

June 2017 Astronomy Calendar by Dave Mitsky

Some information supplied and/or added by Tony Donnangelo

All times are Daylight Saving Time (-4 hrs. U.T.).

Events listed are based on a location of 40°N in the Eastern US and may not be visible in all areas.

Concerning moderate and minor meteor shower activity:

Do not have any high expectations. This general information is to account for why you might be seeing a few more than normal meteors during your observing session.

Lunar light rays may occur prior to or after the predicted time. Initial observations might have occurred after the ray's inception or continued after the observer's session. Rays may last a very short time or for many hours. Obtain further information; send reports (including non-occurrences and miss-calculations), photos, and observations of new rays to:

The Robinson Lunar Observatory: <http://www.lunar-occultations.com/rlo/rlondx.htm>.

- 5/31 The Purbach Cross or Lunar X, an X-shaped illumination effect involving various rims and ridges between the craters La Caille, Blanchinus, and Purbach, is predicted to occur at 9:36 p.m.
- 6/1 Comet 71P/Clark is at opposition at 0.598 A.U.
- 6/1 Comet P/2009 Q4 (Boattini) is at opposition at 3.648 A.U.
- 6/1 Frank Whittle's 110th birthday (1907).
- 6/1 Walter (Walther) (sunrise) lunar light ray predicted to occur at 12:57:50 a.m.
- 6/1 First Quarter Moon occurs at 8:42 a.m.
- 6/2 Venus passes 1.8° from Uranus.
- 6/2 Comet C/2016 S1 (PANSTARRS) is at closest approach to Earth at 2.218 A.U.
- 6/2 Comet 234P/LINEAR is at perihelion at 2.848 A.U.
- 6/2 Kouchibouguac Spring Star Fest VII is being held through the 4th in Kouchibouguac National Park, Canada.
- 6/2 A double Galilean satellite shadow transit occurs at 3:42 a.m.
- 6/3 Venus (magnitude -4.3) is 1.7° south-southeast of Uranus (magnitude +5.9) at 1:00 a.m.
- 6/3 Venus is at greatest western elongation (45.9°) at 8:00 a.m.
- 6/3 Jupiter is 2.2° south-southwest of the Moon at 1:00; a double Galilean satellite shadow transit occurs at 10:21 p.m.
- 6/3 Omega Scorpiids meteor shower (minor activity) peaks from the 3rd to 6th. Duration is from 5/19 to 7/11. Observing and History:
http://meteorshersonline.com/showers/chi_omega_scorpiids.html
- 6/4 Copernicus (sunrise) lunar light ray predicted to occur at 8:43:09 p.m. Sunset at 8:33 p.m.
- 6/4 230th American Astronomical Society (AAS) Meeting is being held through the 8th in Austin, Texas.
- 6/4 Venus is at theoretical dichotomy (50% illuminated) at 2:00 a.m.
- 6/4 Neptune is at western quadrature at 12:00 p.m.
- 6/4 The Moon is 6.3° north-northeast of the first-magnitude star Spica (Alpha Virginis) at 6:00 p.m.
- 6/5 John Bolton's 95th birthday (1922).
- 6/5 Comet C/2015 V2 (Johnson) is at closest approach to Earth at 0.811 A.U.
- 6/5 A double Galilean satellite shadow transit occurs at 4:49 p.m.
- 6/5 Asteroid (1) Ceres is in conjunction with the Sun at 8:00 p.m.
- 6/5 Mersenius P (sunrise) lunar light ray predicted to occur at 10:08:44 p.m.
- 6/6 Comet C/2016 A8 (LINEAR) is at opposition at 2.718 A.U.
- 6/6 Mars is at greatest declination north (24.3°) at 3:00 a.m.
- 6/6 Lacroix G (sunrise) lunar light ray predicted to occur at 9:59:04 p.m.
- 6/7 Babbage (sunrise) lunar light ray predicted to occur at 3:41:38 a.m. Moonset at 4:42 a.m.

6/7 Mercury is 5.5° south-southeast of the bright open cluster M45 (the Pleiades or Subaru) at 4:00 a.m.

6/7 Mars is 0.01° north-northwest of the bright open cluster M35 in Gemini at 9:00 p.m.

6/7 Arietids meteor shower (daylight activity) peaks on 7/8. Duration is from 5/22 to 7/2. Observing and History: http://meteorshowersonline.com/showers/daytime_arietids.html

6/8 World Oceans Day.

6/8 The Moon is at apogee, subtending $29' 24''$ from a distance of 406,400 kilometers (252,526 miles), at 6:21 p.m.

6/9 Comet 138P/Shoemaker-Levy is at opposition at 3.698 A.U.

6/9 Neptune Trojan 2013 KY18 is at opposition at 29.186 A.U.

6/9 Johann Gottfried Galle's 205th birthday (1812).

6/9 A double Galilean satellite shadow transit occurs at 6:09 a.m.

6/9 Full Moon (known as the Flower, Rose or Strawberry Moon) occurs at 1:10 p.m.

6/9 Saturn is 3.1° south of the Moon at 10:00 p.m.

6/9 Tau Herculids meteor shower (minor activity) peaks on 9/10. Duration is 5/19 to 6/19. Observing and History: http://meteorshowersonline.com/showers/tau_herculids.html

6/10 Comet 47P/Ashbrook-Jackson is at perihelion at 2.818 A.U.

6/10 Comet 268P/Bernardi is at opposition at 4.110 A.U.

6/10 Jupiter is stationary in right ascension at 12:00 a.m.

6/10 Theta Ophiuchids meteor shower (minor activity) peaks on 10/11. Duration is 5/21 to 6/16. Observing and History: http://meteorshowersonline.com/showers/theta_ophiuchids.html

6/10 Sagittariids meteor shower (minor activity) peaks on 10/11. Duration is the 10th to 16th. Observing and History: <http://meteorshowersonline.com/showers/sagittariids.html>

6/11 Comet 71P/Clark is at closest approach to Earth at 0.590 A.U.

6/11 Mercury is 4.9° N-NW of the first-magnitude star Aldebaran (Alpha Tauri) at 5:00 p.m.

6/11 Pluto is 2.3° south of the Moon at 10:00 p.m.

6/12 Asteroid (397) Vienna is at closest approach to Earth at 1.739 A.U.

6/12 Jupiter Trojan asteroid (1143) Odysseus is at closest approach to Earth at 4.680 A.U.

6/12 Paul Guldin's 440th birthday (1577).

6/12 Comet C/2015 V2 (Johnson) is at perihelion (1.637 A.U. from the Sun) at 4:00 a.m.

6/12 Crisium, Mare (sunset) lunar light ray predicted to occur at 4:31:04 a.m.

6/12 Venus is at aphelion (0.7282 astronomical units from the Sun) at 5:00 p.m.

6/12 The equation of time - the difference between apparent time and mean time - is 0 at 6:00 p.m.

6/12 A double Galilean satellite shadow transit occurs at 7:27 p.m.

6/13 Comet C/2015 O1 (PANSTARRS) is at opposition at 3.552 A.U.

6/13 Comet 64P/Swift-Gehrels is at opposition at 3.589 A.U.

6/13 Apollo asteroid (2017) FR2 near-Earth flyby at 0.078 A.U.

6/13 Zeta Perseids meteor shower (daylight activity) peaks on 13/14. Duration is from 5/20 to 7/5. Observing and History: http://meteorshowersonline.com/showers/zeta_perseids.html

6/14 The earliest sunrise of the year at latitude 40° north occurs at 4:31 a.m.

6/14 Mercury is at the ascending node through the ecliptic plane at 5:00 p.m.

6/14 The Moon is at the descending node (longitude 326.0°) at 10:40 p.m.

6/15 Comet P/2001 R6 (LINEAR-Skiff) is at opposition at 2.890 A.U.

6/15 Comet P/1996 R2 (Lagerkvist) is at closest approach to Earth at 2.961 A.U.

6/15 Saturn (angular size $18.4''$ magnitude 0.0) is at opposition at 2:00 a.m.

6/15 Lecture on The Total Solar Eclipse of 2017 being held in Washington DC.

6/15 June Lyrids meteor shower (moderate activity) peaks on 15/16. Duration is 10th to 21st. Observing and History: http://meteorshowersonline.com/showers/june_lyrids.html

6/16 Comet 150P/LONEOS is at opposition at 2.204 A.U.

6/16 Comet P/2016 J3 is at opposition at 3.464 A.U.

6/16 Fernelius (sunset) lunar light ray predicted to occur at 5:18:09 a.m. Sunrise at 5:37 a.m.

6/16 A double Galilean satellite shadow transit occurs at 8:46 a.m.

6/16 Neptune is 0.7° north-northwest of the Moon, with an occultation occurring in the southern half of South America and western Antarctica at 9:00 a.m.

6/16 Neptune is stationary in right ascension at 7:00 p.m.

6/16 June Aquilids meteor shower (minor activity) peaks on 16/17. Duration is from 6/2 to 7/2.

Observing and History: http://meteorshowersonline.com/showers/june_aquilids.html

6/17 Hermann Goldschmidt's 215th birthday (1802).

6/17 The earliest morning twilight of the year at latitude 40° north occurs today.

6/17 Last Quarter Moon occurs at 7:34 a.m.

6/17 The Curtiss Cross, an X-shaped illumination effect located between the craters Parry and Gambart, is predicted to occur at 8:40 p.m.

6/18 Phi Sagittariids meteor shower (minor activity) peaks on 18/19. Duration is 6/1 to 7/15.
Observing and History: http://meteorshowersonline.com/showers/phi_sagittariids.html

6/19 Comet 185P/Petrew is at opposition at 1.725 A.U.

6/19 Comet 90P/Gehrels is at perihelion at 2.975 A.U.

6/19 Comet P/2005 R1 (NEAT) is at opposition at 3.183 A.U.

6/19 Mercury is at perihelion (0.3075 astronomical units from the Sun) at 9:00 a.m.

6/19 Uranus is 3.9° north-northwest of the Moon at 4:00 p.m.

6/19 A double Galilean satellite shadow transit occurs at 10:04 p.m.

6/20 Comet P/2009 SK280 (Spacewatch-Hill) is at opposition at 3.773 A.U.

6/20 Comet P/2010 U2 (Hill) is at opposition at 3.968 A.U.

6/20 Summer Solstice is at 12:24 a.m.

6/20 Venus is 2.3° north-northwest of the Moon at 6:00 p.m.

6/20 Ophiuchids meteor shower (minor activity) peaks on 20/21. Duration is from 5/19 to 7/2.
Observing and History: <http://meteorshowersonline.com/showers/ophiuchids.html>

6/21 Comet C/2016 B1 (NEOWISE) is at opposition at 2.971 A.U.

6/21 Summer solstice in the northern hemisphere occurs at 12:24 a.m.

6/21 Mercury is in superior conjunction with the Sun at 10:00 a.m.

6/21 The Sun enters Gemini (longitude 90.41° on the ecliptic) at 11:00 a.m.

6/22 Comet 227P/Catalina-LINEAR is at perihelion at 1.788 A.U.

6/22 Cherry Springs Star Party is being held from the 22nd through the 25th at Cherry Springs State Park in Potter County, Pennsylvania.

6/22 The Moon is 0.54° north of the first-magnitude star Aldebaran (Alpha Tauri), with an occultation taking place in northwestern Africa, most of Europe, the Azores, southern Greenland, and most of North America, at 11:00 a.m.

6/23 Comet P/2009 SK280 (Spacewatch-Hill) is at closest approach to Earth at 3.771 A.U.

6/23 The Moon is at perigee, subtending 33' 23" from a distance of 357,938 kilometers (222,412 miles), at 6:52 a.m.

6/23 Asteroid (40) Harmonia (magnitude +9.3) is at opposition at 7:00 a.m.

6/23 A double Galilean satellite shadow transit occurs at 11:24 a.m.

6/23 New Moon (lunation 1169) occurs at 10:31 p.m.

6/24 The latest evening twilight of the year at latitude 40° north occurs today.

6/24 Mercury is at its greatest declination north (24.7°) at 4:00 a.m.

6/24 Mercury is 5.3° north of the Moon at 5:00 a.m.

6/24 Mars is 4.4 degrees north of the Moon at 4:00 p.m.

6/25 Comet 243P/NEAT is at opposition at 2.484 A.U.

6/25 Comet P/2000 S1 (Skiff) is at perihelion at 2.536 A.U.

6/25 Comet 131P/Mueller is at opposition at 2.893 A.U.

6/25 The Moon is 9.4° south of the first-magnitude star Pollux (Beta Geminorum) at 9:00 a.m.

6/26 Comet P/2011 A2 (Scotti) is at opposition at 2.263 A.U.

6/26 Asteroid (6) Hebe is at closest approach to Earth at 1.539 A.U.

6/26 The Moon is 2.8° south of the bright open cluster M44 (the Beehive Cluster or Praesepe) in Cancer at 7:00 a.m.

6/27 Comet C/2015 O1 (PANSTARRS) is at closest approach to Earth at 3.517 A.U.

6/27 Alexis Bouvard's 250th birthday (1767).

6/27 The Moon is at the ascending node (longitude 145.2°) at 12:27 p.m.

6/27 The latest sunset of the year at latitude 40° north occurs at 7:33 p.m.

6/27 The Moon is 0.04° southwest of the first-magnitude star Regulus (Alpha Leonis), with an occultation taking place in Ecuador, Peru, the Galapagos Islands, Hawaii, and Micronesia, at 9:00 p.m.

6/27 Corvids meteor shower (minor activity) peaks on 27/28. Duration is from 6/25 to 7/3.
Observing and History: <http://meteorshowersonline.com/showers/corvids.html>

6/27 June Scutids meteor shower (minor activity) peaks on 27/28. Duration is from 6/2 to 7/29. Observing and History: http://meteorshowersonline.com/showers/june_scutids.html

6/28 Comet 129P/Shoemaker-Levy is at closest approach to Earth at 3.544 A.U.

6/28 Mercury is 0.77° north of Mars at 3:00 p.m.

6/28 June Bootids meteor shower (minor activity) peaks 28/29. Duration is from 27th to 7/5. Observing and History: http://meteorshowersonline.com/showers/june_bootids.html

6/29 Beta Taurids meteor shower (daylight activity) peaks on 29/30. Duration is from 6/5 to 7/18. Observing and History: http://meteorshowersonline.com/showers/beta_taurids.html

6/29 Mercury is at its greatest latitude north of the ecliptic plane (7.0°) at 4:00 p.m.

6/30 Asteroid Day 2017.

6/30 Comet 71P/Clark Perihelion (1.586 AU)

6/30 Comet P/2001 R6 (LINEAR-Skiff) is at closest approach to Earth at 2.859 AU

6/30 Comet 129P/Shoemaker-Levy is at opposition at 3.545 A.U.

6/30 Burnham (sunrise) lunar light ray predicted to occur at 10:50:01 p.m.

6/30 Hipparchus (sunrise) lunar light ray predicted to occur at 11:48:57 p.m.

Giovanni Cassini (1625-1712), Charles Messier (1730-1817), George Ellery Hale (1868-1938), and Carolyn Shoemaker (1929) were born this month.

The French astronomer Nicolas Louis de Lacaille discovered the globular cluster M55 on June 16, 1752. The French astronomer Charles Messier discovered M20 (the Trifid Nebula) on June 5, 1764. Charles Messier discovered the open cluster M23 on June 20, 1764. The French astronomer Pierre Méchain discovered the spiral galaxy M63 (the Sunflower Galaxy) on June 14, 1779. The Italian astronomer Giovanni Battista Donati discovered Comet C/1858 L1 (Donati), the first comet to be photographed, on June 2, 1858.

The usually minor June Boötid Class III meteor shower may peak on the morning of June 24th. June Boötids are the slowest of all meteors, travelling at 18 kilometers (11 miles) per second. Browse http://www.popastro.com/meteor/activity/activity.php?id_pag=485 for additional information. Information on Iridium flares and passes of the ISS, the Tiangong-1, the USAF's X-37B, the HST, and other satellites can be found at <http://www.heavens-above.com/>

The Moon is 6.2 days old, is illuminated 44.6%, subtends 31.7 arc minutes, and is located in Leo on June 1st at 0:00 UT. The Moon is at its greatest northern declination of +19.3 degrees on June 24th and at its greatest southern declination of -19.4 degrees on June 11th. Longitudinal libration is at a maximum of +7.5 degrees on June 1st and +7.4 degrees on June 29th and a minimum of -7.6 degrees on June 17th. Latitudinal libration is at a maximum of +6.6 degrees on June 22nd and a minimum of -6.6 degrees on June 8th. New Moon occurs on June 24th UT. Large tides will take place for several days thereafter. The First Quarter Moon occults the binary star Rho Leonis (magnitude +3.8) from most of the United States and Canada on the morning of June 1st. The Moon lies approximately three degrees to the upper left of the second-magnitude star Acrab (Beta Scorpii) at dusk on June 7th. From certain parts of the world, the Moon occults Neptune on June 16th, Aldebaran on June 22nd, and Regulus on June 28th. It also occults the third-magnitude star Gamma Leonis for much of North America on the night of June 30th (July 1st UT). See <http://www.lunar-occultations.com/iota/iotandx.htm> for information on lunar occultations taking place this month. Visit <http://saberdoesthestars.wordpress.com/2011/07/05/saber-does-the-stars/> for tips on spotting extreme crescent Moons. Times and dates for the lunar light rays predicted to occur this month are available at <http://www.lunar-occultations.com/rlo/rays/rays.htm>

The Sun is located in Taurus on June 1st. It enters Gemini on June 21st. The Sun reaches its farthest position north for the year on June 20th. There are 15 hours and one minute of daylight at latitude 40 degrees north on the day of the summer solstice. At latitude 40 degrees north, the earliest sunrise occurs on June 14th and the latest sunset on June 27th.

Brightness, apparent size, illumination, distance from the Earth in astronomical units, and location data for the planets and Pluto on June 1st: Mercury (-0.4, 6.3", 66% illuminated, 1.07 a.u., Aries), Venus (magnitude -4.5, 24.5", 48% illuminated, 0.68 a.u., Pisces), Mars (magnitude +1.7, 3.7", 99% illuminated, 2.53 a.u., Taurus), Jupiter (magnitude -2.2, 40.7", 99% illuminated, 4.84 a.u., Virgo), Saturn (magnitude +0.1, 18.3", 100% illuminated, 9.07 a.u., Ophiuchus), Uranus on June 16th (magnitude +5.9, 3.4", 100% illuminated, 20.45 a.u., Pisces), Neptune on June 16th (magnitude +7.9, 2.3", 100% illuminated, 29.74 a.u., Aquarius) and Pluto on June 16th (magnitude +14.2, 0.1", 100% illuminated, 32.42 a.u., Sagittarius).

Mars is in the northwest, Jupiter is in the southwest, and Saturn is in the southeast in the evening sky. At midnight, Jupiter lies in the southwest and Saturn lies in the south. Mercury, Venus, and Uranus can be found in the east, Saturn in the southwest, and Neptune in the southeast at dawn.

Mercury can be seen with difficulty prior to dawn in early June. On June 1st, it is four degrees above the east-northeastern horizon 30 minutes before the Sun rises. The speediest planet is at perihelion on June 19th and is in superior conjunction on June 21st.

Venus is at greatest western elongation on June 3rd. On that date, it rises two hours before sunup and is greater than ten degrees above the eastern horizon an hour before the Sun rises. Venus departs Pisces and enters Aries on June 10th. A waning crescent Moon passes close to the brightest planet on the mornings of June 20th and June 21st. Venus passes into Taurus on June 28th and is situated some eight degrees from the Pleiades on June 30th.

Mars moves into Gemini on June 5th. During the second week of June, the Red Planet disappears into the glare of the Sun.

Jupiter decreases in angular diameter from 40.7 to 37.5 arc seconds and dims from magnitude -2.2 to magnitude -2.1 this month. The gas giant is located three degrees southeast of the third-magnitude star Gamma Virginis and sets around 3:00 a.m. as June begins. It ends retrograde (westward) motion on June 9th. Double Galilean satellite shadow transits take place on June 2nd, June 4th, June 5th, June 9th, June 12th, June 16th, June 20th, and June 23rd UT. Shadows precede the Galilean satellites before Jupiter reaches opposition and follow them after opposition. Browse <http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/> or http://www.projectpluto.com/jeve_grs.htm in order to determine transit times of Jupiter's central meridian by the Great Red Spot. GRS transit times are also available on page 51 of the June 2017 issue of *Sky & Telescope*. Javascript Jupiter at <http://www.shallowsky.com/jupiter/> shows Galilean satellite events. Data on the Galilean satellite events can also be found on page 51 of the June 2017 issue of *Sky & Telescope* and at <http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/>

Saturn reaches opposition on June 15th. At midmonth, the Ringed Planet shines at magnitude +0.0 and spans 18.4 arc seconds. Its rings subtend 41.7 arc seconds and are inclined by 27 degrees, the most since 2003. Eighth-magnitude Titan is positioned north of Saturn on June 8th and June 24th. At 11:30 p.m. EDT on the night of opposition, Titan lies to the south of the planet, Dione is to the west, and Tethys, Enceladus, and Rhea are to the east. For more on Saturn's satellites, browse <http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/>

During June, Uranus is low in the east as twilight ends. It lies 2.4 degrees northeast of Venus on June 1st and 1.8 degrees north of Venus on June 2nd. Uranus remains within two degrees of Venus through June 4th. The ice giant planet rises earlier with each passing night and is located one degree northwest of the fourth-magnitude star Omicron Piscium on June 30th. Visit <http://bluewaterastronomy.info/resources/uranus-finder-chart-2017.png> for a finder chart.

By month's end, Neptune is positioned in the southeast at an altitude of about 40 degrees as morning twilight begins. The eighth planet lies between the fourth-magnitude stars Lambda and Phi Aquarii, about 15 arc minutes east of the sixth-magnitude star 81Aquarii. Browse <http://bluewaterastronomy.info/resources/neptune-finder-chart-2017.png> for a finder chart.

Pluto resides in northern Sagittarius. A finder chart appears on page 243 of the RASC *Observer's Handbook 2017*.

For more on the planets and how to locate them, browse <http://www.nakedeyeplanets.com/>

Comet C/2015 V2 (Johnson) may shine at sixth magnitude as it heads southwestward through Boötes and into Virgo. It passes to the east of the first-magnitude star Arcturus on the nights of June 3rd and June 4th. The comet's closest approach to the Earth occurs on June 5th. Comet Johnson is at perihelion on June 12th. Ninth-magnitude Comet 41P/Tuttle-Giacobini-Kresák travels southward through Ophiuchus near the constellation's eastern border. Comet C/2015 ER61 (PanSTARRS) may reach seventh magnitude as it heads eastward through Pisces. Visit <http://cometchasing.skyhound.com/> and <http://www.aerith.net/comet/future-n.html> for additional information on these and other comets visible during June.

Asteroid 12 Victoria glides northeastward through Virgo, remaining within 2.5 degrees of the first-magnitude star Spica (Alpha Virginis) for the entire month. The 112-kilometer-wide asteroid passes just southeast of the seventh-magnitude star 56 Virginis on the nights of June 7th and June 8th. During June, 12 Victoria decreases in brightness from magnitude +10.5 to magnitude +11.0. Asteroid 324 Bamberga (magnitude +10.3) is at opposition on June 23rd. Asteroid 10 Hygiea (magnitude +9.1) is at opposition on June 30th. Information on asteroid occultations taking place this month is available at http://www.asteroidoccultation.com/2017_06_si.htm

A wealth of current information on solar system celestial bodies is posted at <http://nineplanets.org/> and <http://www.curtrenz.com/astronomy.html>

Free star maps for June can be downloaded at <http://www.skymaps.com/downloads.html> and <http://www.telescope.com/content.jsp?pageName=Monthly-Star-Chart>

Information pertaining to observing some of the more prominent Messier galaxies can be found at <http://www.cloudynights.com/topic/358295-how-to-locate-some-of-the-major-messier-galaxies-and-helpful-advice-for-novice-amateur-astronomers/>

Deep-sky object list generators can be found at <http://www.virtualcolony.com/sac/> and <http://tonightssky.com/MainPage.php>

An article on observing RR Lyrae variable stars, with maxima dates and times for VX Herculis, XZ Draconis, and XZ Cygni appears on pages 48-50 of the June 2017 issue of *Sky & Telescope*.

Comet information for: June 24, 2017 (New Moon).

Constellation		Rises	Transits	Sets
C/2015 V2 (Johnson)	Virgo	3:20 p.m.	9:13 p.m.	3:06 a.m.
45P/Honda-Mirkos-Pajusakova	Leo	12:05 p.m.	6:32 p.m.	12:58 a.m.
C/2015 ER61 (PanSTARRS)	Aries	2:00 a.m.	9:06 a.m.	4:15 p.m.
2P/Encke	Aquarius	12:36 a.m.	5:26 a.m.	10:15 a.m.
41P/Tuttle-Giacobini-Kresak	Ophiuchus	7:10 p.m.	1:13 a.m.	7:16 a.m.
71P/Clark	Scorpius	7:33 p.m.	11:25 p.m.	3:18 a.m.
C/2017 E1 (Borisov)	Cetus	3:27 a.m.	9:57 a.m.	4:27 p.m.
65P/Gunn	Scorpius	8:20 p.m.	1:04 a.m.	5:48 a.m.

C/2015 O1 (PannSTARRS)	Hercules	5:17 p.m.	12:38 a.m.	8:01 a.m.
217P/(LINEAR)	Cetus	2:56 a.m.	9:18 a.m.	3:40 p.m.
213P/Van Ness	Sagittarius	10:26 p.m.	2:19 a.m.	6:12 a.m.
C/2015 VL (Lemmon-Yeung-PannSTARRS)	Pegasus	12:02 a.m.	7:00 a.m.	1:58 p.m.

For location (40°16'N 76°45'W) Hummelstown, PA, USA:

June 1:

	Mercury	Venus	Mars	Jupiter	Saturn	Uranus	Neptune	Pluto
Right ascension	3 ^h 18 ^m 23.3 ^s	1 ^h 39 ^m 3.4 ^s	5 ^h 52 ^m 10.2 ^s	12 ^h 51 ^m 11.6 ^s	17 ^h 40 ^m 30.6 ^s	1 ^h 41 ^m 12.4 ^s	23 ^h 3 ^m 11.6 ^s	19 ^h 21 ^m 43.2 ^s
Declination	15° 57' 44"	7° 56' 39"	24° 17' 53"	-3° 55' 45"	-21° 59' 33"	9° 53' 29"	-7° 2' 11"	-21° 16' 32"
Range (AU)	1.087	0.688	2.535	4.853	9.070	20.634	29.977	32.527
Brightness	-0.3	-4.2	1.9	-2.1	1.0	5.9	7.9	14.2
Constellation	Aries	Pisces	Taurus	Virgo	Ophiuchus	Pisces	Aquarius	Sagittarius
Meridian transit	11:41	10:03	14:16	21:15	02:07	10:06	07:29	03:48
Rises	04:46	03:37	06:46	15:29	21:24	03:34	01:54	23:02
Sets	18:37	16:29	21:45	03:05	06:46	16:39	13:04	08:30
Altitude	-13.3°	-33.7°	18.9°	42.3°	-15.4°	-31.8°	-56.1°	-34.0°
Azimuth	304.7°	321.6°	286.3°	153.2°	106.0°	322.1°	13.4°	90.1°
Diameter in "	6.2	24.7	3.7	40.7	18.4	3.3	2.2	0.1
% illumination	66.4	48.3	99.1	99.4	100.0	100.0	100.0	100.0

July 1:

	Mercury	Venus	Mars	Jupiter	Saturn	Uranus	Neptune	Pluto
Right ascension	7 ^h 36 ^m 3.9 ^s	3 ^h 39 ^m 19.2 ^s	7 ^h 17 ^m 57.6 ^s	12 ^h 53 ^m 20.6 ^s	17 ^h 31 ^m 12.7 ^s	1 ^h 45 ^m 14.4 ^s	23 ^h 3 ^m 12.2 ^s	19 ^h 18 ^m 58.5 ^s
Declination	23° 30' 20"	16° 46' 47"	23° 15' 13"	-4° 17' 45"	-21° 56' 29"	10° 15' 46"	-7° 3' 24"	-21° 24' 29"
Range (AU)	1.271	0.925	2.621	5.289	9.082	20.212	29.490	32.352
Elongation From Sun	12.0°	43.7°	7.8°	93.8°	163.2°	72.0°	115.9°	171.8°
Brightness	-1.0	-4.0	1.7	-1.9	0.1	5.8	7.9	14.2
Equatorial Diameter	5.29"	18.04"	3.57"	37.27"	18.30"	3.49"	2.32"	0.10"
Phase Angle	37.3°	74.9°	4.9°	10.7°	1.7°	2.8°	1.7°	0.3°
Constellation	Gemini	Taurus	Gemini	Virgo	Ophiuchus	Pisces	Aquarius	Sagittarius
Meridian transit	14:02	10:05	13:44	19:19	23:56	08:12	05:31	01:47
Rises	06:33	03:07	06:19	13:34	19:16	01:38	23:52	21:02
Sets	21:30	17:04	21:09	01:07	04:39	14:46	11:05	06:29
Altitude	69.0°	22.6°	66.3°	16.4°	-46.9°	-2.9°	-43.4°	-65.0°
Azimuth	221.7°	273.3°	230.0°	110.6°	79.1°	286.1°	305.3°	46.8°
% illumination	90.7	62.8	99.8	99.1	100.0	99.9	100.0	100.0

For location (40°16'N 76°45'W) Hummelstown, PA, USA:

June 1:

Event	Time	Altitude	Azimuth
Minimum altitude:	01:05	-27.6°	0°
Astronomical twilight begins:	03:39	-18.0°	37°
Nautical twilight begins:	04:26	-12.0°	47°
Civil twilight begins:	05:07	-6.0°	54°
Sunrise:	05:39	-0.8°	60°
Maximum altitude:	13:05	71.9°	180°
Sunset:	20:31	-0.8°	300°
Civil twilight ends:	21:03	-6.0°	306°
Nautical twilight ends:	21:44	-12.0°	313°
Astronomical twilight ends:	22:31	-18.0°	323°

July 1:

Event	Time	Altitude	Azimuth
Minimum altitude:	01:11	-26.6°	0°
Astronomical twilight begins:	03:38	-18.0°	35°
Nautical twilight begins:	04:27	-12.0°	45°
Civil twilight begins:	05:08	-6.0°	53°
Sunrise:	05:41	-0.8°	58°
Maximum altitude:	13:11	72.8°	180°
Sunset:	20:41	-0.8°	302°
Civil twilight ends:	21:13	-6.0°	307°
Nautical twilight ends:	21:55	-12.0°	315°
Astronomical twilight ends:	22:44	-18.0°	325°

The objects listed below are located between 14:00 and 16:00 hours of right ascension.

Forty binary and multiple stars for June: Struve 1812, Kappa Bootis, Otto Struve 279, Iota Bootis, Struve 1825, Struve 1835, Pi Bootis, Epsilon Bootis, Struve 1889, 39 Bootis, Xi Bootis, Struve 1910, Delta Bootis, Mu Bootis (Bootes); Struve 1803 (Canes Venatici); Struve 1932, Struve 1964, Zeta Coronae Borealis, Struve 1973, Otto Struve 302 (Corona Borealis); Struve 1927, Struve 1984, Struve 2054, Eta Draconis, 17-16 Draconis, 17 Draconis (Draco); 54 Hydrae (Hydra); Struve 1919, 5 Serpentis, 6 Serpentis, Struve 1950, Delta Serpentis, Otto Struve 300, Beta Serpentis, Struve 1985 (Serpens Caput); Struve 1831 (Ursa Major); Pi-1 Ursae Minoris (Ursa Minor); Struve 1802, Struve 1833, Phi Virginis (Virgo)

Notable carbon star for June: V Coronae Borealis

Fifty deep-sky objects for June: NGC 5466, NGC 5676, NGC 5689 (Bootes); M102 (NGC 5866), NGC 5678, NGC 5879, NGC 5905, NGC 5907, NGC 5908, NGC 5949, NGC 5963, NGC 5965, NGC 5982, NGC 5985, NGC 6015 (Draco); NGC 5694 (Hydra); NGC 5728, NGC 5791, NGC 5796, NGC 5812, NGC 5861, NGC 5878, NGC 5897 (Libra); M5, NGC 5921, NGC 5957, NGC 5962, NGC 5970, NGC 5984 (Serpens Caput); M101, NGC 5473, NGC 5474, NGC 5485, NGC 5585, NGC 5631 (Ursa Major); NGC 5566, NGC 5634, NGC 5701, NGC 5713, NGC 5746, NGC 5750, NGC 5775, NGC 5806, NGC 5813, NGC 5831, NGC 5838, NGC 5846, NGC 5850, NGC 5854, NGC 5864 (Virgo)

Top ten deep-sky objects for June: M5, M101, M102, NGC 5566, NGC 5585, NGC 5689, NGC 5746, NGC 5813, NGC 5838, NGC 5907

Top five deep-sky binocular objects for June: M5, M101, M102, NGC 5466, NGC 5907

Challenge deep-sky object for June: Abell 2065

