THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

OBSERVER'S CALENDAR

2015

JANUARY

COSMIC FLUORESCENCE At 1 500 light-years away in the constellation of Perseus lies the California Nebula, so named because it resembles the shape of that state. The nebula visually is difficult to detect but can be seen from dark sites and with the aid of an H-β filter. Nearby Xi Perseus, a highly energetic type O7 star, excites the H-β line, which causes the nebula to shine. | IMAGE BY STUART HEGGIE

THE PLANETS THIS MONTH

Mercury	low in WSW in evening twilight, lost in twilight late in month
Venus	very low in WSW in evening twilight
Mars	very low in WSW at dusk, sets in WSW near 8 pm
Jupiter	rises after dark in ENE, transits high in S near 2 am
Saturn	rises in SE after 4 am, in S near sunrise

DEC	S	M	T	W	T	F	S
		1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31			

FEB	S	M	T	W	T	F	S
	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28

Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.

Eastern time is used, except for rise and set events and changes to/from Daylight Saving Time, which are given in local time.

Times for events involving planetary satellites refer to the start time.

Detailed instructions on adjusting times for location are given in the back pages.

Please see back pages for photo details and additional information about this Calendar.

SUNDAY

MONDAY

TUESDAY

WEDNESDAY

THURSDAY

40°N 50°N
Set 3:48 4:13
Rise 14:17 13:50

1

NEW YEAR'S DAY

Mercury 3° below Venus, difficult in bright evening twilight, approaching

Moon crosses Hyades later this evening

FRIDAY

40°N 50°N
Set 4:47 5:15
Rise 15:03 14:34

2

Moon grazes Delta 1 Tauri across S U.S. in the wee hours

SATURDAY

40°N 50°N
Set 5:42 6:12
Rise 15:53 15:23
Sunrise 7:22 7:59
Sunset 16:47 16:11

3

Europa partially occults Io for 11 min 5:55 am

Quadrantid meteors (ZHR=120) 10 pm

40°N 50°N
Set 6:32 7:02
Rise 16:46 16:17

4

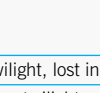
Full Moon 23:53

Earth at perihelion (147,096,208 km)

Two shadows on Jupiter visible in NW of N. America 12:23 pm

Mercury 2° below Venus, difficult in bright evening twilight, approaching

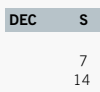
Today's full Moon is the Wolf Moon



40°N 50°N
Set 7:17 7:44
Rise 17:41 17:15

5

Discovery of Eris, similar size to Pluto, triggers creation of dwarf planet classification, 10 years ago.



40°N 50°N
Set 7:58 8:21
Rise 18:37 18:15

6

Two shadows on Jupiter visible in all of N. America except Newfoundland 6:56 am

1st known use of term "cross" referring to Southern Cross, by Corsali, 500 years ago

40°N 50°N
Set 8:34 8:53
Rise 19:33 19:16

7

Moon 6° S of Jupiter tonight

40°N 50°N
Set 9:07 9:21
Rise 20:29 20:17

8

40°N 50°N
Set 9:37 9:46
Rise 21:25 21:19

9

Two shadows on Jupiter visible in E of N. America 8:15 pm

40°N 50°N
Set 10:07 10:10
Rise 22:20 22:20
Sunrise 7:22 7:56
Sunset 16:54 16:19

10

Europa partially occults Io for 9 min. Visible in W of N. America 8:13 am

Mercury 0.6° lower right of Venus closest approach

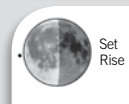
40°N 50°N
Set 10:36 10:33
Rise 23:16 23:22

11

Mercury 0.6° right of Venus, difficult in bright evening twilight, separating

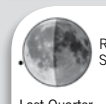
Follow Arcturus unaided into daylight this week

Dave Lane and Paul Gray discover Supernova 2005B, 10 years ago



40°N 50°N
Set 11:05 10:57
Rise --- ---

12



40°N 50°N
Rise 0:13 0:25
Set 11:36 11:23

13

Last Quarter 4:47

Two shadows on Jupiter visible in W of N. America 9:33 am

40°N 50°N
Rise 1:11 1:28
Set 12:11 11:52

14

Mercury at greatest elongation (19° E) this evening (m=-0.7)

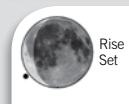
Huygens probe soft lands on Titan, Saturn's largest moon, 10 years ago

40°N 50°N
Rise 2:11 2:33
Set 12:49 12:26

15

Callisto in penumbral eclipse by Io. Drop 0.5 mag. Visible in W of N. America 7:30 am

Warren de la Rue, inventor of the spectroheliograph, born 200 years ago

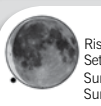


40°N 50°N
Rise 3:12 3:38
Set 13:34 13:06

16

Two shadows on Jupiter visible in all of N. America 10:51 pm

Crescent Moon 1.6° N of Saturn at dawn



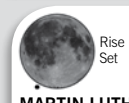
40°N 50°N
Rise 4:13 4:42
Set 14:25 13:55
Sunrise 7:19 7:51
Sunset 17:01 16:29

17

Europa partially eclipses Io. Drop 0.3 mag. Visible in W of N. America 9:36 am

40°N 50°N
Rise 5:12 5:42
Set 15:24 14:54

18



40°N 50°N
Rise 6:08 6:36
Set 16:29 16:01

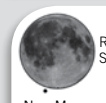
19

MARTIN LUTHER KING JR. DAY (USA)

Old crescent Moon, 24 hours before new in E, 20 hours before new in W, just before sunrise

Neptune 12' upper right of Mars this evening

Ganymede occults Europa for 5 min. Visible in E of N. America 9:31 pm



40°N 50°N
Rise 6:59 7:23
Set 17:39 17:16

20

New Moon 8:14

Two shadows on Jupiter visible in NW of N. America 12:09 pm

Europa partially eclipses Io. Drop 0.4 mag 10:47 pm

Gegenschein visible from a very dark site, highest in S at midnight

40°N 50°N
Rise 7:45 8:04
Set 18:51 18:35

21

Crescent Moon-Venus-Mercury loose group in evening twilight

40°N 50°N
Rise 8:27 8:40
Set 20:03 19:54

22

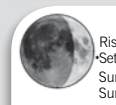
Crescent Moon 4° right of Mars in evening twilight

40°N 50°N
Rise 9:06 9:12
Set 21:15 21:13

23

Two shadows on Jupiter visible in all of N. America 11:35 pm

Callisto's shadow transits Ganymede for 14 min. Drop 1.4 mag 4:05 am



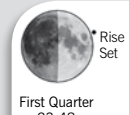
40°N 50°N
Rise 9:43 9:42
Set 22:25 22:30
Sunrise 7:15 7:44
Sunset 17:09 16:40

24

Triple shadow on Jupiter, visible in all of N. America 1:28 am

40°N 50°N
Rise 10:20 10:12
Set 23:33 23:45

25



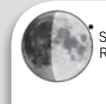
40°N 50°N
Rise 10:57 10:42
Set --- ---

26

First Quarter 23:48

NEO asteroid 2004 BL86 at m=9 moving N 2°/hr

Ganymede occults Europa for 5 min 0:12 am



40°N 50°N
Set 0:38 0:56
Rise 11:36 11:16

27

40°N 50°N
Set 1:41 2:05
Rise 12:17 11:52

28

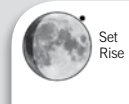
Lunar Straight Wall this evening

Europa partially eclipses Io for 9 min. Drop 0.5 mag 1:17 am

40°N 50°N
Set 2:41 3:08
Rise 13:02 12:34

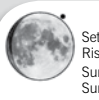
29

3 Juno at opposition (m=8.2)



40°N 50°N
Set 3:37 4:06
Rise 13:50 13:20

30



40°N 50°N
Set 4:28 4:58
Rise 14:41 14:12
Sunrise 7:10 7:35
Sunset 17:18 16:52

31

DISK SPACE From "down under," our home galaxy, the Milky Way passes high overhead, stretching from horizon to horizon. As one peers into the centre of the disk, the apparent shape is easy to spot and the observer can feel his or her place in the cosmos. | IMAGE BY ALAN DYER

FEBRUARY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1 *40ºN 50ºN* Set 5:15 5:43 Rise 15:34 15:07 Io occults Europa for 4 min 10:29 pm *Arthur C. Clarke proposes geo-stationary satellites, 70 years ago*	**2** *40ºN 50ºN* Set 5:57 6:21 Rise 16:30 16:06 Ganymede occults Europa for 6 min 2:53 am	**3** *40ºN 50ºN* Set 6:34 6:55 Rise 17:25 17:06 Full Moon 18:09 Today's full Moon is the Snow Moon	**4** *40ºN 50ºN* Set 7:08 7:24 Rise 18:21 18:08 Europa partially eclipses Io then transits it in 14 min 3:44 am *Lunar cartographer J.N. Kreiger born, 150 years ago*	**5** *40ºN 50ºN* Set 7:40 7:50 Rise 19:17 19:09 Moon 6º S of Jupiter tonight	**6** *40ºN 50ºN* Set 8:10 8:15 Rise 20:13 20:10 Jupiter at opposition (m=-2.6)	**7** *40ºN 50ºN* Set 8:39 8:38 Rise 21:08 21:11 Sunrise 7:03 7:25 Sunset 17:26 17:04 Europa occults then eclipses Io in 11 min. Visible in E of N. America 5:54 pm
8 *40ºN 50ºN* Set 9:08 9:02 Rise 22:04 22:13 Zodiacal Light readily visible from a dark site in W after evening twilight for the next 2 weeks	**9** *40ºN 50ºN* Set 9:38 9:27 Rise 23:01 23:15 Io occults Europa for 3 min 0:26 am Ganymede occults Europa for 6 min 5:34 am	**10** *40ºN 50ºN* Set 10:11 9:54 Rise 23:59 --- *1st supernova is discovered by Canadians, using a Canadian telescope, in Canada, 20 years ago*	**11** *40ºN 50ºN* Rise --- 0:18 Set 10:46 10:25 Last Quarter 22:50 Europa partially eclipses Io. Drop 0.8 mag 6:12 am Callisto partially eclipses Ganymede. Drop 1.4 mag. Visible in W of N. America 8:37 am	**12** *40ºN 50ºN* Rise 0:57 1:22 Set 11:27 11:01 Lunar Curtiss Cross visible in Yukon and Alaska before sunrise Moon 7º W of Saturn before dawn	**13** *40ºN 50ºN* Rise 1:56 2:24 Set 12:13 11:44 Moon 6º E of Saturn before dawn	**14** *40ºN 50ºN* Rise 2:54 3:24 Set 13:06 12:36 Sunrise 6:55 7:13 Sunset 17:34 17:16 **VALENTINE'S DAY** Europa occults Io for 6 min. then at 7:20 pm its shadow transits Io for 7 min. Drop 0.9 mag. Visible in E of N. America 6:59 pm
15 *40ºN 50ºN* Rise 3:50 4:20 Set 14:06 13:37 Mars 2.9º above Venus in evening twilight, approaching 8 Flora at opposition (m=9.0)	**16** *40ºN 50ºN* Rise 4:43 5:10 Set 15:12 14:47 **LOUIS RIEL DAY (MB)** **FAMILY DAY (AB, SK, ON)** **PRESIDENT'S DAY (USA)** Winter Star Party, Florida Keys, www.scas.org/wsp.html (through Feb 22)	**17** *40ºN 50ºN* Rise 5:32 5:54 Set 16:23 16:03	**18** *40ºN 50ºN* Rise 6:17 6:33 Set 17:36 17:23 New Moon 18:47 Europa partially occults Io then at 8:30 am partially eclipses Io. Drop 0.9 mag. Visible in W of N. America 8:02 am *Clyde Tombaugh discovers dwarf planet Pluto, 85 years ago*	**19** *40ºN 50ºN* Rise 6:59 7:08 Set 18:50 18:44 **CHINESE NEW YEAR (GOAT)** Io transits Ganymede for 6 min then at 7:35 pm Io's shadow transits for 9 min. Visible in E of N. America 6:48 pm	**20** *40ºN 50ºN* Rise 7:38 7:40 Set 20:03 20:05 Mars 0.75º above Venus this evening, cres. Moon 1.5º to the right	**21** *40ºN 50ºN* Rise 8:16 8:11 Set 21:15 21:24 Sunrise 6:45 7:00 Sunset 17:43 17:28 Cres. Moon occults Uranus visible in E of N. America early this evening Mars 0.5º upper right of Venus in evening twilight Europa transits Io for 7 min then at 9:41 pm partially eclipses Io for 7 min. Drop 0.9 mag 9:04 pm
22 *40ºN 50ºN* Rise 8:55 8:43 Set 22:24 22:40 Mars 0.5º lower right of Venus in evening twilight, separating	**23** *40ºN 50ºN* Rise 9:34 9:16 Set 23:31 23:52 Ganymede occults Io for 5 min then at 9:37 pm its shadow transits Io for 7 min. Drop 0.6 mag 8:41 pm	**24** *40ºN 50ºN* Rise 10:16 9:53 Set — — Mercury at greatest elongation (27º W) this morning (m=0.0)	**25** *40ºN 50ºN* Set 0:33 0:59 Rise 11:00 10:34 First Quarter 12:14 Lunar X near crater Werner 10 pm Moon occults Aldebaran in daylight in NW of N. America this afternoon	**26** *40ºN 50ºN* Set 1:32 2:00 Rise 11:48 11:19 Lunar Straight Wall this evening Europa in penumbral eclipse by Callisto for 10 min. Drop 0.9 mag. Visible in E of N. America 7:43 pm Io transits Ganymede for 7 min then at 10:31 pm its shadow transits for 9 min. Drop 1.0 mag. Visible in E of N. America 9:27 pm	**27** *40ºN 50ºN* Set 2:25 2:54 Rise 12:38 12:09	**28** *40ºN 50ºN* Set 3:13 3:41 Rise 13:31 13:03 Sunrise 6:35 6:46 Sunset 17:50 17:40 Moon occults Lambda Gem visible in all of N. America except S U.S. early this evening. Before sunset in the W Europa transits Io for 6 min. then at 00:01 am its shadow transits for 7 min. 11:09 pm

THE PLANETS THIS MONTH

Mercury	very low in ESE in morning twilight with increasing difficulty toward the end of month
Venus	very low in WSW in evening twilight
Mars	very low in WSW at dusk, sets in WSW near 8 pm
Jupiter	in E in evening twilight, transits near midnight, low in WNW at dawn
Saturn	rises in SE after 3 am, in S near dawn

JAN	S	M	T	W	T	F	S
					1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31

MAR	S	M	T	W	T	F	S
	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31				

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MARCH

ONE MOON, TWO FACES The waxing crescent Moon in springtime presents the best chance for observers to see the earthshine on the dark side of the Moon. In this composite image, the crescent view can be seen at right while it is overexposed on the left image to capture the earthshine, sunlight reflected off the Earth onto the Moon thus illuminating it. | PHOTO BY MICHAEL WATSON

SUNDAY

1

	40°N	50°N
Set	3:56	4:22
Rise	14:25	14:00

Europa's shadow transits Io for 7 min. Drop 0.9 mag 0:01 am

Daylight Saving Time begins 2 am

Europa transits Io for 5 min at 1:15 am then at 3:20 am its shadow transits for 7 min

Spot Capella unaided before sunset this week

Zodiacal Light readily visible from a dark site in W after evening twilight for the next 2 weeks

8

	40°N	50°N
Set	8:41	8:32
Rise	21:55	22:07

Moon 6° S of Jupiter tonight

15

	40°N	50°N
Rise	3:31	3:59
Set	13:53	13:26

Europa transits Io for 5 min then at 5:39 am its shadow transits 4:21 am

Callisto transits Europa for 11 min 9:33 pm

22

	40°N	50°N
Rise	8:27	8:12
Set	22:11	22:29

Crescent Moon 3° left of Venus in evening twilight

44 Nysa at opposition (m=9.4)

Europa partially occults Io for 5 min. Visible in W of N. America 6:28 am

29

	40°N	50°N
Set	3:34	3:57
Rise	14:14	13:52

MONDAY

2

	40°N	50°N
Set	4:35	4:57
Rise	15:20	15:00

Moon 6° S of Jupiter tonight

Ganymede occults Io for 5 min 11:05 pm

Heinrich Olbers, who proposed paradox named for him, died 175 years ago

9

	40°N	50°N
Set	9:13	8:58
Rise	22:52	23:10

Io's shadow transits Ganymede for 7 min. Drop 0.5 mag. Visible in E of N. America 7:35 pm

16

	40°N	50°N
Rise	4:20	4:44
Set	14:59	14:36

Callisto partially eclipses Europa for 12 min. Drop 0.9 mag 2:46 am

Ganymede partially eclipses Europa for 8 min. Drop 0.5 mag 10:49 pm

23

	40°N	50°N
Rise	9:09	8:48
Set	23:18	23:42

Ganymede partially occults Callisto for 9 min 8:10 pm

TUESDAY

3

	40°N	50°N
Set	5:10	5:27
Rise	16:15	16:00

10

	40°N	50°N
Set	9:47	9:28
Rise	23:49	—

Uranus 30' upper left of Mars in bright evening twilight

Ganymede occults Io for 5 min 2:30 am

17

	40°N	50°N
Rise	5:06	5:25
Set	16:09	15:52

ST. PATRICK'S DAY

24

	40°N	50°N
Rise	9:54	9:28
Set	—	—

Moon occults Aldebaran in NW of N. America this evening, graze in Prince George

Ganymede partially eclipses Europa for 8 min. Drop 0.5 mag 2:03 am

31

	40°N	50°N
Set	4:44	4:58
Rise	16:05	15:53

WEDNESDAY

4

	40°N	50°N
Set	5:42	5:54
Rise	17:11	17:01

Uranus 15' below Venus in bright evening twilight

Giovanni Schiaparelli, Mars observer, born 180 years ago

11

	40°N	50°N
Rise	—	0:12
Set	10:25	10:01

Uranus 20' lower left of Mars in bright evening twilight

Moon 2.5° N of Saturn rising late this evening

18

	40°N	50°N
Rise	5:48	6:01
Set	17:22	17:12

Europa's shadow transits Io for 5 min. Drop 0.5 mag. Visible in E of N. America 8:48 pm

Alexey Leonov makes 1st space walk on Vostok 11 mission, 50 years ago

25

	40°N	50°N
Set	0:20	0:48
Rise	10:41	10:13

Huygens discovers Saturn's largest satellite, Titan, 360 years ago

THURSDAY

5

	40°N	50°N
Set	6:12	6:19
Rise	18:07	18:02

Full Moon 13:06

354 Eleonora at opposition (m=9.6)

Io transits Ganymede for 8 min then at 1:34 am its shadow transits 23:50 pm

Today's full Moon is the Worm Moon

12

	40°N	50°N
Rise	0:47	1:13
Set	11:08	10:41

Uranus 1° below Mars in bright evening twilight

Io partially eclipses Europa for 4 min. Drop 0.5 mag 11:28 pm

Simon Newcomb, born in Wallace, Nova Scotia, 180 years ago

19

	40°N	50°N
Rise	6:28	6:34
Set	18:35	18:33

26

	40°N	50°N
Set	1:17	1:46
Rise	11:32	11:03

FRIDAY

6

	40°N	50°N
Set	6:42	6:44
Rise	19:02	19:03

7 Iris at opposition (m=8.8)

13

	40°N	50°N
Rise	1:44	2:13
Set	11:57	11:28

Last Quarter 13:48

Io transits Ganymede for 8 min then at 5:54 am its shadow transits for 13 min 3:31 am

Lunar Curtiss Cross visible in Atlantic Canada after midnight

Percival Lovell, Mars observer, born 160 years ago

20

	40°N	50°N
Rise	7:07	7:06
Set	19:48	19:53

New Moon 5:36

Spring Equinox 6:45 pm

Young crescent Moon, 14 hours after new in E, 18 hours after new in W a difficult challenge soon after sunset

Total solar eclipse visible in the North Atlantic

Europa partially eclipses Io for 5 min. Drop 0.6 mag 1:40 am

27

	40°N	50°N
Set	2:08	2:37
Rise	12:25	11:57

First Quarter 3:43

Io partially eclipses Europa for 5 min. Drop 0.6 mag 3:53 am

SATURDAY

7

	40°N	50°N
Set	7:11	7:07
Rise	19:58	20:05
Sunrise	6:25	6:31
Sunset	17:58	17:52

Europa transits Callisto for 7 min. Visible in W of N. America 6:21 am

14

	40°N	50°N
Rise	2:39	3:08
Set	12:52	12:23
Sunrise	7:14	7:17
Sunset	19:06	19:03

Io's shadow transits Ganymede for 20 min. Drop 0.8 mag 3:50 am

Saturn stationary

21

	40°N	50°N
Rise	7:46	7:38
Set	21:01	21:13
Sunrise	7:02	7:01
Sunset	19:13	19:14

Crescent Moon 1.6° left of Mars this evening

Io partially occults Ganymede for 22 min. Visible in W of N. America 3:47 am

28

	40°N	50°N
Set	2:54	3:20
Rise	13:19	12:54
Sunrise	6:51	6:46
Sunset	19:20	19:25

Lunar Straight Wall this evening

THE PLANETS THIS MONTH

Mercury	very low in ESE in morning twilight first week of month, lost in twilight after mid-month
Venus	very low in W in evening twilight
Mars	very low in W at dusk, sets in W near 9 pm
Jupiter	high in SE after dark, transits near 11 pm, sets in WNW near 6 am
Saturn	rises in SE after 2 am, in S near dawn

FEB	S	M	T	W	T	F	S
	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28

APR	S	M	T	W	T	F	S
				1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30		

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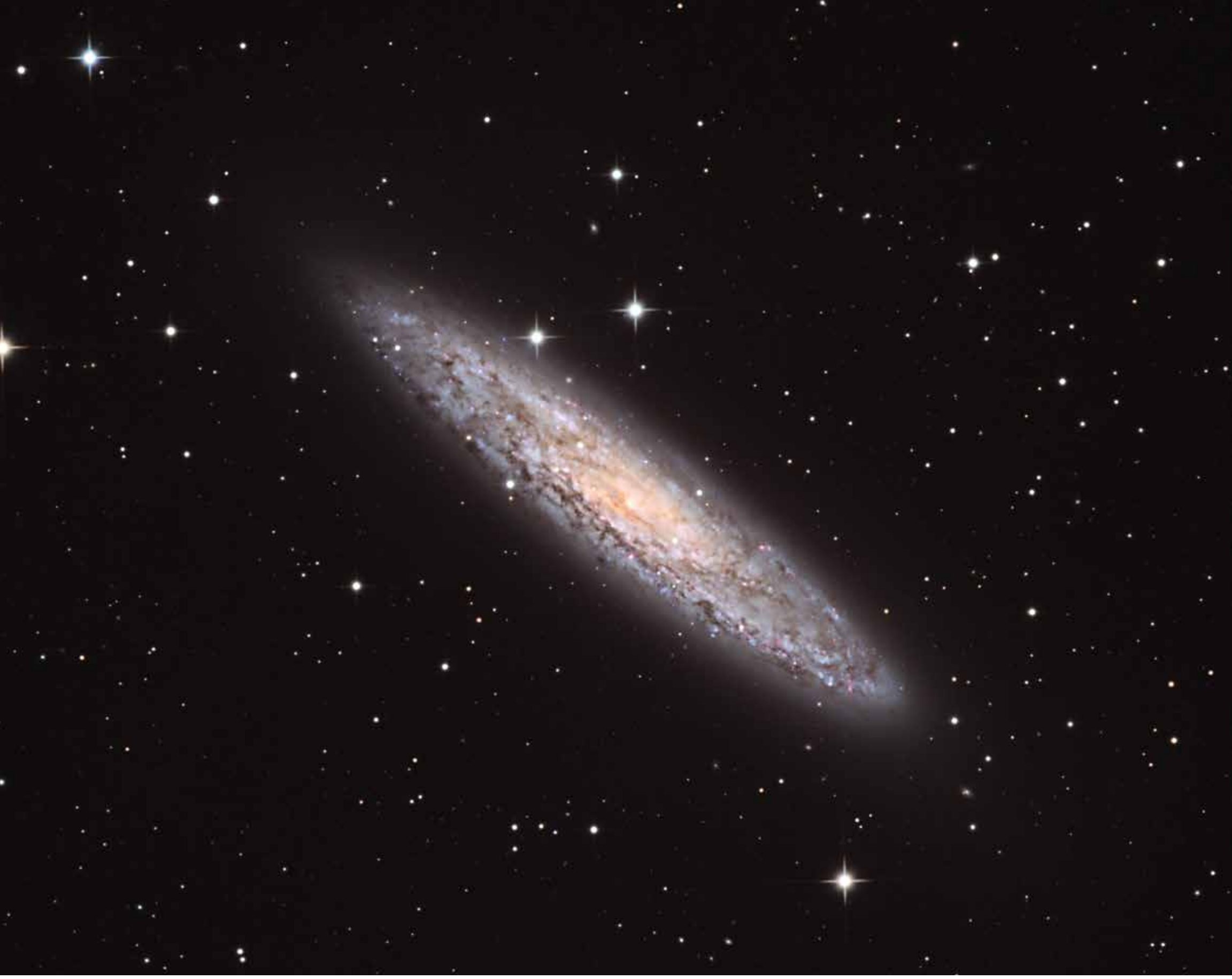

SILVER COIN The Sculptor Galaxy (NGC 253) is also known as the Silver Coin Galaxy for its resemblance to its namesake. It is located near the south galactic pole and is the largest of the Sculptor Group of Galaxies, which is the nearest to our local group of galaxies. A southern-sky splendour, it is an object not to be missed by anyone travelling below the equator. | IMAGE BY DEBRA AND PETER CERAVOLO

APRIL

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

THE PLANETS THIS MONTH

Mercury	very low in WNW after mid-month
Venus	low in W in evening twilight
Mars	very low in W at dusk, lost in twilight late in month
Jupiter	high in S after dark, sets in W near 4 am
Saturn	rises in SE after 11 pm, transits in S near 4 am

Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.

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Detailed instructions on adjusting times for location are given in the back pages.

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	40°N	50°N	
Set	5:15	5:24	**1**
Rise	17:00	16:54	

	40°N	50°N	
Set	5:44	5:48	**2**
Rise	17:56	17:55	

Callisto transits Ganymede for 24 min. Visible in W of N. America 5:36 am

	40°N	50°N	
Set	6:14	6:12	**3**
Rise	18:52	18:57	

GOOD FRIDAY

Io's shadow transits Europa for 5 min. Drop 0.6 mag. Visible in W of N. America 6:07 am

	40°N	50°N	
Set	6:44	6:36	**4**
Rise	19:49	19:59	
Sunrise	6:40	6:31	
Sunset	19:27	19:36	

Full Moon 8:06

FIRST DAY OF PASSOVER

Total lunar eclipse visible in the Pacific and W of N. America. Sets at start of totality to the E

Today's full Moon is the Pink Moon

	40°N	50°N	
Set	7:15	7:02	**5**
Rise	20:46	21:02	

EASTER SUNDAY

Follow Vega unaided into daylight this week

	40°N	50°N	
Set	7:49	7:31	**6**
Rise	21:44	22:05	

Io's shadow transits Europa for 5 min. Drop 0.6 mag. Visible in E of N. America 7:14 pm

	40°N	50°N	
Set	8:26	8:03	**7**
Rise	22:42	23:07	

Moon 2.5° N of Saturn rising late this evening

	40°N	50°N	
Set	9:07	8:41	**8**
Rise	23:39	—	

Europa transits Callisto for 5 min. Visible in E of N. America 6:54 pm

Jupiter stationary

	40°N	50°N	
Rise	—	0:07	**9**
Set	9:54	9:25	

	40°N	50°N	
Rise	0:34	1:03	**10**
Set	10:46	10:16	

Venus 3° lower left of Pleiades this evening

Star cl. M23 reappears on dark limb of Moon before dawn, visible in W of N. America

	40°N	50°N	
Rise	1:26	1:55	**11**
Set	11:43	11:15	
Sunrise	6:29	6:16	
Sunset	19:34	19:47	

Last Quarter 23:44

Venus 2.6° left of Pleiades this evening

	40°N	50°N	
Rise	2:15	2:40	**12**
Set	12:45	12:21	

Venus 3° upper left of Pleiades this evening and separating this week

Europa's shadow transits Ganymede for 9 min. Drop 1.0 mag. Visible in E of N. America 9:41 pm

	40°N	50°N	
Rise	3:00	3:21	**13**
Set	13:52	13:32	

	40°N	50°N	
Rise	3:42	3:57	**14**
Set	15:00	14:47	

Io's shadow transits Europa for 5 min. Drop 0.6 mag. Visible in E of N. America 9:28 pm

	40°N	50°N	
Rise	4:21	4:30	**15**
Set	16:11	16:05	

Mikhail Lomonosov, 1st to observe Venus atmosphere, died 250 years ago

	40°N	50°N	
Rise	5:00	5:02	**16**
Set	17:23	17:24	

	40°N	50°N	
Rise	5:38	5:33	**17**
Set	18:35	18:43	

Callisto transits Ganymede for 10 min. Visible in E of N. America 9:27 pm

	40°N	50°N	
Rise	6:17	6:06	**18**
Set	19:46	20:01	
Sunrise	6:18	6:02	
Sunset	19:41	19:58	

New Moon 14:57

	40°N	50°N	
Rise	6:58	6:40	**19**
Set	20:56	21:17	

Io's shadow transits Ganymede for 9 min. Drop 1.0 mag 0:59 am

	40°N	50°N	
Rise	7:42	7:19	**20**
Set	22:02	22:28	

International Astronomy Week (through Apr 26) www.rasc.ca/astronomy-day

Io's shadow transits Europa for 5 min. Drop 0.6 mag 11:42 pm

20 Massalia at opposition (m=9.3)

	40°N	50°N	
Rise	8:30	8:03	**21**
Set	23:03	23:32	

Crescent Moon 7° left of Venus this evening

Moon occults Aldebaran visible after sunrise north of graze from Colorado to Sudbury

Mars (m=1.2) 1.6° upper left of Mercury (m=-1.2), difficult in bright evening twilight

	40°N	50°N	
Rise	9:21	8:52	**22**
Set	23:59	—	

Mars 1.3° lower left of Mercury, difficult in bright evening twilight

Lyrid meteors (ZHR=20) 7 pm

	40°N	50°N	
Set	—	0:28	**23**
Rise	10:14	9:45	

ST. GEORGE'S DAY (NL)

11 Parthenope at opposition (m=9.7)

	40°N	50°N	
Set	0:48	1:16	**24**
Rise	11:09	10:43	

	40°N	50°N	
Set	1:32	1:56	**25**
Rise	12:05	11:42	
Sunrise	6:08	5:48	
Sunset	19:48	20:09	

First Quarter 19:55

International Astronomy Day www.rasc.ca/astronomy-day

Hubble Space Telescope is deployed, 25 years ago

	40°N	50°N	
Set	2:10	2:31	**26**
Rise	13:01	12:42	

Lunar X near crater Werner visible in all of N. America except Atlantic Canada 1 am

Jupiter visible in daylight 7° upper right of Moon. A challenge just before sunset

Lunar Straight Wall this evening

	40°N	50°N	
Set	2:45	3:00	**27**
Rise	13:57	13:43	

	40°N	50°N	
Set	3:16	3:27	**28**
Rise	14:53	14:44	

Io partially eclipses Europa for 5 min. Drop 0.6 mag 1:58 am

	40°N	50°N	
Set	3:46	3:52	**29**
Rise	15:48	15:45	

Mercury 2.5° lower left of Pleiades, difficult in bright evening twilight

	40°N	50°N	
Set	4:16	4:16	**30**
Rise	16:44	16:47	

MAR	S	M	T	W	T	F	S
	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31				

MAY	S	M	T	W	T	F	S
						1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31						

GUM NEBULA The Vela Supernova Remnant in the centre of the Gum Nebula area of Vela. This is the remains of a star that exploded thousands of years ago. | PHOTO BY ALAN DYER

MAY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

THE PLANETS THIS MONTH

Mercury	low in WNW in evening twilight first week of month, lost after mid-month
Venus	low in WNW in evening twilight
Mars	not observable this month
Jupiter	in W after dark, sets in WNW near 2 am
Saturn	in SE at dusk, transits in S near 2 am, in SW near dawn

1 FRIDAY

	40°N	50°N
Set	4:45	4:40
Rise	17:41	17:49

Mercury 2.5° upper left of Pleiades, separating this week, difficult in bright evening twilight

2 SATURDAY

	40°N	50°N
Set	5:16	5:05
Rise	18:38	18:52
Sunrise	5:59	5:35
Sunset	19:55	20:20

3

	40°N	50°N
Set	5:49	5:33
Rise	19:36	19:56

Full Moon 23:42

Today's full Moon is the Flower Moon

Halley discovers Baily's Beads and solar prominences, 300 years ago

4

	40°N	50°N
Set	6:25	6:04
Rise	20:35	20:59

Moon 6° W of Saturn this evening

5

	40°N	50°N
Set	7:05	6:40
Rise	21:33	22:01

Moon 7° E of Saturn this evening

Io partially eclipses Europa for 5 min. Drop 0.6 mag. Visible in W of N. America 4:13 am

6

	40°N	50°N
Set	7:51	7:22
Rise	22:30	23:00

Eta Aquariid meteors (ZHR=40) 8 am

7

	40°N	50°N
Set	8:41	8:12
Rise	23:24	23:53

Mercury at greatest elongation (21° E). Best evening apparition of the year (m=0.4)

Venus 2.5° right of star cluster M35 next few evenings

8

	40°N	50°N
Set	9:38	9:09
Rise	—	—

9

	40°N	50°N
Rise	0:13	0:40
Set	10:38	10:12
Sunrise	5:51	5:24
Sunset	20:02	20:30

10

	40°N	50°N
Rise	0:59	1:22
Set	11:42	11:21

MOTHER'S DAY

Texas Star Party, Fort Davis, Texas, www.texasstarparty.org (through May 17)

Venus 2° above M35

11

	40°N	50°N
Rise	1:41	1:59
Set	12:49	12:33

Last Quarter 6:36

12

	40°N	50°N
Rise	2:20	2:32
Set	13:57	13:48

Lunar Curtiss Cross visible in E of N. America 3:00 am

13

	40°N	50°N
Rise	2:57	3:03
Set	15:06	15:04

Ganymede partially occults Callisto for 9 min 11:07 pm

14

	40°N	50°N
Rise	3:34	3:33
Set	16:15	16:21

15

	40°N	50°N
Rise	4:11	4:03
Set	17:25	17:37

Io partially eclipses Europa for 5 min. Drop 0.5 mag. Visible in E of N. America 7:38 pm

16

	40°N	50°N
Rise	4:50	4:36
Set	18:34	18:53
Sunrise	5:44	5:13
Sunset	20:09	20:41

17

	40°N	50°N
Rise	5:32	5:12
Set	19:42	20:06

532 Herculina at opposition (m=9.1)

18

	40°N	50°N
Rise	6:18	5:52
Set	20:46	21:14

New Moon 0:13

VICTORIA DAY (CANADA)

19

	40°N	50°N
Rise	7:07	6:39
Set	21:46	22:15

20

	40°N	50°N
Rise	8:00	7:31
Set	22:39	23:08

Two shadows on Jupiter visible in E of N. America 8:06 pm

Ganymede partially eclipses Europa for 9 min 00:33 am

21

	40°N	50°N
Rise	8:56	8:28
Set	23:26	23:52

RTMC Astronomy Expo, Big Bear, CA www.rtmcastronomyexpo.org (through May 25)

Crescent Moon, Venus and Jupiter within 8° this evening

Moon occults Lambda Gem before sunset in the W

22

	40°N	50°N
Rise	9:53	9:27
Set	—	—

23

	40°N	50°N
Set	0:07	0:30
Rise	10:50	10:29
Sunrise	5:39	5:05
Sunset	20:15	20:50

Moon 6° lower left of Jupiter this evening

Saturn at opposition (m=0.0)

24

	40°N	50°N
Set	0:44	1:02
Rise	11:47	11:30

25

	40°N	50°N
Set	1:17	1:30
Rise	12:43	12:32

First Quarter 13:19

MEMORIAL DAY (USA)

CASCA 2015, Hamilton, ON (through May 27)

26

	40°N	50°N
Set	1:48	1:56
Rise	13:38	13:33

Lunar Straight Wall this evening

27

	40°N	50°N
Set	2:17	2:20
Rise	14:34	14:34

Two shadows on Jupiter visible in E of N. America 10:01 pm

28

	40°N	50°N
Set	2:46	2:43
Rise	15:30	15:36

29

	40°N	50°N
Set	3:16	3:08
Rise	16:27	16:39

30

	40°N	50°N
Set	3:48	3:34
Rise	17:25	17:43
Sunrise	5:35	4:58
Sunset	20:21	20:58

31

	40°N	50°N
Set	4:23	4:03
Rise	18:24	18:47

APR	S	M	T	W	T	F	S
				1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	

JUN	S	M	T	W	T	F	S
		1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30				

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HOODOOS AND THE MILKY WAY Untouched skies remain dark over the untouched land of the Hoodoos in Writing-on-Stone Provincial Park, Alberta. A view one could compare to that as from another world awaits those who seek out such special locations. | PHOTO BY WARREN FINLAY

JUNE

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1 *40°N 50°N* Set 5:01 4:37 Rise 19:24 19:50	**2** *40°N 50°N* Set 5:45 5:18 Rise 20:22 20:51 Full Moon 12:19 Today's full Moon is the Strawberry Moon *Ed White makes 1st US space walk on Gemini 4 mission, 50 years ago*	**3** *40°N 50°N* Set 6:35 6:05 Rise 21:18 21:48 Two shadows on Jupiter visible in W of N. America except NW 12:58 am	**4** *40°N 50°N* Set 7:30 7:00 Rise 22:11 22:39	**5** *40°N 50°N* Set 8:30 8:03 Rise 22:59 23:24	**6** *40°N 50°N* Set 9:35 9:11 Rise 23:42 — Sunrise 5:32 4:53 Sunset 20:26 21:05 Venus at greatest elongation (45° E) this evening
7 *40°N 50°N* Rise — 0:02 Set 10:41 10:23	**8** *40°N 50°N* Rise 0:22 0:36 Set 11:49 11:37	**9** *40°N 50°N* Rise 1:00 1:07 Set 12:57 12:52 Last Quarter 11:42	**10** *40°N 50°N* Rise 1:36 1:37 Set 14:05 14:07 Venus 2.5° lower right of Beehive cluster M44, approaching	**11** *40°N 50°N* Rise 2:12 2:06 Set 15:13 15:22 New Moon In June Star Party, Algonquin Park, ON (through June 14)	**12** *40°N 50°N* Rise 2:49 2:37 Set 16:20 16:36 Europa transits Io for 4 min. Visible in E of N. America 8:12 pm Europa partially occults Io for 4 min 10:31 pm 2 Pallas at opposition (m=9.4)	**13** *40°N 50°N* Rise 3:28 3:10 Set 17:27 17:49 Sunrise 5:31 4:51 Sunset 20:30 21:10 Venus 1° above Beehive Cluster M44
14 *40°N 50°N* Rise 4:11 3:47 Set 18:31 18:58 Venus 1.5° above Beehive cluster M44 and separating this week	**15** *40°N 50°N* Rise 4:57 4:30 Set 19:32 20:01	**16** *40°N 50°N* Rise 5:48 5:19 Set 20:28 20:58 New Moon 10:05	**17** *40°N 50°N* Rise 6:42 6:13 Set 21:18 21:46	**18** *40°N 50°N* Rise 7:39 7:12 Set 22:03 22:27 **FIRST DAY OF RAMADAN**	**19** *40°N 50°N* Rise 8:37 8:13 Set 22:42 23:02 Moon 7° S of Venus this evening, Jupiter nearby	**20** *40°N 50°N* Rise 9:34 9:16 Set 23:17 23:32 Sunrise 5:31 4:51 Sunset 20:32 21:13 Moon 6° lower left of Jupiter this evening, Venus nearby
21 *40°N 50°N* Rise 10:31 10:18 Set 23:49 23:59 **NATIONAL ABORIGINAL DAY (NT)** **FATHER'S DAY** Summer solstice 12:38 pm Mercury within 3° of Aldebaran this week, difficult in bright morning twilight, best in southern U.S.	**22** *40°N 50°N* Rise 11:28 11:20 Set — —	**23** *40°N 50°N* Set 0:19 0:24 Rise 12:23 12:21 Lunar X near crater Werner visible in all of N. America except Atlantic Canada 11:30 pm 129 Antigone at opposition (m=9.8)	**24** *40°N 50°N* Set 0:48 0:47 Rise 13:19 13:22 First Quarter 7:03 **FÊTE NATIONALE (QC)** **DISCOVERY DAY (NL)** Mercury at greatest elongation (22° W) this morning (m=0.6) Lunar Straight Wall this evening	**25** *40°N 50°N* Set 1:17 1:11 Rise 14:15 14:24 Venus 3° lower right of Jupiter this evening, approaching	**26** *40°N 50°N* Set 1:48 1:36 Rise 15:12 15:27 Europa partially occults Io for 3 min. Visible in W of N. America 00:52 am	**27** *40°N 50°N* Set 2:20 2:04 Rise 16:11 16:31 Sunrise 5:33 4:53 Sunset 20:33 21:13
28 *40°N 50°N* Set 2:57 2:35 Rise 17:10 17:34 Moon 1.1° N of Saturn this evening Venus 1.2° lower right of Jupiter this evening, approaching	**29** *40°N 50°N* Set 3:38 3:12 Rise 18:09 18:37	**30** *40°N 50°N* Set 4:25 3:56 Rise 19:07 19:37 Venus 20' below Jupiter this evening, closest approach				

THE PLANETS THIS MONTH

Mercury	very low in ENE in morning twilight last week of month
Venus	very low in WNW in evening twilight
Mars	not observable this month
Jupiter	in W during twilight, sets in NW near midnight
Saturn	in S at dusk, sets in WSW near dawn

MAY	S	M	T	W	T	F	S
						1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31						

JUL	S	M	T	W	T	F	S
				1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	

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REFLECTIONS Recently past the quietest solar maximum in decades, fine displays of aurora have not been as common as during previous solar maxima. Here the observer had the pleasure of seeing the aurora reflected on a lake, adding to the fine display. | PHOTO BY WARREN FINLAY

JULY

JUN	S	M	T	W	T	F	S
		1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30				

AUG	S	M	T	W	T	F	S
							1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31					

THE PLANETS THIS MONTH

Mercury	very low in ENE in morning twilight first week of month, lost after mid-month
Venus	very low in W in evening twilight, lost in twilight late this month
Mars	not observable this month
Jupiter	low in W soon after sunset, lost in twilight late this month
Saturn	in SW at dusk, sets in WSW near 2 am

SUNDAY

MONDAY

TUESDAY

WEDNESDAY

THURSDAY

FRIDAY

SATURDAY

1
Set 5:18 20:02
Rise 4:48 20:31
Full Moon 22:20
CANADA DAY, MEMORIAL DAY (NL)
RASC General Assembly hosted by the Halifax Centre (through July 5) www.rasc.ca/ga2014
Venus 40' left of Jupiter this evening, separating
Today's full Moon is the Thunder Moon

2
Set 6:17 20:53
Rise 5:49 21:20

3
Set 7:22 21:40
Rise 6:56 22:02

4
Set 8:29 22:23
Rise 8:09 22:39
Sunrise 5:37 4:57
Sunset 20:32 21:11
INDEPENDENCE DAY (USA)
Earth at aphelion (152,093,476 km)
Deep Impact probe deliberately crashes into Comet Tempel 1's nucleus, 10 years ago

5
Set 9:38 23:02
Rise 9:25 23:12

6
Set 10:48 23:39
Rise 10:41 23:42
Pluto at opposition (m=14.1)

7
Set 11:56 —
Rise 11:57 —

8
Rise 0:15 13:05
Set 0:11 13:12
Last Quarter 16:24

9
Rise 0:51 14:12
Set 0:41 14:26
NUNAVUT DAY
George Darwin born 170 years ago

10
Rise 1:29 15:18
Set 1:13 15:38
Venus at greatest illuminated extent (m=-4.7) this evening

11
Rise 2:10 16:22
Set 1:48 16:47
Sunrise 5:41 5:03
Sunset 20:30 21:07
135 Hertha at opposition (m=9.9)

12
Rise 2:54 17:23
Set 2:28 17:51
ORANGEMEN'S DAY (NL)
Moon occults Aldebaran visible after sunrise N of graze from N B.C. to Gaspe
Venus passing within 3° below Regulus this week, difficult in bright evening twilight, best in S U.S.
Spot Arcturus unaided before sunset this week

13
Rise 3:42 18:20
Set 3:13 18:49

14
Rise 4:34 19:12
Set 4:04 19:41

15
Rise 5:29 19:58
Set 5:00 20:24
New Moon 21:25
Mariner 4 transmits 1st close-up pictures of Mars, 50 years ago

16
Rise 6:26 20:39
Set 6:00 21:02

17
Rise 7:23 21:16
Set 7:02 21:34
Mars (m=1.6) 1.6° above Mercury (m=-1.5), difficult in bright morning twilight, best in S U.S.

18
Rise 8:20 21:49
Set 8:05 22:02
Sunrise 5:46 5:11
Sunset 20:26 21:01
Crescent Moon-Venus-Jupiter grouping, in evening twilight, best in S U.S.
C.H.F. Peters, discoverer of 48 asteroids, died 125 years ago

19
Rise 9:17 22:20
Set 9:07 22:28

20
Rise 10:13 22:50
Set 10:08 22:52

21
Rise 11:09 23:19
Set 11:10 23:15

22
Rise 12:04 23:49
Set 12:11 23:40

23
Rise 13:00 —
Set 13:13 —

24
Set 0:20 13:57
Rise 0:06 14:15
First Quarter 0:04
Lunar Straight Wall this evening

25
Set 0:54 14:55
Rise 0:35 15:17
Sunrise 5:52 5:20
Sunset 20:21 20:53
Moon 3° W of Saturn this evening
1 Ceres at opposition (m=7.5)

26
Set 1:32 15:53
Rise 1:08 16:20

27
Set 2:15 16:51
Rise 1:48 17:20

28
Set 3:04 17:48
Rise 2:35 18:18
Jupiter 2.9° right of Regulus, difficult in bright evening twilight, best in S U.S.

29
Set 4:01 18:41
Rise 3:31 19:10

30
Set 5:03 19:31
Rise 4:36 19:56
68 Leto at opposition (m=9.8)

31
Set 6:10 20:17
Rise 5:47 20:36
Full Moon 6:43
Todays full Moon is the Grain Moon

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CLUSTER WITH SAPPHIRES Messier 3 (NGC 5272) is considered to be one of the finest globular clusters in the northern sky. It is noted for having a large number of the so-called Blue Stragglers, young main-sequence stars that appear to be much younger than the rest of cluster's stars. Under a dark sky, M3 is a good test of one's eyesight, while through a telescope its view is rivaled in the northern sky by only that of Messier 13. | IMAGE BY STUART HEGGIE

AUGUST

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

THE PLANETS THIS MONTH

Mercury	very low in W after mid month,
Venus	visible after mid-month very low in ENE
Mars	very low in ENE in morning twilight
Jupiter	not observable this month
Saturn	in SW at dusk, sets in WSW near midnight

1

	40°N	50°N
Set	7:20	7:04
Rise	20:59	21:12
Sunrise	5:58	5:29
Sunset	20:14	20:43

2

	40°N	50°N
Set	8:32	8:22
Rise	21:38	21:44

Saturn stationary

3

	40°N	50°N
Set	9:43	9:40
Rise	22:16	22:15

CIVIC HOLIDAY (AB, BC, MB, NB, NS, NT, NU, ON, SK)

4

	40°N	50°N
Set	10:54	10:58
Rise	22:53	22:45

5

	40°N	50°N
Set	12:03	12:14
Rise	23:31	23:17

6

	40°N	50°N
Set	13:10	13:28
Rise	—	23:51

Last Quarter 22:03

Mercury 0.7° right of Jupiter, Regulus to the left, difficult in bright evening twilight in S U.S.

Comet Halley's second predicted return, 180 years ago

7

	40°N	50°N
Rise	0:11	—
Set	14:15	14:38

Keji Dark-Sky Weekend, Kejimkujik National Park, NS (through Aug 9)

8

	40°N	50°N
Rise	0:54	0:29
Set	15:17	15:44
Sunrise	6:05	5:39
Sunset	20:06	20:31

Mount Kobau Star Party, Osoyoos, BC (through Aug 16)

9

	40°N	50°N
Rise	1:40	1:12
Set	16:15	16:44

10

	40°N	50°N
Rise	2:30	2:01
Set	17:08	17:37

Comet West discovered, 40 years ago

Foundation laid for Royal Greenwich Observatory, 340 years ago

11

	40°N	50°N
Rise	3:23	2:54
Set	17:55	18:22

12

	40°N	50°N
Rise	4:18	3:52
Set	18:38	19:02

Crescent Moon 8° right of Mars in morning twilight

13

	40°N	50°N
Rise	5:15	4:52
Set	19:16	19:35

Starfest, Mount Forest, ON, www.nyaa.ca (through Aug 16)

Stellafane Convention, Springfield, VT (through Aug 16)

Saskatchewan Summer Star Party, Cypress Hills, SK (through Aug 16)

Perseid meteors (ZHR=100) 2 am

14

	40°N	50°N
Rise	6:12	5:54
Set	19:50	20:05

New Moon 10:54

Nova East, Smileys Provincial Park, NS halifax.rasc.ca/ne (through Aug 16)

15

	40°N	50°N
Rise	7:09	6:56
Set	20:22	20:32
Sunrise	6:12	5:50
Sunset	19:57	20:19

Venus at inferior conjunction

21 Lutetia at opposition (m=9.3)

16

	40°N	50°N
Rise	8:05	7:58
Set	20:52	20:56

17

	40°N	50°N
Rise	9:01	8:59
Set	21:21	21:20

DISCOVERY DAY (YT)

Mars within 2° upper right of Beehive cluster M44, difficult in bright morning twilight

18

	40°N	50°N
Rise	9:56	10:00
Set	21:51	21:44

Extragalactic naked-eye supernova in M31, 130 years ago

19

	40°N	50°N
Rise	10:52	11:01
Set	22:21	22:09

20

	40°N	50°N
Rise	11:47	12:03
Set	22:54	22:36

Mars in Beehive Cluster M44, difficult in bright morning twilight

21

	40°N	50°N
Rise	12:44	13:04
Set	23:29	23:07

Butterpot Star Party, St. John's, NL www.stjohnsrasc.ca/ (through Aug 23)

Lunar X near crater Werner visible in all of N. America except Atlantic Canada 10 pm

S. Chandrasekhar, known for stellar models, died 20 years ago

22

	40°N	50°N
Rise	13:41	14:05
Set	—	23:43
Sunrise	6:18	6:00
Sunset	19:47	20:05

First Quarter 15:31

Lunar Straight Wall this evening

Moon 4° E of Saturn this evening

23

	40°N	50°N
Set	0:09	—
Rise	14:37	15:05

Mars 2° lower left of Beehive Cluster M44, difficult in bright morning twilight, separating

24

	40°N	50°N
Set	0:54	0:26
Rise	15:33	16:03

Cres. Moon occults Star cl. M23, visible in all of N. America except E early this evening

25

	40°N	50°N
Set	1:46	1:16
Rise	16:27	16:56

26

	40°N	50°N
Set	2:44	2:15
Rise	17:18	17:44

Johann Encke, discoverer of division in Saturn's ring, died 150 years ago

27

	40°N	50°N
Set	3:48	3:22
Rise	18:06	18:28

28

	40°N	50°N
Set	4:56	4:36
Rise	18:50	19:06

29

	40°N	50°N
Set	6:08	5:54
Rise	19:31	19:41
Sunrise	6:25	6:10
Sunset	19:37	19:51

Full Moon 14:35

Today's full Moon is the Sturgeon Moon

30

	40°N	50°N
Set	7:21	7:14
Rise	20:11	20:13

31

	40°N	50°N
Set	8:34	8:35
Rise	20:49	20:45

JUL	S	M	T	W	T	F	S
				1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	

SEP	S	M	T	W	T	F	S
			1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30			

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SEPTEMBER

HEART AND SOUL The Heart Nebula (right) and Soul Nebula (left) form an intriguing pair in the northern sky. Located in Cassiopeia at 6 000 light-years away, this is an active star-forming region. | IMAGE BY LYNN HILBORN

THE PLANETS THIS MONTH

Mercury	very low in W after sunset but not easily observed
Venus	very low in ENE in morning twilight
Mars	low in ENE in morning twilight
Jupiter	very low in ENE in morning twilight
Saturn	very low in SW after sunset, sets after dusk

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1 *40°N 50°N* Set 9:46 9:54 Rise 21:28 21:17 Neptune at opposition (m=7.8) Venus climbing to right of Mars this week, at dawn	**2** *40°N 50°N* Set 10:57 11:12 Rise 22:09 21:52	**3** *40°N 50°N* Set 12:05 12:26 Rise 22:52 22:29	**4** *40°N 50°N* Set 13:09 13:35 Rise 23:38 23:12 Mercury at greatest elongation (27° E) this evening. Poor apparition (m=0.1) Moon occults Aldebaran visible in E of N. America, except S, late evening	**5** *40°N 50°N* Set 14:09 14:38 Rise — 23:59 Sunrise 6:31 6:21 Sunset 19:25 19:36 Last Quarter 5:54
6 *40°N 50°N* Rise 0:27 — Set 15:04 15:33 Lunar Curtiss Cross visible in E of Atlantic Canada, before midnight 9 Metis at opposition (m=9.2)	**7** *40°N 50°N* Rise 1:20 0:51 Set 15:53 16:21 **LABOUR DAY**	**8** *40°N 50°N* Rise 2:14 1:47 Set 16:37 17:02 Northern Prairie Star Party, Tofield, AB (through Sep 13) *Comet Ikeya-Seki discovered, 50 years ago*	**9** *40°N 50°N* Rise 3:10 2:46 Set 17:16 17:37	**10** *40°N 50°N* Rise 4:06 3:47 Set 17:52 18:08 Mars-Crescent Moon-Venus form a line in morning twilight	**11** *40°N 50°N* Rise 5:03 4:48 Set 18:24 18:35 *International Cometary Explorer is first spacecraft to fly by a comet, 30 years ago*	**12** *40°N 50°N* Rise 5:59 5:50 Set 18:55 19:01 Sunrise 6:38 6:31 Sunset 19:14 19:21 Old crescent Moon, 21 hours before new in E, 17 hours before new in W, a difficult challenge just before sunrise
13 *40°N 50°N* Rise 6:54 6:51 Set 19:24 19:25 New Moon 2:41 Partial solar eclipse visible from S Africa to the South Pole	**14** *40°N 50°N* Rise 7:50 7:52 Set 19:54 19:49 **ROSH HASHANAH BEGINS** Follow Capella unaided into daylight this week Furthest Lunar Apogee of the year ~406,465 km, 07:28:50 ET	**15** *40°N 50°N* Rise 8:45 8:53 Set 20:24 20:13	**16** *40°N 50°N* Rise 9:41 9:54 Set 20:55 20:40	**17** *40°N 50°N* Rise 10:37 10:55 Set 21:29 21:09	**18** *40°N 50°N* Rise 11:33 11:56 Set 22:07 21:43 Moon 3° S of Saturn this evening	**19** *40°N 50°N* Rise 12:28 12:55 Set 22:49 22:22 Sunrise 6:45 6:42 Sunset 19:02 19:05
20 *40°N 50°N* Rise 13:23 13:52 Set 23:37 23:08 Regulus climbing towards Mars this week, at dawn	**21** *40°N 50°N* Rise 14:16 14:46 Set — — First Quarter 4:59 Venus at greatest illuminated extent (m=-4.8) this morning Lunar Straight Wall this evening	**22** *40°N 50°N* Set 0:30 0:01 Rise 15:07 15:35 Moon occults Rho Sagittarii visible in E of N. America early this evening	**23** *40°N 50°N* Set 1:29 1:03 Rise 15:55 16:19 **YOM KIPPUR** Fall Equinox 4:21 pm	**24** *40°N 50°N* Set 2:34 2:11 Rise 16:39 16:58	**25** *40°N 50°N* Set 3:42 3:25 Rise 17:21 17:34 Mars 0.8° left of Regulus at dawn, closest approach	**26** *40°N 50°N* Set 4:54 4:43 Rise 18:01 18:08 Sunrise 6:51 6:52 Sunset 18:51 18:50
27 *40°N 50°N* Set 6:07 6:04 Rise 18:41 18:40 Full Moon 22:51 Total lunar eclipse visible in all of N. America except W Alaska Today's full Moon is the Harvest Moon Closest Lunar Perigee of the year ~356,876 km, 21:47:03 ET	**28** *40°N 50°N* Set 7:20 7:25 Rise 19:20 19:13	**29** *40°N 50°N* Set 8:34 8:46 Rise 20:01 19:47 4 Vesta at opposition (m=6.2)	**30** *40°N 50°N* Set 9:46 10:04 Rise 20:45 20:24			

AUG	S	M	T	W	T	F	S
							1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31					

OCT	S	M	T	W	T	F	S
					1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31

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THROUGH THE SHADOW Our Moon slipped through the shadow of planet Earth during the wee hours on 2014 April 15. Our planet's atmosphere acting like a lens refracted the longer red wavelengths of light around the globe and onto the eclipsed Moon, giving it the eerie copper-red glow, an event that will occur twice again this year. | PHOTO BY MICHAEL WATSON

OCTOBER

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

THE PLANETS THIS MONTH

Mercury	very low in E at first of month, very low by mid-month and lost in twilight by month-end
Venus	low in E in morning twilight
Mars	low in E in morning twilight
Jupiter	in E in morning twilight
Saturn	very low in SW after sunset, lost in twilight late this month

SEP	S	M	T	W	T	F	S
			1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30			

NOV	S	M	T	W	T	F	S
	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30					

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1 — THURSDAY

	40°N	50°N
Set	10:54	11:18
Rise	21:31	21:06

Moon occults Theta 1&2 Tauri north of graze from Seattle-Saskatoon late this evening

2 — FRIDAY

	40°N	50°N
Set	11:59	12:26
Rise	22:21	21:53

Two shadows on Jupiter visible in W of N. America except Alaska 8:26 am

Moon occults Aldebaran before dawn in the W, after sunrise in the E.

3 — SATURDAY

	40°N	50°N
Set	12:57	13:26
Rise	23:14	22:45
Sunrise	6:58	7:03
Sunset	18:39	18:34

15 Eunomia at opposition (m=7.9)

1st Mars meteorite found, is observed to fall in Chassigny, France, 200 years ago

4

	40°N	50°N
Set	13:50	14:18
Rise	—	23:41

Last Quarter 17:06

Regulus climbing towards Venus this week, at dawn

Follow Sirius unaided into daylight this week

5

	40°N	50°N
Rise	0:08	—
Set	14:36	15:02

Moon occults Lambda Gem N of graze Los Angeles – Philadelphia before sunrise

6

	40°N	50°N
Rise	1:05	0:40
Set	15:17	15:39

7

	40°N	50°N
Rise	2:01	1:40
Set	15:53	16:11

G. de Vaucouleurs, who first suggested local supercluster of galaxies, died 20 years ago

8

	40°N	50°N
Rise	2:57	2:41
Set	16:27	16:39

Venus-Regulus-Crescent Moon at dawn

Moon occults Omicron Leonis visible in New England and E Canada before dawn

9

	40°N	50°N
Rise	3:53	3:43
Set	16:57	17:05

Try to spot Uranus (m=5.7) unaided this weekend

Venus 2.5° right of Regulus, closest approach

Jupiter-Mars-Crescent Moon at dawn

10

	40°N	50°N
Rise	4:49	4:44
Set	17:27	17:29
Sunrise	7:05	7:14
Sunset	18:28	18:20

S Taurid meteors (ZHR=5)

11

	40°N	50°N
Rise	5:44	5:45
Set	17:56	17:53

Crescent Moon 1.1° lower right of Mercury this morning

Regulus climbing away from Venus this week

Zodiacal Light readily visible from a dark site in E before morning twilight for the next two weeks

12

	40°N	50°N
Rise	6:40	6:46
Set	18:26	18:18

New Moon 20:06

THANKSGIVING DAY (CANADA)

COLUMBUS DAY (USA)

Uranus at opposition (m=5.7)

Mars approaching Jupiter this week, at dawn

13

	40°N	50°N
Rise	7:36	7:47
Set	18:57	18:44

471 Papagena at opposition (m=9.5)

14

	40°N	50°N
Rise	8:32	8:48
Set	19:31	19:12

ISLAMIC NEW YEAR

15

	40°N	50°N
Rise	9:28	9:49
Set	20:07	19:44

Crescent Moon 8° right of Saturn early this evening

16

	40°N	50°N
Rise	10:24	10:49
Set	20:48	20:21

Try to spot Uranus (m=5.7) unaided this weekend

Mercury at greatest elongation (18° W), best morning apparition of the year (m=-0.5)

Crescent Moon 5° upper left of Saturn early this evening

17

	40°N	50°N
Rise	11:18	11:47
Set	21:33	21:04
Sunrise	7:13	7:25
Sunset	18:18	18:05

Mars 0.4° upper left of Jupiter this morning, closest approach

18

	40°N	50°N
Rise	12:11	12:41
Set	22:23	21:54

Two shadows on Jupiter visible in all of N. America except W and NE 6:42 am

Mars 0.4° left of Jupiter

19

	40°N	50°N
Rise	13:02	13:30
Set	23:19	22:51

Lunar X near crater Werner visible in all of N. America except E 10 pm

Jupiter climbing away from Mars this week, at dawn

20

	40°N	50°N
Rise	13:49	14:15
Set	—	23:55

First Quarter 16:31

Lunar Straight Wall this evening

21

	40°N	50°N
Set	0:19	—
Rise	14:33	14:55

Orionid meteors (ZHR=20) 6 pm

22

	40°N	50°N
Set	1:24	1:04
Rise	15:14	15:30

Radio astronomy pioneer Karl Jansky born 110 years ago

23

	40°N	50°N
Set	2:31	2:18
Rise	15:54	16:03

24

	40°N	50°N
Set	3:41	3:35
Rise	16:32	16:35
Sunrise	7:20	7:36
Sunset	18:08	17:52

Venus 1.7° upper right of Jupiter

25

	40°N	50°N
Set	4:53	4:54
Rise	17:11	17:07

Two shadows on Jupiter visible in W of N. America 8:36 am

Venus 1.2° right of Jupiter at dawn

29 Amphitrite at opposition (m=8.7)

26

	40°N	50°N
Set	6:06	6:14
Rise	17:51	17:40

Venus at greatest elongation (46° W) this morning

Venus-Jupiter-Mars tightest grouping

27

	40°N	50°N
Set	7:19	7:34
Rise	18:33	18:15

Full Moon 8:05

Venus sinking down from Jupiter this week

Today's full Moon is the Hunter's Moon

28

	40°N	50°N
Set	8:31	8:52
Rise	19:19	18:56

29

	40°N	50°N
Set	9:39	10:05
Rise	20:08	19:41

30

	40°N	50°N
Set	10:43	11:12
Rise	21:01	20:32

Venus within 2° upper right of Mars at dawn, approaching

31

	40°N	50°N
Set	11:40	12:09
Rise	21:57	21:28
Sunrise	7:28	7:48
Sunset	17:59	17:39

HALLOWE'EN

TWILIGHT PAIRING A beautiful conjunction of our Moon with the planet Mercury at left is a striking sight. Difficult targets for many, Mercury, a young crescent Moon about 28 hours old, and the earthshine on the dark side of the Moon make this view of all three in one an observation to remember. | IMAGE BY PETER CERAVOLO.

NOVEMBER

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1 *40°N 50°N* Set 11:31 11:58 Rise 21:55 21:28 Daylight Saving Time ends 2 am Two shadows on Jupiter visible in Alaska 12:34 pm Venus within 1.1° upper right of Mars at dawn, approaching this week	**2** *40°N 50°N* Set 12:15 12:39 Rise 22:52 22:30 *Harlow Shapley born 130 years ago*	**3** *40°N 50°N* Set 12:54 13:13 Rise 23:50 23:32 Last Quarter 7:24 Venus 0.7° lower right of Mars this morning, closest approach	**4** *40°N 50°N* Set 13:28 13:43 Rise — — Lunar Curtiss Cross visible in E of N. America near midnight Moon occults Omicron Leonis visible in W of N. America before sunrise	**5** *40°N 50°N* Rise 0:46 0:34 Set 14:00 14:10	**6** *40°N 50°N* Rise 1:42 1:35 Set 14:30 14:34 Crescent Moon 3° right of Jupiter this morning	**7** *40°N 50°N* Rise 2:38 2:36 Set 14:59 14:58 Sunrise 6:36 7:00 Sunset 16:51 16:27 Venus-Mars-Crescent Moon at dawn 39 Laetitia at opposition (m=9.5)
8 *40°N 50°N* Rise 3:33 3:37 Set 15:28 15:22 Venus sinking down from Mars this week, at dawn Zodiacal Light readily visible from a dark site in E before morning twilight for the next two weeks	**9** *40°N 50°N* Rise 4:29 4:38 Set 15:59 15:47	**10** *40°N 50°N* Rise 5:25 5:40 Set 16:31 16:14 *, largest telescope in southern hemisphere, is deployed 10 years ago*	**11** *40°N 50°N* Rise 6:22 6:42 Set 17:07 16:45 New Moon 12:47 **REMEMBRANCE DAY (CANADA)** **VETERAN'S DAY (USA)** *Vesto Slipher born 140 years ago*	**12** *40°N 50°N* Rise 7:18 7:43 Set 17:46 17:21 N Taurid meteors (ZHR=5)	**13** *40°N 50°N* Rise 8:14 8:42 Set 18:30 18:02 *Leslie Peltier discovers first of 11 comets 90 years ago*	**14** *40°N 50°N* Rise 9:09 9:38 Set 19:20 18:50 Sunrise 6:44 7:11 Sunset 16:45 16:17
15 *40°N 50°N* Rise 10:00 10:29 Set 20:14 19:45	**16** *40°N 50°N* Rise 10:48 11:15 Set 21:12 20:46 *Venera 3 is 1st man-made object to reach surface of another planet 50 years ago*	**17** *40°N 50°N* Rise 11:33 11:56 Set 22:14 21:53 Leonid meteors (ZHR=15) 11 pm	**18** *40°N 50°N* Rise 12:14 12:32 Set 23:19 23:03	**19** *40°N 50°N* Rise 12:52 13:05 Set — — First Quarter 1:27 Lunar Straight Wall this evening	**20** *40°N 50°N* Set 0:26 0:16 Rise 13:29 13:35 192 Nausikaa at opposition (m=9.0)	**21** *40°N 50°N* Set 1:34 1:31 Rise 14:06 14:05 Sunrise 6:52 7:22 Sunset 16:40 16:09
22 *40°N 50°N* Set 2:44 2:48 Rise 14:43 14:36	**23** *40°N 50°N* Set 3:54 4:06 Rise 15:23 15:09	**24** *40°N 50°N* Set 5:06 5:24 Rise 16:06 15:46 *John Brashear, known for astronomical lenses, born 175 years ago*	**25** *40°N 50°N* Set 6:16 6:39 Rise 16:53 16:28 Full Moon 17:44 Full Moon occults Aldebaran late tonight, except S U.S. Today's full Moon is the Hunter's/Beaver Moon	**26** *40°N 50°N* Set 7:22 7:50 Rise 17:45 17:16 **THANKSGIVING DAY (USA)**	**27** *40°N 50°N* Set 8:24 8:54 Rise 18:40 18:11	**28** *40°N 50°N* Set 9:20 9:48 Rise 19:39 19:10 Sunrise 7:00 7:33 Sunset 16:36 16:03 Moon occults Lambda Gem Canadian Prairies to E B.C. and N, this evening
29 *40°N 50°N* Set 10:08 10:34 Rise 20:38 20:13	**30** *40°N 50°N* Set 10:50 11:13 Rise 21:37 21:17					

THE PLANETS THIS MONTH

Mercury	not visible this month
Venus	low in SE in morning twilight
Mars	rises in E near 3 am, in SE near dawn
Jupiter	rises by 2 am in E, high in SE by sunrise
Saturn	not observable this month

OCT	S	M	T	W	T	F	S
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	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
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DEC	S	M	T	W	T	F	S
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	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31		

Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.

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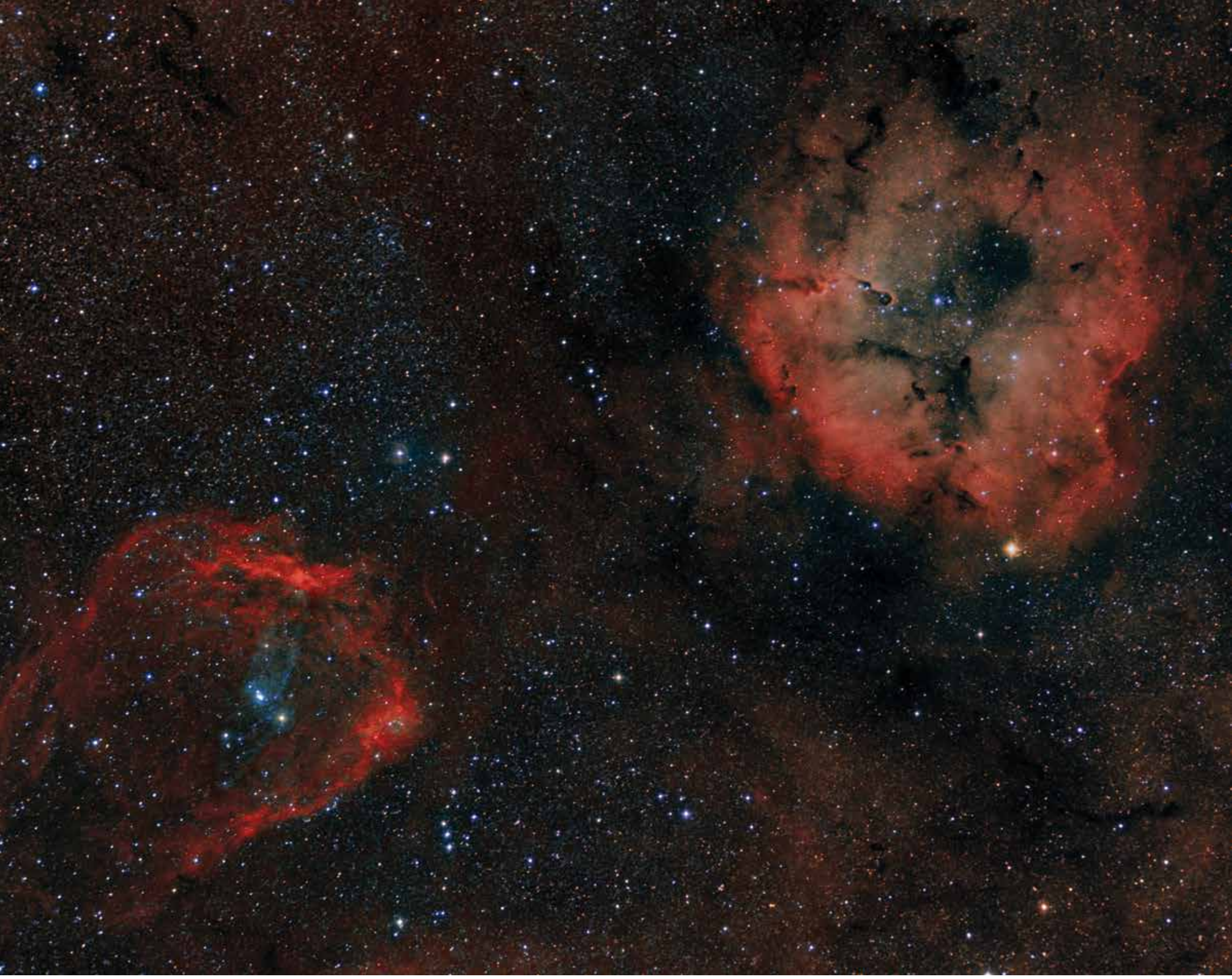
Times for events involving planetary satellites refer to the start time.

Detailed instructions on adjusting times for location are given in the back pages.

Please see back pages for photo details and additional information about this Calendar.



DECEMBER

ELEPHANT, BAT, AND SQUID? An elephant, a bat, and a squid share this view. The dark silhouette of the Elephant Trunk can be found in the nebula at upper right, while the Bat is the large red nebula at lower left. Hidden in the Bat is the newly discovered (2011) squid-shaped object that appears to be a planetary nebulae. | PHOTO BY LYNN HILBORN

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
THE PLANETS THIS MONTH **Mercury** very low in SW after mid-month **Venus** low in SE in morning twilight **Mars** rises in E near 2 am, in SE near dawn **Jupiter** rises near midnight in E, transits high in S by sunrise **Saturn** very low in SE in morning twilight		**1** *40ºN 50ºN* Set 11:28 11:45 Rise 22:35 22:20 Binocular comet C/2013 US10 (Catalina) before dawn this month	**2** *40ºN 50ºN* Set 12:01 12:13 Rise 23:32 23:23	**3** *40ºN 50ºN* Set 12:32 12:39 Rise — — Last Quarter 2:41 Jupiter visible in daylight 7º left of Moon. A challenge just after sunrise	**4** *40ºN 50ºN* Rise 0:28 0:24 Set 13:01 13:02 Jupiter visible in daylight 5º right of Moon. A challenge just after sunrise	**5** *40ºN 50ºN* Rise 1:24 1:26 Set 13:30 13:26 Sunrise 7:06 7:42 Sunset 16:35 15:59 Venus-Mars-Crescent Moon-Jupiter form a long line at dawn
6 *40ºN 50ºN* Rise 2:20 2:27 Set 14:00 13:50 Crescent Moon 3º below Mars in the wee hours	**7** *40ºN 50ºN* Rise 3:16 3:28 Set 14:32 14:17 Cres. Moon occults Venus at dawn in NW of N. America, after sunrise elsewhere. Not visible in Newfoundland *Gerard Kuiper born 110 years ago*	**8** *40ºN 50ºN* Rise 4:12 4:30 Set 15:06 14:46 *Karl Hencke discovers minor planet 5 Astrea 170 years ago*	**9** *40ºN 50ºN* Rise 5:09 5:32 Set 15:44 15:19 16 Psyche at opposition (m=9.4)	**10** *40ºN 50ºN* Rise 6:06 6:33 Set 16:26 15:58 Old crescent Moon, 22 hours before new in E, 18 hours before new in W, a challenge just before sunrise	**11** *40ºN 50ºN* Rise 7:02 7:32 Set 17:14 16:44 New Moon 5:29 New Moon – Gegenschein visible from a very dark site – highest in S at midnight	**12** *40ºN 50ºN* Rise 7:56 8:26 Set 18:07 17:38 Sunrise 7:13 7:49 Sunset 16:35 15:58
13 *40ºN 50ºN* Rise 8:47 9:15 Set 19:05 18:38	**14** *40ºN 50ºN* Rise 9:33 9:58 Set 20:07 19:44 Geminid meteors (ZHR=120) 1 pm	**15** *40ºN 50ºN* Rise 10:16 10:36 Set 21:12 20:53 *Gemini 6 and 7 perform 1st rendezvous in space 50 years ago*	**16** *40ºN 50ºN* Rise 10:55 11:09 Set 22:17 22:06	**17** *40ºN 50ºN* Rise 11:32 11:40 Set 23:24 23:19 *David Levy begins searching for comets 50 years ago*	**18** *40ºN 50ºN* Rise 12:08 12:09 Set — — First Quarter 10:14 Lunar X near crater Werner visible in W of N. America 1 am	**19** *40ºN 50ºN* Set 0:32 0:33 Rise 12:43 12:38 Sunrise 7:17 7:55 Sunset 16:37 15:59 Lunar Straight Wall this evening in W of N. America
20 *40ºN 50ºN* Set 1:40 1:48 Rise 13:20 13:09	**21** *40ºN 50ºN* Set 2:48 3:04 Rise 14:00 13:43 Winter solstice 11:48 pm	**22** *40ºN 50ºN* Set 3:57 4:18 Rise 14:44 14:21 Ursid meteors (ZHR=10) 9 pm	**23** *40ºN 50ºN* Set 5:04 5:30 Rise 15:32 15:04	**24** *40ºN 50ºN* Set 6:07 6:36 Rise 16:24 15:55	**25** *40ºN 50ºN* Set 7:05 7:35 Rise 17:21 16:52 Full Moon 6:12 **CHRISTMAS DAY** 27 Euterpe at opposition (m=8.4) Today's full Moon is the Cold/Long Night's Moon	**26** *40ºN 50ºN* Set 7:58 8:26 Rise 18:20 17:54 Sunrise 7:21 7:58 Sunset 16:41 16:03 **BOXING DAY (CANADA)**
27 *40ºN 50ºN* Set 8:44 9:08 Rise 19:21 18:58	**28** *40ºN 50ºN* Set 9:24 9:44 Rise 20:21 20:03	**29** *40ºN 50ºN* Set 10:00 10:15 Rise 21:19 21:07 Mercury at greatest elongation (20º E) this evening (m=-0.6) *Biela's Comet splits 170 years ago*	**30** *40ºN 50ºN* Set 10:32 10:42 Rise 22:17 22:10	**31** *40ºN 50ºN* Set 11:03 11:06 Rise 23:13 23:12 **NEW YEAR'S EVE** Moon 6º E of Jupiter rising before midnight		

NOV	S	M	T	W	T	F	S
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JAN	S	M	T	W	T	F	S
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	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31						

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January *(Cosmic Fluorescence)*
A composite image made from 15 × 10 min in Hα; 8 × 5 min in RGB for a total exposure of 4.5 hours. Image was taken from Flesherton, Ontario, April 2014 using Apogee U16M w Astrodon 5nm Hα filter with a Takahashi FSQ *f*/5 Fluorite Refractor on a Paramount ME guided with an SBIG ST-402ME. Image by Stuart Heggie.

February *(Disk Space)*
A stitched panorama composed of 6 segments, each taken with an 8-mm fisheye lens on a Canon 5D Mark II. Each segment is a 1-minute untracked exposure at *f*/3.5 and ISO 4000. Image by Alan Dyer.

March *(One Moon, Two Faces)*
A composite image from two frames. Left is a 2.6-second exposure and right is a 1/320-second exposure, both with a Nikon D800 on an Explore Scientific 152-mm, *f*/8 refracting telescope, taken on 2014 April 2. Image was processed in Photoshop CS6. Photo by Michael Watson.

April *(Silver Coin)*
A composite image made from 2.5-minute exposures totalling in L 113 min, R 60 min, G 55 min, and B 60 mins, for a total exposure of 4.8 hours. Image was taken from the Space Atacama Lodge, Chile, using Apogee U16M with a Ceravolo 300 Astrograph at *f*/9 on a Paramount ME. Image by Debra and Peter Ceravolo.

May *(Gum Nebula)*
A composite image made from a stack of 10 × 12-minute exposures with the Borg 77-mm autographic Apo refractor at *f*/4.3 (330 mm focal length) and the filter-modified Canon 5D Mark II at ISO 800. Taken from Coonabarabran, Australia, March 2014. Photo by Alan Dyer.

June *(Hoodoos and the Milky Way)*
A single image from a 59-sec exposure at 15 mm with a fisheye lens at *f*/2.8 using a Canon 6D at ISO 3200. Taken from Writing-on-Stone Provincial Park, Alberta, 2014 May 26. Photo by Warren Finlay.

July *(Reflections)*
A single image from a 13-sec exposure with a 15-mm fisheye lens at *f*/2.8 using a Canon 6D at ISO 3200. Taken from Berry Creek northeast of Hanna, Alberta, 2014 April 30. Photo by Warren Finlay.

August *(Cluster with Sapphires)*
A composite image made from 6 × 10 min exposures in each LRG and B for a total exposure of 4 hours. Image was taken from Flesherton, Ontario, April 2014 using Apogee U16M with a 12.5″ Planewave CDK on a Paramount ME guided with an SBIG ST-402ME. Image by Stuart Heggie.

September *(Heart and Soul)*
A composite image made from 3 × 30 min exposures in each Hα, OIII, SII for a total exposure of 4.5 hours, with a 200-mm Canon lens at *f*/2.8 and an ML8300 camera. Image processed using the Hubble Palette of colours. Taken from the Whistlestop Observatory, Grafton, Ontario, by Lynn Hilborn.

October *(Through the Shadow)*
A composite image from multiple frames of 1.6 seconds each at ISO 400 taken over 1 hour and 42 minutes, from 01:53 CDT to 03:35 CDT with a Nikon D800 on an Explore Scientific 152-mm *f*/8 refracting telescope. Frames were stacked in RegiStar, then processed in Photoshop CS6. Photo by Michael Watson.

November *(Twilight Pairing)*
A single image exposed for 3.2 secs at ISO 200 with a Canon 60D and a focal length of 120 mm on a still tripod. Image was taken from Anarchist Mountain, Osoyoos, B.C., 2014 January 31. Image by Peter Ceravolo.

December *(Elephant, Bat, and Squid?)*
A composite image made from 8 × 30 mins in OIII, 14 × 15 mins in Hα, 6 × 10 mins in R, G, and B, for total of 11 hours. Taken with a Canon 135-mm *f*/2.5 lens and an FLI ML8300 camera binned 1×1 and Baader filters. Image was taken on 2014 June 22, 26, 27, and July 1 from the WhistleStop Observatory, Grafton, Ontario, by Lynn Hilborn.

Most of the data appearing in the monthly grids was generated using custom software written by Dave Lane, Alister Ling, and Larry McNish. The Moon images were created using custom software written by Alister Ling.

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The Royal Astronomical Society of Canada

Since it was founded in 1890, the RASC has filled a special role in both amateur and professional astronomy. Today, it has over 4500 members worldwide who share a passion for the night sky and make contributions to astronomy in many ways.

The RASC has a long tradition of high-quality, volunteer-produced publications. *The Observer's Handbook* has been published since 1907 and is recognized worldwide as the leading handbook of its type. The *Journal*, also published since 1907, contains articles of interest to amateur astronomers. *The Beginner's Observing Guide* is an introduction to the night sky for the novice observer, the *Observer's Calendar* is a forum for astro-photography by amateur astronomers, and *Skyways* (available in French as "*Explorons l'Astronomie*") is an astronomy teacher's guide.

For information on joining the Society, or to order an RASC publication, visit www.rasc.ca or contact the National Office at:

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How to Use this Calendar

A graphical representation of the Moon's appearance in the late evening is given in each daily box. In addition to the varying phase, the depicted size of the Moon varies, reflecting the change in the apparent size of the Moon in the sky as it moves closer to or farther from Earth. The depicted face of the Moon also changes slightly to reflect lunar libration, the rocking motion of the Moon, which means that over time approximately 59% of the lunar surface can be seen from Earth. A small dot of size proportional to the amount of libration appears near the lunar limb that is librated. These daily lunar graphics were prepared using images provided by Roger Fell.

Daily Moon and weekly Sun rise and set times, and the times of Moon phases, are shown in the top portion of the boxes. If no Moon rise or set time is given, this event occurs the next day.

A summary of the naked-eye visibility and position of the planets is given each month. Descriptions are for approximate latitude 45° and, unless otherwise stated, apply to midmonth; rise and set times at the beginning or end of the month may vary by an hour or more from those given. Times and compass directions may also differ somewhat from the given ones at other latitudes.

Special astronomical events are given at the bottom of the daily boxes. Events observable in some part of Canada or the continental United States are listed. Days on which particularly interesting phenomena or events occur are highlighted with a green bar under the date. Detailed information on all events, including their visibility from particular locations, may be determined by consulting the *Observer's Handbook*, which is published annually by the RASC.

Adjustments for Actual Location

When it is in effect, times are adjusted for Daylight Saving Time. Moon phases and special events are given in Eastern time. The user's local time for events other than Moon and Sun rise and set may be determined by converting the given time to the user's time zone (e.g. Pacific time is Eastern time minus 3 hours). For occultations, a further adjustment of an hour or more may be needed for any particular geographical location because of parallax effects. Parallax also means that actual angular separations for events involving the Moon may vary by close to 1° from those given. Also, the Moon's rapid movement of approximately 0.5° per hour means that separations may be considerably larger at a time that is even a few hours away from the given time.

Two sets of rise and set times are given to accommodate North American observers in midnorthern latitudes. Times are displayed for locations 40°N latitude and 75°W longitude and for 50°N, 75°W. The actual times for a given location must be calculated using the tables at the right.

The tables give (longitude) corrections in minutes to the tabulated rise and set times for selected Canadian and U.S. cities. In the column labelled **Correction**, an entry such as 50°N + 25 means add 25 minutes to the displayed 50°N time. This computed time is an approximation. In the column labelled **Accuracy**, the approximate maximum error in minutes for Moon rise and set using this method is indicated. The error for Sun rise and set is less. These errors can be substantially reduced by interpolating according to latitude, as explained in the following section. Note that the rise and set times calculated using the above method will be local times. It is not necessary to adjust them for time zone.

Other Locations, and Improving Accuracy

For locations not listed in the tables at right, the user should calculate a correction factor. This amount is +4 minutes for each degree that the user's location is west of the central meridian of the user's time zone or – 4 minutes for each degree that it is east. This correction factor should be added to the displayed 50°N or 40°N time for the location whose latitude is nearest that of the user's site. The accuracy in minutes for Moon rise and set can be calculated by multiplying the difference between the user's latitude and 50°N/40°N respectively by 4.5, and then adding 0.2 times the difference between the user's longitude and 75°W.

Improvement in accuracy may be obtained for many sites by interpolating or extrapolating the 50°N and 40°N times depending on the user's latitude. For example, the latitude of Ottawa is approximately midway between 50°N and 40°N. An observer in Ottawa can improve accuracy to better than 5 minutes by averaging the given 50°N and 40°N times and then adding the correction factor for Ottawa, which is 3 minutes. Western observers may gain additional accuracy by adding about 10% of the difference between the listed time and the next day's time.

Canadian Locations

City	Correction	Accuracy	Latitude
Calgary	50°N + 36	15	51
Charlottetown	40°N + 12	20	46
Edmonton	50°N + 34	25	54
Halifax	40°N + 14	25	45
Hamilton	40°N + 20	15	43
Kingston	40°N + 6	20	44
Kitchener	40°N + 22	15	43
London	40°N + 25	15	43
Moncton	40°N + 19	20	46
Montréal	50°N – 6	20	46
Niagara	40°N + 16	15	43
Kelowna	50°N – 3	10	50
Ottawa	50°N + 3	20	45
Prince George	50°N + 11	25	54
Québec	50°N – 15	15	47
Regina	50°N + 58*	10	50
St. John's	50°N + 1	20	48
Sarnia	40°N + 30	15	43
Saskatoon	50°N + 67*	15	52
Thunder Bay	50°N + 57	10	48
Toronto	40°N + 18	20	44
Vancouver	50°N + 12	15	49
Victoria	50°N + 13	20	49
Windsor	40°N + 32	15	42
Winnipeg	50°N + 29	5	50

U.S. Locations

City	Correction	Accuracy	Latitude
Atlanta	40°N + 37	30	34
Boston	40°N – 16	10	42
Chicago	40°N – 10	15	42
Cincinnati	40°N + 38	10	39
Denver	40°N + 0	10	40
Flagstaff	40°N + 27*	30	35
Kansas City	40°N + 18	10	39
Los Angeles	40°N – 7	35	34
Minneapolis	40°N + 13	25	45
New York	40°N – 4	5	41
San Francisco	40°N + 10	20	38
Seattle	50°N + 9	20	48
Tucson	40°N + 24*	40	32
Washington	40°N + 8	5	39

**Subtract 60 minutes in the summer.*

2015

JAN	S	M	T	W	T	F	S
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	18	19	**20**	21	22	23	24
	25	26	27	28	29	30	31

FEB	S	M	T	W	T	F	S
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	15	16	17	**18**	19	20	21
	22	23	24	25	26	27	28

MAR	S	M	T	W	T	F	S
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	22	23	24	25	26	27	28
	29	30	31				

APR	S	M	T	W	T	F	S
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	12	13	14	15	16	17	**18**
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MAY	S	M	T	W	T	F	S
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	31						

JUN	S	M	T	W	T	F	S
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JUL	S	M	T	W	T	F	S
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	12	13	14	**15**	16	17	18
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	26	27	28	29	30	31	

AUG	S	M	T	W	T	F	S
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	9	10	11	12	13	**14**	15
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	30	31					

SEP	S	M	T	W	T	F	S
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OCT	S	M	T	W	T	F	S
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NOV	S	M	T	W	T	F	S
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	20	21	22	23	24	25	26
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New Moon dates (UT) are displayed in **blue**.

2016

JAN	S	M	T	W	T	F	S
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	31						

FEB	S	M	T	W	T	F	S
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	7	**8**	9	10	11	12	13
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	21	22	23	24	25	26	27
	28	29					

MAR	S	M	T	W	T	F	S
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	6	7	8	**9**	10	11	12
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	27	28	29	30	31		

APR	S	M	T	W	T	F	S
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	17	18	19	20	21	22	23
	24	25	26	27	28	29	30

MAY	S	M	T	W	T	F	S
	1	2	3	4	5	**6**	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31				

JUN	S	M	T	W	T	F	S
				1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30		

JUL	S	M	T	W	T	F	S
						1	2
	3	**4**	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31						

AUG	S	M	T	W	T	F	S
		1	**2**	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31			

SEP	S	M	T	W	T	F	S
					1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	

OCT	S	M	T	W	T	F	S
							1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31					

NOV	S	M	T	W	T	F	S
			1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	**29**	30			

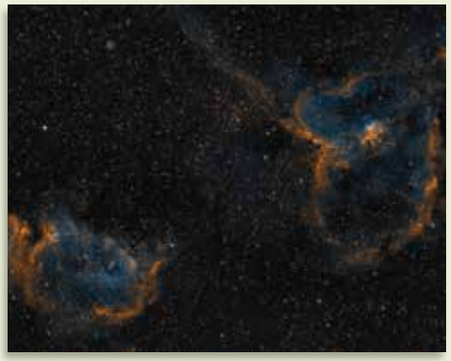
DEC	S	M	T	W	T	F	S
			1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	**29**	30	31		












40ºN 50ºN
Set 12:54 13:13
Rise 23:50 23:32

3

Last Quarter
7:24

Venus 0.7º lower right of Mars this morning, closest approach

40ºN 50ºN
Set 13:28 13:43
Rise — —

4

Lunar Curtiss Cross visible in E of N. America near midnight

Moon occults Omicron Leonis visible in W of N. America before sunrise

40ºN 50ºN
Rise 5:25 5:40
Set 16:31 16:14

10

Zodiacal Light readily visible from a dark site in E before morning twilight for the next two weeks

SALT, largest telescope in southern hemisphere, is deployed 10 years ago

40ºN 50ºN
Rise 6:22 6:42
Set 17:07 16:45

11

New Moon
12:47

REMEMBRANCE DAY (CANADA)
VETERAN'S DAY (USA)

Vesto Slipher born 140 years ago

The Royal Astronomical Society of Canada

Observer's Calendar 2015

All photos in this unique Calendar were taken by members of The Royal Astronomical Society of Canada (RASC) who are astronomy enthusiasts. It was produced by volunteer members of The Royal Astronomical Society of Canada.

This Calendar includes comprehensive listings of astronomical data such as lunar and planetary conjunctions, Sun and Moon rise and set times, eclipses, meteor showers, and Moon phases.

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ISBN 9781927879030

$17.95 Canada/US