    Elevation: 1708 meters      Year 2019  
Page 14

#### Seasons Report for 2019

MEQ: 3/20/2019 15:00	Winter Length:	88.98 days
JSO: 6/21/2019 8:55	Spring Length:	92.75 days
SEQ: 9/23/2019 0:50	Summer Length:	93.66 days
DSO: 12/21/2019 21:19	Autumn Length:	89.85 days

#### Dates of Easter Report for 2019

4/21/2019

#### Lunar Eclipse Report for 2019

Lunar eclipse on 1/20/2019

Moon rise: 17:10  
Moon set: 7:16  
Magnitude: 1.19  
Partial phase begins: 20:34  
Total phase begins: 21:42  
Time of maximum eclipse: 22:12  
Total phase ends: 22:42  
Partial phase ends: 23:50

Lunar eclipse on 7/16/2019

Moon rise: 20:03  
Moon set: 4:50  
Magnitude: 0.65  
Partial phase begins: 13:05  
Time of maximum eclipse: 14:33  
Partial phase ends: 16:02

#### Solar Eclipse Report for 2019

Solar eclipse on 1/ 5/2019

Sun rise: 7:49  
Sun set: 17:13  
Time of maximum eclipse: 18:44  
Eclipse is partial, maximum magnitude = 0.72  
Eclipse is visible in the northern hemisphere

Solar eclipse on 7/ 2/2019

Sun rise: 5:00  
Sun set: 20:00  
Time of maximum eclipse: 12:23  
Eclipse is total  
Eclipse is visible in the southern hemisphere

Solar eclipse on 12/25/2019

Sun rise: 7:47  
Sun set: 17:04  
Time of maximum eclipse: 22:21  
Eclipse is annular  
Eclipse is visible in the northern hemisphere

The time of maximum eclipse (above) does not necessarily specify when the eclipse will be maximal when viewed from the specified location.

To see how the eclipse will look at the specified location, run a Planetarium movie of the eclipse.

Planet View Info Report for 1/ 1/2019 to 12/31/2019

Mercury

Date	Rise	Set	RA	Dec	Elongation	Ill Fr	DIST(AU)
1/ 1/2019	6:42	15:57	17h33m16s	-23°10'11"	16°23'49"	0.893	1.29617
1/ 8/2019	7:04	16:12	18h18m50s	-24°03'56"	13°06'42"	0.938	1.36466
1/15/2019	7:23	16:33	19h06m17s	-23°56'46"	9°30'46"	0.969	1.40650
1/22/2019	7:38	17:00	19h54m51s	-22°42'15"	5°38'37"	0.988	1.42269
1/29/2019	7:49	17:33	20h43m56s	-20°16'10"	2°12'52"	0.998	1.41157
2/ 5/2019	7:56	18:09	21h33m01s	-16°36'39"	4°45'04"	0.989	1.36790
2/12/2019	7:58	18:48	22h21m08s	-11°47'36"	9°56'32"	0.938	1.28224
2/19/2019	7:55	19:24	23h05m43s	-6°10'26"	15°04'58"	0.797	1.14427
2/26/2019	7:42	19:46	23h40m07s	-0°48'25"	18°04'16"	0.530	0.95945
3/ 5/2019	7:16	19:38	23h53m58s	2°27'36"	15°44'10"	0.219	0.77205
3/12/2019	6:38	18:53	23h42m55s	2°06'32"	6°50'18"	0.028	0.64491
3/19/2019	5:59	17:52	23h20m33s	-1°05'31"	8°07'09"	0.032	0.60952
3/26/2019	5:31	17:04	23h08m05s	-4°14'23"	18°40'08"	0.161	0.64975
4/ 2/2019	5:14	16:40	23h12m46s	-5°33'42"	24°59'51"	0.309	0.73083
4/ 9/2019	5:03	16:35	23h31m04s	-4°58'21"	27°31'00"	0.436	0.82847
4/16/2019	4:55	16:44	23h58m26s	-2°50'28"	27°19'11"	0.543	0.93142
4/23/2019	4:50	17:03	0h32m10s	0°30'06"	25°07'13"	0.640	1.03491
4/30/2019	4:47	17:31	1h11m16s	4°47'51"	21°15'48"	0.737	1.13555
5/ 7/2019	4:47	18:07	1h56m05s	9°47'53"	15°50'58"	0.841	1.22740
5/14/2019	4:52	18:52	2h47m45s	15°08'44"	8°53'18"	0.943	1.29745
5/21/2019	5:04	19:45	3h46m59s	20°10'14"	0°42'03"	1.000	1.32257
5/28/2019	5:25	20:36	4h51m02s	23°50'45"	7°58'26"	0.946	1.28181
6/ 4/2019	5:53	21:15	5h53m05s	25°25'42"	15°26'35"	0.803	1.18332
6/11/2019	6:21	21:37	6h47m07s	25°02'42"	20°56'30"	0.644	1.05748
6/18/2019	6:44	21:42	7h30m28s	23°18'32"	24°13'38"	0.502	0.92833
6/25/2019	6:58	21:33	8h01m59s	20°52'21"	25°07'31"	0.374	0.80808
7/ 2/2019	6:58	21:12	8h20m24s	18°20'26"	23°15'19"	0.251	0.70380
7/ 9/2019	6:40	20:38	8h24m06s	16°19'05"	18°06'34"	0.132	0.62347
7/16/2019	6:04	19:55	8h13m08s	15°22'53"	9°53'00"	0.038	0.57985
7/23/2019	5:15	19:11	7h54m08s	15°47'41"	5°30'49"	0.013	0.58932
7/30/2019	4:31	18:38	7h41m14s	17°10'31"	13°04'17"	0.091	0.66257
8/ 6/2019	4:04	18:25	7h46m38s	18°39'31"	18°15'28"	0.267	0.79610
8/13/2019	4:03	18:29	8h13m56s	19°14'35"	18°36'00"	0.516	0.97102
8/20/2019	4:28	18:43	8h59m15s	17°59'29"	14°38'10"	0.778	1.14998
8/27/2019	5:08	18:55	9h52m58s	14°36'03"	8°13'03"	0.947	1.28711
9/ 3/2019	5:51	19:02	10h45m48s	9°43'50"	2°01'01"	0.998	1.36258
9/10/2019	6:30	19:02	11h34m06s	4°16'10"	5°31'31"	0.985	1.38658
9/17/2019	7:05	19:00	12h18m04s	-1°12'51"	10°49'35"	0.949	1.37464
9/24/2019	7:36	18:55	12h58m49s	-6°25'33"	15°21'38"	0.906	1.33665
10/ 1/2019	8:04	18:49	13h37m20s	-11°11'44"	19°07'27"	0.855	1.27709
10/ 8/2019	8:28	18:42	14h14m00s	-15°23'13"	22°05'52"	0.793	1.19720
10/15/2019	8:47	18:36	14h48m15s	-18°50'33"	24°05'33"	0.708	1.09674
10/22/2019	8:58	18:27	15h17m47s	-21°19'37"	24°32'55"	0.584	0.97612
10/29/2019	8:52	18:12	15h36m38s	-22°24'44"	22°06'14"	0.397	0.84146
11/ 5/2019	8:13	17:44	15h33m34s	-21°14'45"	14°04'55"	0.145	0.71910
11/12/2019	6:58	17:02	15h04m06s	-17°10'20"	0°51'58"	0.001	0.67706
11/19/2019	5:56	16:27	14h40m22s	-13°27'29"	14°35'46"	0.203	0.77214

11/26/2019	5:40	16:09	14h48m17s	-13°36'20"	19°47'45"	0.523	0.94420
12/ 3/2019	5:53	16:03	15h17m23s	-16°07'27"	19°22'46"	0.741	1.11030
12/10/2019	6:16	16:03	15h55m57s	-19°08'33"	16°47'12"	0.862	1.24125
12/17/2019	6:42	16:08	16h39m01s	-21°46'59"	13°28'36"	0.928	1.33566
12/24/2019	7:08	16:19	17h24m46s	-23°39'55"	9°55'47"	0.965	1.39787
12/31/2019	7:32	16:36	18h12m24s	-24°35'24"	6°17'01"	0.987	1.43147

Venus

Date	Rise	Set	RA	Dec	Elongation	Ill Fr	DIST(AU)
1/ 1/2019	4:04	14:21	15h27m59s	-15°18'38"	46°51'40"	0.474	0.63470
1/ 8/2019	4:11	14:16	15h56m32s	-16°54'37"	46°56'49"	0.512	0.68789
1/15/2019	4:19	14:13	16h26m44s	-18°22'36"	46°43'10"	0.546	0.74105
1/22/2019	4:28	14:13	16h58m24s	-19°36'44"	46°14'24"	0.579	0.79400
1/29/2019	4:37	14:14	17h31m19s	-20°32'03"	45°33'25"	0.609	0.84653
2/ 5/2019	4:46	14:19	18h05m12s	-21°04'25"	44°42'44"	0.637	0.89842
2/12/2019	4:53	14:26	18h39m45s	-21°10'50"	43°44'12"	0.664	0.94954
2/19/2019	4:59	14:35	19h14m40s	-20°49'32"	42°38'57"	0.689	0.99986
2/26/2019	5:03	14:46	19h49m37s	-19°59'55"	41°27'56"	0.712	1.04931
3/ 5/2019	5:05	14:58	20h24m22s	-18°42'32"	40°12'10"	0.735	1.09774
3/12/2019	5:04	15:12	20h58m41s	-16°59'04"	38°52'22"	0.756	1.14505
3/19/2019	5:02	15:26	21h32m24s	-14°52'00"	37°28'52"	0.776	1.19123
3/26/2019	4:59	15:41	22h05m29s	-12°24'20"	36°01'56"	0.795	1.23626
4/ 2/2019	4:54	15:55	22h37m59s	-9°39'26"	34°32'03"	0.814	1.28000
4/ 9/2019	4:48	16:10	23h09m57s	-6°41'03"	32°59'31"	0.831	1.32231
4/16/2019	4:41	16:25	23h41m31s	-3°32'57"	31°24'26"	0.848	1.36316
4/23/2019	4:33	16:40	0h12m51s	-0°18'54"	29°46'51"	0.864	1.40250
4/30/2019	4:26	16:55	0h44m09s	2°57'21"	28°07'01"	0.879	1.44020
5/ 7/2019	4:19	17:10	1h15m39s	6°11'56"	26°25'11"	0.893	1.47607
5/14/2019	4:12	17:25	1h47m30s	9°20'55"	24°41'24"	0.907	1.51002
5/21/2019	4:06	17:41	2h19m55s	12°20'20"	22°55'40"	0.920	1.54199
5/28/2019	4:01	17:57	2h53m04s	15°06'15"	21°08'13"	0.932	1.57187
6/ 4/2019	3:58	18:13	3h27m03s	17°34'34"	19°19'19"	0.943	1.59946
6/11/2019	3:57	18:29	4h01m57s	19°41'17"	17°29'02"	0.953	1.62462
6/18/2019	3:58	18:44	4h37m42s	21°22'37"	15°37'27"	0.963	1.64733
6/25/2019	4:02	18:58	5h14m13s	22°35'16"	13°44'50"	0.971	1.66750
7/ 2/2019	4:09	19:10	5h51m18s	23°16'33"	11°51'31"	0.979	1.68500
7/ 9/2019	4:18	19:20	6h28m40s	23°24'43"	9°57'43"	0.985	1.69970
7/16/2019	4:30	19:27	7h06m00s	22°59'11"	8°03'39"	0.990	1.71162
7/23/2019	4:44	19:32	7h43m01s	22°00'29"	6°09'56"	0.994	1.72076
7/30/2019	4:59	19:34	8h19m26s	20°30'16"	4°17'50"	0.997	1.72709
8/ 6/2019	5:15	19:34	8h55m05s	18°31'09"	2°31'17"	0.999	1.73054
8/13/2019	5:32	19:31	9h29m52s	16°06'28"	1°17'34"	1.000	1.73118
8/20/2019	5:49	19:27	10h03m46s	13°19'59"	2°05'20"	0.999	1.72911
8/27/2019	6:06	19:21	10h36m53s	10°15'41"	3°47'06"	0.998	1.72440
9/ 3/2019	6:22	19:14	11h09m21s	6°57'41"	5°36'15"	0.995	1.71704
9/10/2019	6:39	19:06	11h41m21s	3°30'12"	7°26'45"	0.992	1.70713
9/17/2019	6:55	18:58	12h13m06s	-0°02'35"	9°17'11"	0.987	1.69484
9/24/2019	7:11	18:50	12h44m51s	-3°36'34"	11°06'50"	0.982	1.68029
10/ 1/2019	7:28	18:42	13h16m50s	-7°07'34"	12°55'26"	0.975	1.66352
10/ 8/2019	7:45	18:35	13h49m17s	-10°31'14"	14°42'56"	0.968	1.64461
10/15/2019	8:02	18:29	14h22m24s	-13°43'09"	16°29'13"	0.960	1.62370
10/22/2019	8:19	18:25	14h56m23s	-16°38'52"	18°14'05"	0.952	1.60095
10/29/2019	8:37	18:23	15h31m20s	-19°13'52"	19°57'26"	0.942	1.57640
11/ 5/2019	8:54	18:23	16h07m18s	-21°23'43"	21°39'21"	0.932	1.55006

11/12/2019	9:10	18:25	16h44m11s	-23°04'15"	23°19'49"	0.921	1.52205
11/19/2019	9:25	18:31	17h21m49s	-24°12'01"	24°58'39"	0.910	1.49248
11/26/2019	9:38	18:40	17h59m55s	-24°44'29"	26°35'46"	0.897	1.46138
12/ 3/2019	9:48	18:51	18h38m07s	-24°40'17"	28°11'14"	0.884	1.42874
12/10/2019	9:55	19:05	19h16m02s	-23°59'29"	29°45'01"	0.871	1.39457
12/17/2019	9:59	19:20	19h53m17s	-22°43'33"	31°16'55"	0.856	1.35897
12/24/2019	9:59	19:36	20h29m36s	-20°55'05"	32°46'44"	0.840	1.32197
12/31/2019	9:58	19:53	21h04m50s	-18°37'36"	34°14'26"	0.824	1.28352

Mars

Date	Rise	Set	RA	Dec	Elongation	Ill Fr	DIST(AU)
1/ 1/2019	11:41	23:46	0h00m15s	-0°17'53"	79°40'38"	0.873	1.26105
1/ 8/2019	11:23	23:42	0h17m18s	1°42'57"	77°15'15"	0.877	1.32032
1/15/2019	11:06	23:39	0h34m29s	3°42'53"	74°51'08"	0.882	1.38012
1/22/2019	10:49	23:35	0h51m48s	5°41'06"	72°28'01"	0.887	1.44027
1/29/2019	10:32	23:32	1h09m15s	7°36'50"	70°05'31"	0.891	1.50068
2/ 5/2019	10:16	23:29	1h26m52s	9°29'28"	67°43'35"	0.897	1.56122
2/12/2019	9:59	23:25	1h44m41s	11°18'18"	65°22'26"	0.902	1.62164
2/19/2019	9:44	23:22	2h02m41s	13°02'35"	63°02'02"	0.907	1.68175
2/26/2019	9:28	23:19	2h20m53s	14°41'37"	60°42'10"	0.912	1.74144
3/ 5/2019	9:13	23:16	2h39m19s	16°14'50"	58°22'45"	0.917	1.80059
3/12/2019	8:59	23:12	2h57m59s	17°41'38"	56°04'00"	0.923	1.85895
3/19/2019	8:45	23:09	3h16m52s	19°01'23"	53°46'01"	0.928	1.91631
3/26/2019	8:31	23:05	3h35m58s	20°13'32"	51°28'39"	0.933	1.97259
4/ 2/2019	8:19	23:01	3h55m17s	21°17'36"	49°11'43"	0.938	2.02768
4/ 9/2019	8:07	22:57	4h14m47s	22°13'10"	46°55'23"	0.943	2.08135
4/16/2019	7:55	22:53	4h34m27s	22°59'51"	44°39'47"	0.948	2.13341
4/23/2019	7:45	22:47	4h54m14s	23°37'19"	42°24'46"	0.952	2.18377
4/30/2019	7:35	22:42	5h14m06s	24°05'21"	40°10'08"	0.957	2.23236
5/ 7/2019	7:26	22:35	5h34m02s	24°23'50"	37°55'54"	0.961	2.27900
5/14/2019	7:18	22:28	5h53m57s	24°32'41"	35°42'12"	0.965	2.32349
5/21/2019	7:10	22:20	6h13m50s	24°31'56"	33°28'56"	0.969	2.36577
5/28/2019	7:03	22:12	6h33m37s	24°21'42"	31°15'51"	0.973	2.40579
6/ 4/2019	6:57	22:02	6h53m16s	24°02'11"	29°02'52"	0.977	2.44341
6/11/2019	6:51	21:52	7h12m46s	23°33'40"	26°50'04"	0.980	2.47846
6/18/2019	6:45	21:40	7h32m02s	22°56'28"	24°37'25"	0.983	2.51087
6/25/2019	6:40	21:28	7h51m05s	22°11'00"	22°24'41"	0.986	2.54064
7/ 2/2019	6:35	21:16	8h09m53s	21°17'40"	20°11'42"	0.989	2.56765
7/ 9/2019	6:30	21:02	8h28m26s	20°16'58"	17°58'30"	0.991	2.59174
7/16/2019	6:26	20:48	8h46m42s	19°09'24"	15°45'08"	0.993	2.61288
7/23/2019	6:21	20:34	9h04m42s	17°55'30"	13°31'26"	0.995	2.63107
7/30/2019	6:16	20:19	9h22m27s	16°35'45"	11°17'13"	0.996	2.64623
8/ 6/2019	6:12	20:03	9h39m58s	15°10'42"	9°02'36"	0.998	2.65824
8/13/2019	6:07	19:47	9h57m14s	13°40'53"	6°47'55"	0.999	2.66706
8/20/2019	6:02	19:31	10h14m18s	12°06'52"	4°33'51"	0.999	2.67273
8/27/2019	5:57	19:14	10h31m12s	10°29'07"	2°23'54"	1.000	2.67522
9/ 3/2019	5:53	18:57	10h47m57s	8°48'09"	1°05'44"	1.000	2.67441
9/10/2019	5:48	18:40	11h04m34s	7°04'31"	2°43'05"	1.000	2.67030
9/17/2019	5:43	18:23	11h21m06s	5°18'46"	4°57'03"	0.999	2.66295
9/24/2019	5:38	18:06	11h37m35s	3°31'20"	7°16'02"	0.999	2.65239
10/ 1/2019	5:33	17:48	11h54m04s	1°42'46"	9°37'12"	0.997	2.63854
10/ 8/2019	5:28	17:31	12h10m33s	-0°06'25"	11°59'44"	0.996	2.62142
10/15/2019	5:23	17:14	12h27m05s	-1°55'38"	14°23'17"	0.994	2.60113
10/22/2019	5:19	16:57	12h43m43s	-3°44'25"	16°47'50"	0.992	2.57777

10/29/2019	5:14	16:40	13h00m29s	-5°32'12"	19°13'21"	0.990	2.55130
11/ 5/2019	5:09	16:23	13h17m25s	-7°18'24"	21°39'37"	0.987	2.52177
11/12/2019	5:05	16:07	13h34m32s	-9°02'24"	24°06'21"	0.984	2.48936
11/19/2019	5:01	15:50	13h51m53s	-10°43'38"	26°33'29"	0.981	2.45421
11/26/2019	4:57	15:35	14h09m30s	-12°21'31"	29°01'02"	0.978	2.41634
12/ 3/2019	4:53	15:19	14h27m23s	-13°55'21"	31°28'46"	0.974	2.37586
12/10/2019	4:49	15:04	14h45m35s	-15°24'28"	33°56'19"	0.970	2.33299
12/17/2019	4:45	14:50	15h04m06s	-16°48'15"	36°23'32"	0.966	2.28791
12/24/2019	4:41	14:37	15h22m57s	-18°06'03"	38°50'21"	0.961	2.24074
12/31/2019	4:38	14:24	15h42m09s	-19°17'10"	41°16'38"	0.957	2.19160

Jupiter

Date	Rise	Set	RA	Dec	Elongation	Ill Fr	DIST(AU)
1/ 1/2019	5:40	15:07	16h41m23s	-21°34'20"	28°29'27"	0.998	6.19341
1/ 8/2019	5:19	14:45	16h47m34s	-21°45'43"	34°10'39"	0.997	6.13267
1/15/2019	4:58	14:23	16h53m34s	-21°55'50"	39°54'35"	0.997	6.06279
1/22/2019	4:37	14:00	16h59m20s	-22°04'42"	45°41'25"	0.996	5.98445
1/29/2019	4:16	13:38	17h04m49s	-22°12'23"	51°31'40"	0.995	5.89834
2/ 5/2019	3:54	13:15	17h10m00s	-22°18'56"	57°25'51"	0.994	5.80514
2/12/2019	3:31	12:52	17h14m50s	-22°24'25"	63°24'13"	0.993	5.70578
2/19/2019	3:08	12:28	17h19m15s	-22°28'55"	69°26'59"	0.992	5.60131
2/26/2019	2:45	12:04	17h23m14s	-22°32'32"	75°34'40"	0.992	5.49279
3/ 5/2019	2:21	11:40	17h26m43s	-22°35'22"	81°47'59"	0.991	5.38127
3/12/2019	1:57	11:15	17h29m40s	-22°37'30"	88°07'18"	0.991	5.26805
3/19/2019	1:32	10:50	17h32m03s	-22°39'03"	94°32'47"	0.991	5.15451
3/26/2019	1:06	10:24	17h33m50s	-22°40'05"	101°04'54"	0.991	5.04203
4/ 2/2019	0:40	9:58	17h35m00s	-22°40'42"	107°44'17"	0.992	4.93197
4/ 9/2019	0:13	9:31	17h35m29s	-22°40'55"	114°31'14"	0.993	4.82586
4/16/2019	23:41	9:03	17h35m19s	-22°40'48"	121°25'34"	0.993	4.72531
4/23/2019	23:12	8:34	17h34m29s	-22°40'20"	128°27'16"	0.994	4.63180
4/30/2019	22:43	8:05	17h33m01s	-22°39'31"	135°36'25"	0.996	4.54674
5/ 7/2019	22:13	7:36	17h30m56s	-22°38'19"	142°52'39"	0.997	4.47160
5/14/2019	21:43	7:06	17h28m19s	-22°36'43"	150°14'58"	0.998	4.40776
5/21/2019	21:12	6:35	17h25m14s	-22°34'41"	157°42'14"	0.999	4.35632
5/28/2019	20:41	6:05	17h21m47s	-22°32'13"	165°13'29"	0.999	4.31814
6/ 4/2019	20:10	5:34	17h18m04s	-22°29'20"	172°47'04"	1.000	4.29400
6/11/2019	19:38	5:02	17h14m14s	-22°26'07"	179°17'47"	1.000	4.28436
6/18/2019	19:07	4:31	17h10m24s	-22°22'41"	172°00'36"	1.000	4.28929
6/25/2019	18:35	4:00	17h06m42s	-22°19'10"	164°29'07"	0.999	4.30852
7/ 2/2019	18:04	3:30	17h03m15s	-22°15'47"	157°00'50"	0.999	4.34167
7/ 9/2019	17:33	2:59	17h00m11s	-22°12'43"	149°37'39"	0.998	4.38801
7/16/2019	17:03	2:29	16h57m34s	-22°10'11"	142°21'02"	0.997	4.44649
7/23/2019	16:33	2:00	16h55m30s	-22°08'22"	135°11'38"	0.995	4.51590
7/30/2019	16:04	1:31	16h54m01s	-22°07'24"	128°09'50"	0.994	4.59502
8/ 6/2019	15:36	1:03	16h53m10s	-22°07'23"	121°16'07"	0.993	4.68247
8/13/2019	15:09	0:35	16h52m57s	-22°08'24"	114°30'51"	0.992	4.77670
8/20/2019	14:42	0:08	16h53m24s	-22°10'25"	107°53'47"	0.992	4.87624
8/27/2019	14:16	23:37	16h54m29s	-22°13'25"	101°24'24"	0.991	4.97970
9/ 3/2019	13:50	23:11	16h56m12s	-22°17'18"	95°02'22"	0.991	5.08567
9/10/2019	13:25	22:46	16h58m30s	-22°21'57"	88°47'28"	0.991	5.19270
9/17/2019	13:01	22:21	17h01m23s	-22°27'14"	82°39'07"	0.991	5.29945
9/24/2019	12:37	21:57	17h04m48s	-22°32'58"	76°36'29"	0.991	5.40477
10/ 1/2019	12:14	21:33	17h08m42s	-22°39'00"	70°38'58"	0.992	5.50750
10/ 8/2019	11:52	21:09	17h13m05s	-22°45'08"	64°46'14"	0.993	5.60643

Midway, UT (JMC) Latitude: 40°30'53" N Longitude: 111°27'50" W  
 Local Time = UT - 7.00 hours Elevation: 1708 meters Year 2019  
 Page 19

10/15/2019	11:29	20:46	17h17m53s	-22°51'12"	58°57'48"	0.993	5.70056
10/22/2019	11:07	20:23	17h23m04s	-22°57'01"	53°12'52"	0.994	5.78903
10/29/2019	10:46	20:01	17h28m36s	-23°02'24"	47°30'52"	0.995	5.87097
11/ 5/2019	10:24	19:39	17h34m27s	-23°07'13"	41°51'32"	0.996	5.94552
11/12/2019	10:03	19:17	17h40m34s	-23°11'19"	36°14'33"	0.997	6.01197
11/19/2019	9:42	18:56	17h46m56s	-23°14'33"	30°39'21"	0.998	6.06981
11/26/2019	9:22	18:35	17h53m29s	-23°16'50"	25°05'25"	0.998	6.11848
12/ 3/2019	9:01	18:14	18h00m13s	-23°18'03"	19°32'34"	0.999	6.15744
12/10/2019	8:40	17:53	18h07m04s	-23°18'10"	14°00'40"	0.999	6.18635
12/17/2019	8:19	17:33	18h14m00s	-23°17'06"	8°29'20"	1.000	6.20501
12/24/2019	7:59	17:12	18h21m00s	-23°14'50"	2°58'09"	1.000	6.21323
12/31/2019	7:38	16:52	18h28m01s	-23°11'24"	2°33'23"	1.000	6.21082

Saturn

Date	Rise	Set	RA	Dec	Elongation	Ill Fr	DIST(AU)
1/ 1/2019	7:51	17:11	18h49m02s	-22°28'01"	1°10'02"	1.000	11.06185
1/ 8/2019	7:26	16:47	18h52m36s	-22°24'10"	5°16'18"	1.000	11.05723
1/15/2019	7:02	16:23	18h56m08s	-22°20'01"	11°34'22"	1.000	11.03978
1/22/2019	6:38	16:00	18h59m37s	-22°15'36"	17°53'09"	1.000	11.00978
1/29/2019	6:13	15:36	19h03m01s	-22°11'01"	24°12'38"	1.000	10.96761
2/ 5/2019	5:49	15:12	19h06m19s	-22°06'18"	30°33'07"	0.999	10.91365
2/12/2019	5:24	14:48	19h09m27s	-22°01'32"	36°54'35"	0.999	10.84853
2/19/2019	4:59	14:23	19h12m26s	-21°56'47"	43°17'02"	0.999	10.77310
2/26/2019	4:34	13:59	19h15m14s	-21°52'10"	49°40'51"	0.999	10.68827
3/ 5/2019	4:09	13:34	19h17m48s	-21°47'45"	56°06'27"	0.998	10.59498
3/12/2019	3:43	13:09	19h20m08s	-21°43'37"	62°33'58"	0.998	10.49434
3/19/2019	3:17	12:44	19h22m13s	-21°39'52"	69°03'24"	0.998	10.38769
3/26/2019	2:51	12:19	19h24m00s	-21°36'34"	75°35'03"	0.998	10.27637
4/ 2/2019	2:25	11:53	19h25m30s	-21°33'48"	82°09'24"	0.998	10.16170
4/ 9/2019	1:59	11:26	19h26m40s	-21°31'38"	88°46'39"	0.998	10.04517
4/16/2019	1:32	11:00	19h27m31s	-21°30'08"	95°26'43"	0.998	9.92840
4/23/2019	1:05	10:33	19h28m02s	-21°29'20"	102°09'44"	0.998	9.81298
4/30/2019	0:37	10:05	19h28m13s	-21°29'15"	108°56'07"	0.998	9.70041
5/ 7/2019	0:10	9:38	19h28m03s	-21°29'54"	115°46'00"	0.998	9.59229
5/14/2019	23:38	9:10	19h27m33s	-21°31'17"	122°39'07"	0.998	9.49029
5/21/2019	23:10	8:41	19h26m44s	-21°33'20"	129°35'18"	0.998	9.39590
5/28/2019	22:41	8:12	19h25m37s	-21°36'01"	136°34'41"	0.999	9.31048
6/ 4/2019	22:12	7:43	19h24m14s	-21°39'16"	143°37'11"	0.999	9.23538
6/11/2019	21:43	7:14	19h22m35s	-21°42'59"	150°42'17"	0.999	9.17189
6/18/2019	21:14	6:44	19h20m45s	-21°47'04"	157°49'23"	1.000	9.12100
6/25/2019	20:45	6:14	19h18m45s	-21°51'25"	164°58'15"	1.000	9.08346
7/ 2/2019	20:16	5:44	19h16m38s	-21°55'55"	172°08'30"	1.000	9.05995
7/ 9/2019	19:46	5:14	19h14m27s	-22°00'27"	179°15'41"	1.000	9.05095
7/16/2019	19:17	4:44	19h12m15s	-22°04'55"	173°28'16"	1.000	9.05654
7/23/2019	18:48	4:14	19h10m07s	-22°09'13"	166°17'51"	1.000	9.07656
7/30/2019	18:18	3:44	19h08m04s	-22°13'16"	159°08'01"	1.000	9.11072
8/ 6/2019	17:49	3:15	19h06m11s	-22°17'01"	151°59'34"	0.999	9.15852
8/13/2019	17:20	2:45	19h04m29s	-22°20'23"	144°53'16"	0.999	9.21909
8/20/2019	16:52	2:16	19h03m02s	-22°23'20"	137°49'27"	0.999	9.29137
8/27/2019	16:23	1:47	19h01m51s	-22°25'50"	130°48'10"	0.999	9.37426
9/ 3/2019	15:55	1:19	19h00m58s	-22°27'52"	123°49'43"	0.998	9.46651
9/10/2019	15:27	0:51	19h00m24s	-22°29'24"	116°54'32"	0.998	9.56660
9/17/2019	14:59	0:23	19h00m11s	-22°30'27"	110°02'45"	0.998	9.67298
9/24/2019	14:32	23:51	19h00m18s	-22°31'00"	103°14'04"	0.998	9.78415

10/ 1/2019	14:05	23:24	19h00m46s	-22°31'02"	96°28'26"	0.998	9.89854
10/ 8/2019	13:38	22:58	19h01m34s	-22°30'32"	89°46'02"	0.998	10.01447
10/15/2019	13:12	22:32	19h02m43s	-22°29'31"	83°06'47"	0.998	10.13029
10/22/2019	12:46	22:06	19h04m10s	-22°27'57"	76°30'19"	0.998	10.24452
10/29/2019	12:20	21:40	19h05m56s	-22°25'50"	69°56'17"	0.998	10.35571
11/ 5/2019	11:54	21:15	19h08m00s	-22°23'10"	63°24'43"	0.998	10.46231
11/12/2019	11:29	20:50	19h10m19s	-22°19'57"	56°55'35"	0.998	10.56294
11/19/2019	11:04	20:25	19h12m53s	-22°16'10"	50°28'26"	0.999	10.65643
11/26/2019	10:39	20:01	19h15m39s	-22°11'49"	44°02'55"	0.999	10.74166
12/ 3/2019	10:14	19:37	19h18m37s	-22°06'55"	37°38'58"	0.999	10.81749
12/10/2019	9:49	19:13	19h21m45s	-22°01'28"	31°16'34"	0.999	10.88299
12/17/2019	9:24	18:49	19h25m01s	-21°55'31"	24°55'26"	1.000	10.93747
12/24/2019	9:00	18:25	19h28m23s	-21°49'05"	18°35'09"	1.000	10.98031
12/31/2019	8:35	18:02	19h31m50s	-21°42'12"	12°15'36"	1.000	11.01091

Uranus

Date	Rise	Set	RA	Dec	Elongation	Ill Fr	DIST(AU)
1/ 1/2019	12:49	2:09	1h47m08s	10°28'49"	108°20'55"	0.999	19.53242
1/ 8/2019	12:21	1:42	1h47m04s	10°28'44"	101°11'52"	0.999	19.64869
1/15/2019	11:54	1:15	1h47m10s	10°29'34"	94°05'36"	0.999	19.76784
1/22/2019	11:26	0:47	1h47m26s	10°31'18"	87°02'25"	0.999	19.88797
1/29/2019	10:59	0:20	1h47m51s	10°33'55"	80°02'14"	0.999	20.00736
2/ 5/2019	10:32	23:50	1h48m26s	10°37'24"	73°05'03"	0.999	20.12431
2/12/2019	10:05	23:23	1h49m10s	10°41'40"	66°11'08"	0.999	20.23705
2/19/2019	9:38	22:57	1h50m01s	10°46'43"	59°20'42"	1.000	20.34397
2/26/2019	9:11	22:31	1h51m01s	10°52'25"	52°33'32"	1.000	20.44370
3/ 5/2019	8:44	22:05	1h52m08s	10°58'45"	45°49'23"	1.000	20.53495
3/12/2019	8:18	21:39	1h53m20s	11°05'37"	39°08'18"	1.000	20.61646
3/19/2019	7:51	21:13	1h54m39s	11°12'56"	32°30'23"	1.000	20.68718
3/26/2019	7:24	20:48	1h56m01s	11°20'38"	25°55'21"	1.000	20.74636
4/ 2/2019	6:58	20:22	1h57m28s	11°28'36"	19°22'48"	1.000	20.79333
4/ 9/2019	6:31	19:56	1h58m57s	11°36'47"	12°52'37"	1.000	20.82747
4/16/2019	6:05	19:31	2h00m29s	11°45'04"	6°25'04"	1.000	20.84843
4/23/2019	5:38	19:05	2h02m01s	11°53'23"	0°29'21"	1.000	20.85611
4/30/2019	5:12	18:40	2h03m34s	12°01'40"	6°28'00"	1.000	20.85049
5/ 7/2019	4:45	18:14	2h05m05s	12°09'49"	12°51'06"	1.000	20.83161
5/14/2019	4:19	17:49	2h06m35s	12°17'45"	19°13'33"	1.000	20.79977
5/21/2019	3:52	17:23	2h08m03s	12°25'24"	25°35'23"	1.000	20.75547
5/28/2019	3:26	16:58	2h09m27s	12°32'43"	31°57'06"	1.000	20.69930
6/ 4/2019	2:59	16:32	2h10m47s	12°39'37"	38°19'11"	1.000	20.63185
6/11/2019	2:32	16:06	2h12m02s	12°46'03"	44°41'44"	1.000	20.55399
6/18/2019	2:06	15:40	2h13m12s	12°51'56"	51°04'59"	1.000	20.46676
6/25/2019	1:39	15:14	2h14m15s	12°57'14"	57°29'28"	1.000	20.37122
7/ 2/2019	1:12	14:47	2h15m10s	13°01'53"	63°55'42"	0.999	20.26845
7/ 9/2019	0:45	14:21	2h15m59s	13°05'52"	70°23'52"	0.999	20.15976
7/16/2019	0:18	13:54	2h16m38s	13°09'08"	76°54'04"	0.999	20.04662
7/23/2019	23:47	13:27	2h17m10s	13°11'40"	83°26'42"	0.999	19.93042
7/30/2019	23:20	13:00	2h17m32s	13°13'25"	90°02'19"	0.999	19.81262
8/ 6/2019	22:52	12:33	2h17m45s	13°14'23"	96°41'01"	0.999	19.69479
8/13/2019	22:25	12:05	2h17m49s	13°14'33"	103°22'46"	0.999	19.57864
8/20/2019	21:57	11:38	2h17m43s	13°13'56"	110°07'46"	0.999	19.46574
8/27/2019	21:29	11:10	2h17m28s	13°12'32"	116°56'24"	0.999	19.35763
9/ 3/2019	21:02	10:42	2h17m04s	13°10'24"	123°48'43"	1.000	19.25593
9/10/2019	20:34	10:14	2h16m32s	13°07'33"	130°44'26"	1.000	19.16226

9/17/2019	20:06	9:45	2h15m51s	13°04'02"	137°43'29"	1.000	19.07804
9/24/2019	19:38	9:17	2h15m04s	12°59'55"	144°45'59"	1.000	19.00453
10/ 1/2019	19:10	8:48	2h14m10s	12°55'17"	151°51'52"	1.000	18.94301
10/ 8/2019	18:41	8:19	2h13m12s	12°50'14"	159°00'36"	1.000	18.89459
10/15/2019	18:13	7:50	2h12m09s	12°44'50"	166°11'43"	1.000	18.86006
10/22/2019	17:45	7:21	2h11m04s	12°39'13"	173°24'47"	1.000	18.84002
10/29/2019	17:17	6:52	2h09m57s	12°33'29"	179°07'53"	1.000	18.83492
11/ 5/2019	16:48	6:23	2h08m51s	12°27'47"	171°59'44"	1.000	18.84500
11/12/2019	16:20	5:54	2h07m46s	12°22'13"	164°41'57"	1.000	18.87006
11/19/2019	15:52	5:26	2h06m44s	12°16'55"	157°23'14"	1.000	18.90971
11/26/2019	15:24	4:57	2h05m47s	12°12'00"	150°04'05"	1.000	18.96341
12/ 3/2019	14:56	4:28	2h04m55s	12°07'34"	142°45'11"	1.000	19.03033
12/10/2019	14:27	4:00	2h04m09s	12°03'44"	135°27'15"	1.000	19.10931
12/17/2019	14:00	3:31	2h03m31s	12°00'35"	128°10'36"	1.000	19.19902
12/24/2019	13:32	3:03	2h03m02s	11°58'11"	120°55'23"	1.000	19.29809
12/31/2019	13:04	2:35	2h02m41s	11°56'36"	113°42'05"	0.999	19.40493

Neptune

Date	Rise	Set	RA	Dec	Elongation	Ill Fr	DIST(AU)
1/ 1/2019	11:06	22:21	23h02m52s	-7°09'19"	63°50'01"	1.000	30.35959
1/ 8/2019	10:39	21:54	23h03m27s	-7°05'36"	56°51'13"	1.000	30.46523
1/15/2019	10:12	21:28	23h04m06s	-7°01'22"	49°53'58"	1.000	30.56286
1/22/2019	9:45	21:01	23h04m50s	-6°56'40"	42°58'30"	1.000	30.65114
1/29/2019	9:18	20:35	23h05m38s	-6°51'35"	36°04'38"	1.000	30.72891
2/ 5/2019	8:51	20:08	23h06m30s	-6°46'09"	29°12'19"	1.000	30.79511
2/12/2019	8:24	19:42	23h07m24s	-6°40'27"	22°21'48"	1.000	30.84876
2/19/2019	7:57	19:16	23h08m21s	-6°34'32"	15°33'25"	1.000	30.88920
2/26/2019	7:30	18:50	23h09m19s	-6°28'28"	8°47'34"	1.000	30.91603
3/ 5/2019	7:03	18:23	23h10m18s	-6°22'20"	2°11'54"	1.000	30.92892
3/12/2019	6:36	17:57	23h11m17s	-6°16'12"	4°51'31"	1.000	30.92767
3/19/2019	6:09	17:31	23h12m16s	-6°10'08"	11°30'52"	1.000	30.91242
3/26/2019	5:42	17:05	23h13m14s	-6°04'12"	18°11'16"	1.000	30.88354
4/ 2/2019	5:15	16:39	23h14m10s	-5°58'28"	24°51'07"	1.000	30.84143
4/ 9/2019	4:48	16:12	23h15m03s	-5°52'59"	31°30'13"	1.000	30.78665
4/16/2019	4:21	15:46	23h15m54s	-5°47'50"	38°08'23"	1.000	30.72003
4/23/2019	3:54	15:19	23h16m42s	-5°43'04"	44°45'48"	1.000	30.64260
4/30/2019	3:27	14:53	23h17m25s	-5°38'43"	51°22'52"	1.000	30.55537
5/ 7/2019	3:00	14:26	23h18m04s	-5°34'51"	57°59'50"	1.000	30.45946
5/14/2019	2:33	13:59	23h18m39s	-5°31'30"	64°36'40"	1.000	30.35623
5/21/2019	2:06	13:32	23h19m08s	-5°28'43"	71°13'28"	1.000	30.24716
5/28/2019	1:39	13:05	23h19m32s	-5°26'30"	77°50'42"	1.000	30.13364
6/ 4/2019	1:11	12:38	23h19m50s	-5°24'54"	84°28'41"	1.000	30.01715
6/11/2019	0:44	12:11	23h20m02s	-5°23'55"	91°07'25"	1.000	29.89934
6/18/2019	0:17	11:44	23h20m09s	-5°23'34"	97°46'54"	1.000	29.78186
6/25/2019	23:45	11:16	23h20m09s	-5°23'50"	104°27'32"	1.000	29.66626
7/ 2/2019	23:18	10:48	23h20m04s	-5°24'43"	111°09'40"	1.000	29.55408
7/ 9/2019	22:50	10:21	23h19m53s	-5°26'11"	117°53'15"	1.000	29.44698
7/16/2019	22:22	9:53	23h19m36s	-5°28'14"	124°38'11"	1.000	29.34652
7/23/2019	21:54	9:25	23h19m15s	-5°30'49"	131°24'42"	1.000	29.25406
7/30/2019	21:27	8:57	23h18m48s	-5°33'52"	138°13'07"	1.000	29.17091
8/ 6/2019	20:59	8:28	23h18m18s	-5°37'22"	145°03'21"	1.000	29.09840
8/13/2019	20:31	8:00	23h17m43s	-5°41'13"	151°55'07"	1.000	29.03767
8/20/2019	20:03	7:32	23h17m06s	-5°45'22"	158°48'23"	1.000	28.98957
8/27/2019	19:35	7:03	23h16m26s	-5°49'44"	165°43'11"	1.000	28.95486

9/ 3/2019	19:07	6:35	23h15m44s	-5°54'15"	172°38'20"	1.000	28.93422
9/10/2019	18:39	6:06	23h15m02s	-5°58'50"	178°53'55"	1.000	28.92804
9/17/2019	18:11	5:38	23h14m19s	-6°03'22"	173°13'08"	1.000	28.93641
9/24/2019	17:43	5:09	23h13m37s	-6°07'48"	166°14'05"	1.000	28.95927
10/ 1/2019	17:15	4:41	23h12m57s	-6°12'03"	159°11'59"	1.000	28.99642
10/ 8/2019	16:47	4:12	23h12m18s	-6°16'00"	152°08'31"	1.000	29.04739
10/15/2019	16:19	3:44	23h11m43s	-6°19'36"	145°04'15"	1.000	29.11134
10/22/2019	15:52	3:16	23h11m12s	-6°22'47"	137°59'13"	1.000	29.18737
10/29/2019	15:24	2:48	23h10m45s	-6°25'29"	130°53'30"	1.000	29.27444
11/ 5/2019	14:56	2:20	23h10m23s	-6°27'38"	123°47'33"	1.000	29.37125
11/12/2019	14:28	1:52	23h10m06s	-6°29'12"	116°41'45"	1.000	29.47624
11/19/2019	14:01	1:24	23h09m55s	-6°30'09"	109°36'08"	1.000	29.58785
11/26/2019	13:33	0:56	23h09m51s	-6°30'28"	102°30'41"	1.000	29.70448
12/ 3/2019	13:06	0:29	23h09m52s	-6°30'06"	95°25'45"	1.000	29.82434
12/10/2019	12:38	0:02	23h10m00s	-6°29'05"	88°21'47"	1.000	29.94555
12/17/2019	12:11	23:31	23h10m14s	-6°27'25"	81°18'48"	1.000	30.06631
12/24/2019	11:43	23:04	23h10m34s	-6°25'07"	74°16'45"	1.000	30.18492
12/31/2019	11:16	22:37	23h11m00s	-6°22'12"	67°15'50"	1.000	30.29957

Pluto

Date	Rise	Set	RA	Dec	Elongation	Ill Fr	DIST(AU)
1/ 1/2019	8:28	17:52	19h29m09s	-21°57'34"	10°20'15"	1.000	34.67919
1/ 8/2019	8:02	17:26	19h30m09s	-21°56'03"	3°26'14"	1.000	34.69838
1/15/2019	7:35	17:00	19h31m10s	-21°54'31"	3°27'51"	1.000	34.70314
1/22/2019	7:08	16:33	19h32m11s	-21°52'57"	10°21'10"	1.000	34.69356
1/29/2019	6:42	16:07	19h33m10s	-21°51'25"	17°14'18"	1.000	34.66989
2/ 5/2019	6:15	15:40	19h34m08s	-21°49'56"	24°07'17"	1.000	34.63247
2/12/2019	5:48	15:14	19h35m03s	-21°48'32"	30°59'54"	1.000	34.58188
2/19/2019	5:22	14:47	19h35m56s	-21°47'13"	37°51'57"	1.000	34.51903
2/26/2019	4:55	14:21	19h36m44s	-21°46'03"	44°43'34"	1.000	34.44492
3/ 5/2019	4:28	13:54	19h37m29s	-21°45'01"	51°34'59"	1.000	34.36060
3/12/2019	4:01	13:27	19h38m08s	-21°44'10"	58°26'04"	1.000	34.26734
3/19/2019	3:34	13:00	19h38m43s	-21°43'31"	65°16'37"	1.000	34.16664
3/26/2019	3:07	12:33	19h39m12s	-21°43'05"	72°06'43"	1.000	34.06002
4/ 2/2019	2:40	12:06	19h39m35s	-21°42'52"	78°56'42"	1.000	33.94898
4/ 9/2019	2:13	11:39	19h39m53s	-21°42'54"	85°46'32"	1.000	33.83516
4/16/2019	1:45	11:11	19h40m04s	-21°43'10"	92°36'01"	1.000	33.72034
4/23/2019	1:18	10:44	19h40m09s	-21°43'41"	99°25'12"	1.000	33.60622
4/30/2019	0:50	10:16	19h40m08s	-21°44'27"	106°14'24"	1.000	33.49437
5/ 7/2019	0:23	9:49	19h40m01s	-21°45'28"	113°03'43"	1.000	33.38648
5/14/2019	23:51	9:21	19h39m48s	-21°46'42"	119°52'56"	1.000	33.28422
5/21/2019	23:23	8:53	19h39m30s	-21°48'09"	126°42'00"	1.000	33.18909
5/28/2019	22:56	8:25	19h39m06s	-21°49'48"	133°31'14"	1.000	33.10242
6/ 4/2019	22:28	7:57	19h38m38s	-21°51'38"	140°20'48"	1.000	33.02552
6/11/2019	22:00	7:28	19h38m06s	-21°53'37"	147°10'28"	1.000	32.95966
6/18/2019	21:32	7:00	19h37m30s	-21°55'43"	154°00'07"	1.000	32.90581
6/25/2019	21:04	6:32	19h36m51s	-21°57'55"	160°49'57"	1.000	32.86472
7/ 2/2019	20:36	6:03	19h36m11s	-22°00'10"	167°40'07"	1.000	32.83708
7/ 9/2019	20:08	5:35	19h35m28s	-22°02'29"	174°30'10"	1.000	32.82346
7/16/2019	19:40	5:07	19h34m45s	-22°04'46"	178°34'26"	1.000	32.82407
7/23/2019	19:12	4:38	19h34m03s	-22°07'03"	171°46'49"	1.000	32.83891
7/30/2019	18:44	4:10	19h33m21s	-22°09'16"	164°55'54"	1.000	32.86789
8/ 6/2019	18:16	3:42	19h32m40s	-22°11'24"	158°04'29"	1.000	32.91076
8/13/2019	17:47	3:13	19h32m02s	-22°13'25"	151°12'58"	1.000	32.96692

8/20/2019	17:20	2:45	19h31m28s	-22°15'18"	144°21'20"	1.000	33.03556
8/27/2019	16:52	2:17	19h30m57s	-22°17'01"	137°29'19"	1.000	33.11586
9/ 3/2019	16:24	1:49	19h30m30s	-22°18'35"	130°36'57"	1.000	33.20680
9/10/2019	15:56	1:21	19h30m08s	-22°19'56"	123°44'31"	1.000	33.30707
9/17/2019	15:28	0:53	19h29m52s	-22°21'06"	116°52'01"	1.000	33.41526
9/24/2019	15:01	0:25	19h29m41s	-22°22'02"	109°59'11"	1.000	33.52995
10/ 1/2019	14:33	23:54	19h29m36s	-22°22'45"	103°05'59"	1.000	33.64961
10/ 8/2019	14:06	23:26	19h29m38s	-22°23'15"	96°12'39"	1.000	33.77253
10/15/2019	13:38	22:59	19h29m45s	-22°23'31"	89°19'18"	1.000	33.89694
10/22/2019	13:11	22:31	19h29m59s	-22°23'34"	82°25'41"	1.000	34.02120
10/29/2019	12:44	22:04	19h30m19s	-22°23'23"	75°31'41"	1.000	34.14362
11/ 5/2019	12:17	21:37	19h30m45s	-22°22'59"	68°37'32"	1.000	34.26243
11/12/2019	11:50	21:10	19h31m17s	-22°22'22"	61°43'24"	1.000	34.37593
11/19/2019	11:23	20:44	19h31m54s	-22°21'34"	54°49'09"	1.000	34.48262
11/26/2019	10:56	20:17	19h32m36s	-22°20'35"	47°54'37"	1.000	34.58107
12/ 3/2019	10:29	19:50	19h33m22s	-22°19'25"	40°59'59"	1.000	34.66982
12/10/2019	10:02	19:24	19h34m13s	-22°18'07"	34°05'31"	1.000	34.74763
12/17/2019	9:36	18:57	19h35m06s	-22°16'41"	27°11'12"	1.000	34.81353
12/24/2019	9:09	18:31	19h36m03s	-22°15'08"	20°16'50"	1.000	34.86665
12/31/2019	8:42	18:04	19h37m01s	-22°13'30"	13°22'41"	1.000	34.90621

Planet Apsides Report for 2019

Earth

1/ 3/2019	Perihelion	Distance from Sun:	0.98 AU
7/ 5/2019	Aphelion	Distance from Sun:	1.02 AU

Mercury

2/25/2019	Perihelion	Distance from Sun:	0.31 AU
5/24/2019	Perihelion	Distance from Sun:	0.31 AU
8/19/2019	Perihelion	Distance from Sun:	0.31 AU
11/15/2019	Perihelion	Distance from Sun:	0.31 AU
1/12/2019	Aphelion	Distance from Sun:	0.47 AU
4/10/2019	Aphelion	Distance from Sun:	0.47 AU
7/ 6/2019	Aphelion	Distance from Sun:	0.47 AU
10/ 2/2019	Aphelion	Distance from Sun:	0.47 AU
12/29/2019	Aphelion	Distance from Sun:	0.47 AU

Venus

8/ 8/2019	Perihelion	Distance from Sun:	0.72 AU
4/17/2019	Aphelion	Distance from Sun:	0.73 AU
11/28/2019	Aphelion	Distance from Sun:	0.73 AU

Mars

8/25/2019	Aphelion	Distance from Sun:	1.67 AU
-----------	----------	--------------------	---------

Jupiter

No Apsis

Saturn

No Apsis

Planet Conjunction/Opposition Report for 1/ 1/2019 to 12/31/2019

Mercury

Date	Hour	Event
1/29/2019	20	Superior Conjunction
3/14/2019	19	Inferior Conjunction
5/21/2019	17	Superior Conjunction
7/21/2019	17	Inferior Conjunction
9/ 3/2019	18	Superior Conjunction
11/11/2019	17	Inferior Conjunction

Venus

Date	Hour	Event
8/13/2019	22	Superior Conjunction

Mars

Date	Hour	Event
9/ 2/2019	4	Conjunction

Jupiter

Date	Hour	Event
12/27/2019	17	Conjunction (Occultation)
6/10/2019	17	Opposition

Saturn

Date	Hour	Event
1/ 1/2019	21	Conjunction
7/ 9/2019	17	Opposition

Uranus

Date	Hour	Event
4/22/2019	17	Conjunction
10/28/2019	1	Opposition

Neptune

Date	Hour	Event
3/ 6/2019	18	Conjunction
9/10/2019	1	Opposition

Pluto

Date	Hour	Event
1/11/2019	5	Conjunction (Occultation)
7/14/2019	17	Opposition

Midway, UT (JMC)      Latitude: 40°30'53" N    Longitude: 111°27'50" W  
 Local Time = UT - 7.00 hours    Elevation: 1708 meters      Year 2019  
 Page 25

Planet Data Report

Planet	Mean Dist From Sun (AU)	Period of Revolution	Inclination	Equatorial Diameter (km)
Mercury	0.39	88 days	7°	4880
Venus	0.72	224.7 days	3.4°	12100
Earth	1.00	365.24 days	0°	12756
Mars	1.52	687 days	1.9°	6794
Jupiter	5.20	11.86 years	1.3°	143200
Saturn	9.54	29.46 years	2.5°	120000
Uranus	19.18	84 years	0.8°	52290
Neptune	30.06	165 years	1.8°	50450
Pluto	39.44	248 years	17.2°	2200-2300

Moon Apsides Report for 1/ 1/2019 to 12/31/2019

Date	Hour	Apsis	Distance (km)	Diameter
1/ 8/2019	21	Apogee	406112	0.4904°
1/21/2019	13	Perigee	357353	0.5573°
2/ 5/2019	2	Apogee	406558	0.4899°
2/19/2019	2	Perigee	356771	0.5582°
3/ 4/2019	4	Apogee	406393	0.4901°
3/19/2019	13	Perigee	359374	0.5542°
3/31/2019	17	Apogee	405582	0.4910°
4/16/2019	15	Perigee	364207	0.5468°
4/28/2019	11	Apogee	404582	0.4923°
5/13/2019	15	Perigee	369016	0.5397°
5/26/2019	6	Apogee	404136	0.4928°
6/ 7/2019	16	Perigee	368499	0.5405°
6/23/2019	1	Apogee	404567	0.4923°
7/ 4/2019	22	Perigee	363730	0.5475°
7/20/2019	17	Apogee	405500	0.4911°
8/ 2/2019	0	Perigee	359407	0.5541°
8/17/2019	4	Apogee	406230	0.4903°
8/30/2019	9	Perigee	357188	0.5576°
9/13/2019	6	Apogee	406371	0.4901°
9/27/2019	19	Perigee	357820	0.5566°
10/10/2019	12	Apogee	405903	0.4907°
10/26/2019	4	Perigee	361330	0.5512°
11/ 7/2019	2	Apogee	405047	0.4917°
11/23/2019	1	Perigee	366727	0.5431°
12/ 4/2019	21	Apogee	404451	0.4924°
12/18/2019	13	Perigee	370269	0.5379°

Moon Nodes Report for 1/ 1/2019 to 12/31/2019

Date	Time	Node	Illuminated Fraction
1/ 6/2019	17:07	Descending	0.00
1/20/2019	15:48	Ascending	1.00
2/ 2/2019	23:34	Descending	0.03
2/17/2019	2:41	Ascending	0.91
3/ 2/2019	4:02	Descending	0.17

Midway, UT (JMC) Latitude: 40°30'53" N Longitude: 111°27'50" W  
 Local Time = UT - 7.00 hours Elevation: 1708 meters Year 2019  
 Page 26

3/16/2019	9:21	Ascending	0.71
3/29/2019	6:07	Descending	0.40
4/12/2019	11:07	Ascending	0.46
4/25/2019	8:01	Descending	0.65
5/ 9/2019	11:49	Ascending	0.23
5/22/2019	12:11	Descending	0.86
6/ 5/2019	15:45	Ascending	0.06
6/18/2019	18:48	Descending	0.98
7/ 2/2019	23:52	Ascending	0.00
7/16/2019	2:04	Descending	0.99
7/30/2019	10:01	Ascending	0.04
8/12/2019	7:44	Descending	0.91
8/26/2019	18:49	Ascending	0.18
9/ 8/2019	10:34	Descending	0.73
9/22/2019	23:29	Ascending	0.41
10/ 5/2019	11:48	Descending	0.48
10/20/2019	0:27	Ascending	0.66
11/ 1/2019	14:39	Descending	0.23
11/16/2019	1:47	Ascending	0.87
11/28/2019	21:12	Descending	0.06
12/13/2019	7:14	Ascending	0.99
12/26/2019	6:00	Descending	0.00

Meteor Showers Report for 1/ 1/2019 to 12/31/2019

Date	Meteor Shower	ZHR	RA	DEC	Illum. Frac.	Longitude
1/ 3/2019	Quadrantids	80	15h28m	50°	0.05	283°
4/11/2019	Virginids	5	14h04m	-9°	0.38	22°
4/22/2019	Lyrids	12	18h08m	32°	0.87	32°
4/28/2019	alpha-Scorpiids	5	16h32m	-24°	0.34	38°
5/ 5/2019	eta-Aquarids	35	22h20m	-1°	0.01	45°
5/12/2019	alpha-Scorpiids	5	16h04m	-24°	0.58	52°
6/ 9/2019	Ophiuchids	5	17h56m	-23°	0.44	79°
6/20/2019	Ophiuchids	5	17h20m	-20°	0.89	89°
7/ 8/2019	Capricornids	5			0.42	106°
7/15/2019	Capricornids	5	20h44m	-15°	0.99	113°
7/20/2019	alpha-Cygnids	5	21h00m	48°	0.87	118°
7/26/2019	Capricornids	5	21h00m	-15°	0.34	123°
7/29/2019	delta-Aquarids	20	22h36m	-17°	0.08	126°
7/31/2019	Piscis Australids	5	22h40m	-30°	0.00	128°
8/ 2/2019	alpha-Capricornids	5	20h36m	-10°	0.04	130°
8/ 6/2019	iota-Aquarids	8	22h10m	-15°	0.39	134°
8/12/2019	Perseids	75	3h04m	58°	0.93	140°
8/21/2019	alpha-Cygnids	5	21h00m	48°	0.69	148°
9/ 8/2019	Piscids	10	0h36m	7°	0.75	166°
9/21/2019	Piscids	5	0h24m	0°	0.54	178°
10/13/2019	Piscids	??	1h44m	14°	1.00	200°
10/22/2019	Orionids	25	6h24m	15°	0.37	209°
11/ 3/2019	Taurids	8	3h44m	14°	0.43	221°
11/17/2019	Leonids	10	10h08m	22°	0.73	235°
12/ 9/2019	Puppids-Velids	15	9h00m	-48°	0.93	257°
12/14/2019	Geminids	75	7h28m	32°	0.93	262°
12/22/2019	Ursids	5	14h28m	78°	0.14	271°
12/25/2019	Puppids-Velids	15	9h20m	-65°	0.00	274°

Twilight Report for 1/ 1/2019 to 12/31/2019

Date	Sun		Astronomical		Nautical		Civil	
	Rise	Set	Begin	End	Begin	End	Begin	End
1/ 1/2019	7:49	17:10	6:06	18:53	6:39	18:20	7:14	17:45
1/ 8/2019	7:49	17:16	6:07	18:58	6:40	18:25	7:14	17:52
1/15/2019	7:47	17:24	6:06	19:05	6:39	18:32	7:12	17:59
1/22/2019	7:44	17:32	6:04	19:12	6:36	18:39	7:09	18:06
1/29/2019	7:38	17:40	6:00	19:19	6:32	18:47	7:04	18:14
2/ 5/2019	7:31	17:49	5:54	19:26	6:26	18:54	6:58	18:22
2/12/2019	7:23	17:57	5:47	19:34	6:19	19:02	6:51	18:30
2/19/2019	7:14	18:06	5:39	19:41	6:10	19:10	6:42	18:38
2/26/2019	7:04	18:14	5:29	19:49	6:01	19:17	6:32	18:46
3/ 5/2019	6:54	18:22	5:19	19:56	5:51	19:25	6:22	18:53
3/12/2019	6:43	18:29	5:08	20:04	5:40	19:32	6:11	19:01
3/19/2019	6:31	18:37	4:56	20:12	5:28	19:40	6:00	19:08
3/26/2019	6:20	18:44	4:43	20:21	5:16	19:48	5:48	19:16
4/ 2/2019	6:08	18:51	4:30	20:29	5:04	19:56	5:36	19:23
4/ 9/2019	5:57	18:59	4:17	20:39	4:52	20:04	5:25	19:31
4/16/2019	5:46	19:06	4:04	20:48	4:39	20:13	5:13	19:39
4/23/2019	5:36	19:13	3:51	20:58	4:28	20:21	5:02	19:47
4/30/2019	5:26	19:21	3:38	21:09	4:16	20:30	4:52	19:55
5/ 7/2019	5:18	19:28	3:26	21:20	4:06	20:39	4:43	20:03
5/14/2019	5:10	19:35	3:14	21:31	3:57	20:48	4:35	20:10
5/21/2019	5:04	19:41	3:04	21:41	3:49	20:57	4:28	20:18
5/28/2019	5:00	19:47	2:56	21:51	3:42	21:05	4:23	20:24
6/ 4/2019	4:56	19:52	2:50	21:59	3:38	21:11	4:19	20:30
6/11/2019	4:55	19:56	2:46	22:05	3:35	21:16	4:17	20:34
6/18/2019	4:55	19:59	2:45	22:09	3:34	21:20	4:17	20:37
6/25/2019	4:57	20:00	2:46	22:11	3:36	21:21	4:18	20:39
7/ 2/2019	5:00	20:00	2:51	22:09	3:40	21:20	4:21	20:38
7/ 9/2019	5:04	19:58	2:57	22:05	3:45	21:17	4:26	20:36
7/16/2019	5:09	19:55	3:06	21:58	3:52	21:12	4:32	20:32
7/23/2019	5:15	19:50	3:15	21:49	3:59	21:05	4:38	20:26
7/30/2019	5:21	19:43	3:25	21:39	4:07	20:57	4:45	20:19
8/ 6/2019	5:28	19:35	3:36	21:27	4:16	20:47	4:53	20:10
8/13/2019	5:34	19:26	3:46	21:15	4:25	20:36	5:00	20:00
8/20/2019	5:41	19:17	3:56	21:02	4:33	20:25	5:08	19:50
8/27/2019	5:48	19:06	4:06	20:48	4:41	20:13	5:15	19:39
9/ 3/2019	5:55	18:55	4:15	20:35	4:49	20:00	5:23	19:27
9/10/2019	6:02	18:43	4:24	20:21	4:57	19:48	5:30	19:15
9/17/2019	6:08	18:32	4:32	20:08	5:05	19:35	5:37	19:03
9/24/2019	6:15	18:20	4:40	19:55	5:12	19:23	5:44	18:51
10/ 1/2019	6:22	18:08	4:47	19:43	5:19	19:11	5:51	18:40
10/ 8/2019	6:29	17:57	4:55	19:32	5:26	19:00	5:58	18:28
10/15/2019	6:37	17:46	5:02	19:21	5:33	18:49	6:05	18:18
10/22/2019	6:44	17:36	5:09	19:11	5:40	18:40	6:12	18:08
10/29/2019	6:52	17:26	5:16	19:03	5:48	18:31	6:20	17:59
11/ 5/2019	7:00	17:18	5:23	18:55	5:55	18:24	6:27	17:51
11/12/2019	7:09	17:11	5:30	18:49	6:02	18:17	6:35	17:45
11/19/2019	7:17	17:05	5:37	18:45	6:09	18:13	6:42	17:40
11/26/2019	7:25	17:01	5:44	18:42	6:16	18:10	6:50	17:36
12/ 3/2019	7:32	16:59	5:50	18:41	6:23	18:08	6:57	17:35
12/10/2019	7:38	16:59	5:55	18:42	6:28	18:09	7:03	17:35
12/17/2019	7:43	17:00	6:00	18:44	6:33	18:11	7:07	17:36
12/24/2019	7:47	17:04	6:04	18:47	6:37	18:14	7:11	17:40
12/31/2019	7:49	17:09	6:06	18:52	6:39	18:19	7:13	17:44