



## CLUB NEWS AND EVENTS

### MONTHLY MEETINGS

**Board Meeting** – April 7 @ 7:00 p.m.

**Members Meeting** – April 7 @ 8:00 p.m.

Held at Schoonover Observatory

**PROGRAM:** Long-time club member, Joanne Konst, will host a presentation on the development of the modern calendar; exploring how it developed and its link with astronomical events.

### UNDER THE DOME

#### March meeting snippets:

Officers continue to work with the City of Lima to bring the observatory back to regular operation as soon as possible. The club received a \$250,000 grant award in 2022 from the State of Ohio; the funds from the grant will be used to restore and update Schoonover Observatory.

The club is exploring the possibility of hosting beginner astronomy classes. Let us know if you're interested! Classes would require a materials fee.

There is a limited stock of Lima Astro t-shirts remaining and plenty of eclipse glasses! Visit Schoonover Observatory to get yours!

#### March Program

Club member and retired engineer, Robert Verb, hosted a presentation about the measurements and sizes of objects in space. The program provided a visual look at the size comparison of many planets and stars, and had those in attendance pondering the difference between accuracy and precision. .

### ASTRONOMY NEWS

#### CLUB MEMBER, MICHAEL RITCHIE, PRESENTED WITH THE JEFFERSON AWARD

Michael Ritchie was presented with the Jefferson Award in March for his extensive contributions and dedication to the community promoting the science of astronomy. Michael has been a member of the club for over 50 years. If you've visited Schoonover Observatory, you've probably heard him speaking about astronomy, the club, or the community. Stop by during the next club meeting to congratulate him!

#### ARTEMIS II CREW SELECTION, MISSION UPDATE

NASA has announced the names for the Artemis 2 crew headed to the Moon in 2024.

- Commander Reid Wiseman is a naval aviator and veteran of Soyuz TMA-13M and International Space Station (ISS) expedition 40/41.
- Pilot Victor Glover is a U.S. Navy pilot, graduate of the U.S. Test Pilot School, and veteran of SpaceX Crew-1 and ISS Expedition 64/65.
- Mission Specialist Christina Hammock Koch is an engineer and veteran of Soyuz MS-12/-13 and ISS expedition 59/60/61.
- Mission Specialist Jeremy Hansen is a fighter pilot and captain in the Royal Canadian Air Force.

#### SATELLITES AND SPACE DEBRIS ARE POLLUTING OUR NIGHT SKIES

Astronomers are sounding the alarm about low-Earth orbit satellites and space debris as significant contributors to light pollution that will affect even the remotest earthbound stargazer.



# SOLAR ECLIPSES ARE COMING

DAVID PROSPER - NIGHT SKY NETWORK

Have you ever witnessed a total solar eclipse? What about an annular solar eclipse? If not, then you are in luck if you live in North America: the next twelve months will see two solar eclipses darken the skies for observers in the continental United States, Mexico, and Canada!

**Solar eclipse fans** get a chance to witness an annular eclipse this fall. On Saturday, October 14, 2023, the Moon will move exactly in front of the Sun from the point of view of observers along a narrow strip of land stretching across the United States from Oregon to Texas and continuing on to Central and South America. Since the Moon will be at its furthest point in its orbit from Earth at that time (known as apogee), it won't completely block the Sun; instead, a dramatic "ring" effect will

be seen as the bright edge of the Sun will be visible around the black silhouette of the Moon. The distinct appearance of this style of eclipse is why it's called an annular eclipse, as annular means ring-like. If you are standing under a tree or behind a screen you will see thousands of ring-like shadows projected everywhere during maximum eclipse, and the light may take on a wan note, but it won't actually get dark outside; it will be similar to the brightness of a cloudy day. This eclipse must only be observed with properly certified eclipse glasses, or other safe observation methods like pinhole projection or shielded solar telescopes. Even during the peak of the eclipse, the tiny bit of the Sun seen via the "ring" can damage your retinas and even blind you.

**Just six months** later, a dramatic total solar eclipse will darken the skies from Mexico to northeast Canada, casting its shadow across the USA in a strip approximately 124 miles (200 km) wide, on Monday, April 8, 2024. While protection must be worn to safely observe most of this eclipse, it's not needed to witness totality itself, the brief amount of time when the Moon blocks the entire surface of the Sun from view. And if you try to view totality through your eclipse viewer, you won't actually be able to see anything! The Moon's shadow will dramatically darken the skies into something resembling early evening, confusing animals and delighting human observers. You will even be able to see bright stars and planets - provided you are able to take your



This detailed solar eclipse map shows the paths of where and when the Moon's shadow will cross the USA for the upcoming 2023 annular solar eclipse and 2024 total solar eclipse, made using data compiled from multiple NASA missions. Where will you be? This map is very detailed, so if you would like to download a larger copy of the image, you can do so and find out more about its features at: <https://svs.gsfc.nasa.gov/5073>

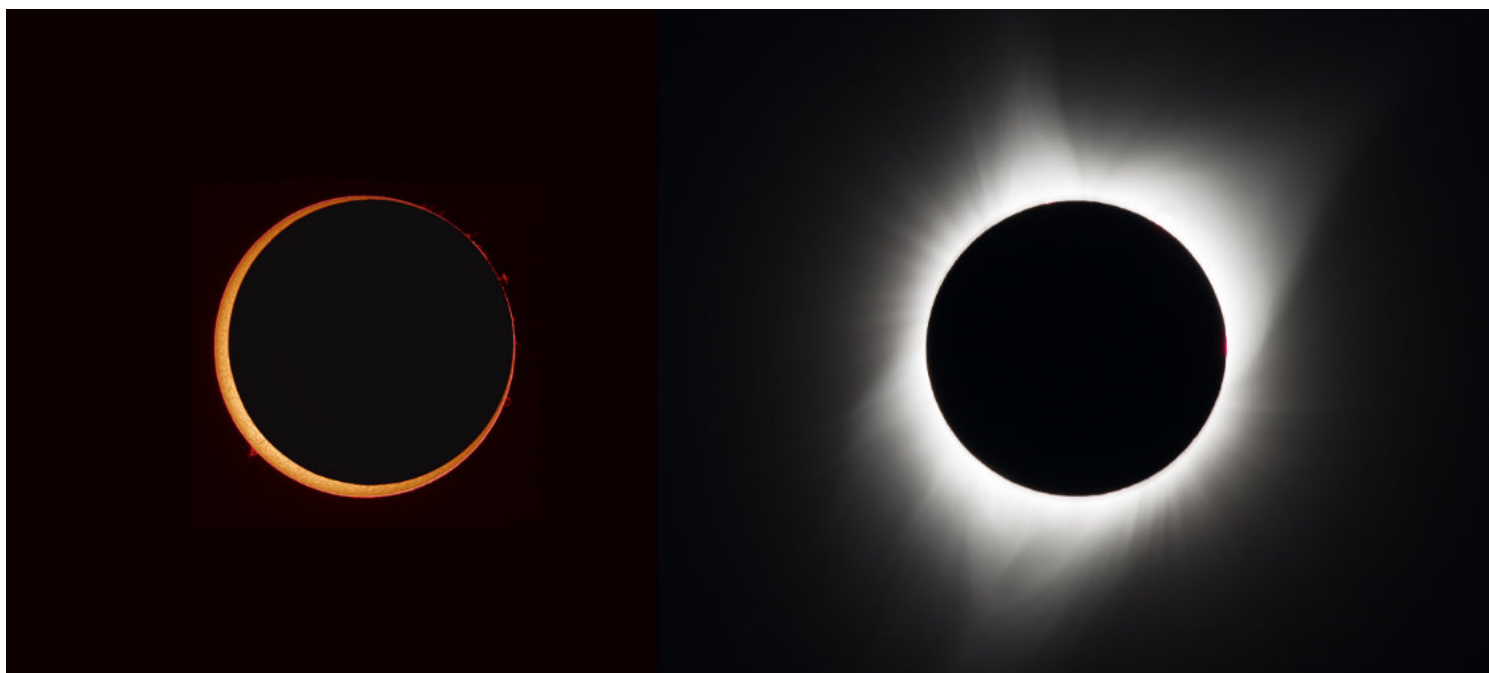
Credits: NASA/Scientific Visualization Studio/Michala Garrison; eclipse calculations by Ernie Wright, NASA Goddard Space Flight Center.

eyes off the majesty of the total eclipse! While the darkness and accompanying chilly breeze will be a thrill, the most spectacular observation of all will be the Sun's magnificent corona! Totality is the only time you can observe the corona, which is actually the beautiful outer fringes of the Sun's atmosphere. For observers in the middle of the path, they will get to experience the deepest portion of the eclipse, which will last over four minutes - twice as long as 2017's

total solar eclipse over North America.

**While some folks** may be lucky enough to witness both eclipses in full - especially the residents of San Antonio, Texas, whose city lies at the crossroads of both paths - everyone off the paths of maximum eclipse can still catch sight of beautiful partial eclipses if the skies are clear. The Eclipse Ambassadors program is recruiting volunteers across the USA to prepare communities off the

central paths in advance of this amazing cosmic ballet. Find more information and apply to share the excitement at [eclipseambassadors.org](http://eclipseambassadors.org). NASA has published a fantastic Solar Eclipse Safety Guide which can help you plan your viewing at [bit.ly/nasaclipsesafety](http://bit.ly/nasaclipsesafety). And you can find a large collection of solar eclipse resources, activities, visualizations, photos, and more from NASA at [solarsystem.nasa.gov/eclipses](http://solarsystem.nasa.gov/eclipses)



Photos of an annular total solar eclipse (left) and a total solar eclipse (right). Note that the annular eclipse is shown with a dark background, as it is only safe to view with protection - you can see how a small portion of the Sun is still visible as the ring around the Moon. On the right, you can see the Sun's wispy corona, visible only during totality itself, when the Moon completely - or totally - hides the Sun from view. A total solar eclipse is only safe to view without protection during totality itself; it is absolutely necessary to protect your eyes throughout the rest of the eclipse!

*Credits: Left, Annular Eclipse: Stefan Seip (Oct 3, 2005). Right, Total Eclipse, NASA/Aubrey Gemignani (August 21, 2017)*

**Eclipse glasses are available NOW!**

**Custom Lima Astronomical Society eclipse glasses are available for purchase for \$5.00.**

**Funds received from the sale of eclipse glasses go towards programming, outreach, and future projects such as the proposed Dark Sky Observatory at Kendrick Woods.**

**Eclipse glasses will start going FAST now that we are only a year away from the April 2024 Total Solar Eclipse!**

# FIND AN OBSERVING PROGRAM FOR YOU WITH THE ASTRONOMICAL LEAGUE!

**Looking for something** to jump-start your stargazing? Maybe need a bit of direction? Or possibly you are tired of looking at the same set of objects every time you observe? If so you should definitely check out one of the [Astronomical League's observing programs!](#)

**The League has** run their excellent observing programs for [the past 50 years](#). Since 1967, the Astronomical League's observing programs have awarded over 10,000 observing certificates to skilled amateurs in recognition of their stargazing achievements - along with some great pins, too! These programs have helped amateur astronomers shore up their observing legs as well. Many folks might eventually observe all of the Messier objects, for example; but the League's requirements for their Messier program will make that observer carefully take into consideration the factors around their observation, such as the time and observing conditions present that night, as part

of their needed documentation. Some harder to spot objects may even go unnoticed but for the need to complete the observing list - helping to sharpen those eyes and star-hopping skills, with a cool pin and certificate as a reward - although the true reward is the boost in confidence and knowledge gleaned from working towards these observations for the participating observers.

**The are programs** for observers of all levels and interests. Beginners can start with programs like the Binocular Messier or Constellation Hunter programs. The Caldwell Observing Program, Two in the View, or Asteroid Observing programs are great programs for stargazers who have gotten a few observations under their belt and want to further sharpen their skills! Experts can test their mettle and go deep with programs like the Binocular Variable Star Observing Program, Herschel 400, or Master Observing Program. Even stargazers

who are surrounded by light pollution in urban areas can participate in programs like the Urban Observers Program or Lunar Observing Program - or help fight light pollution and attain the Dark Sky Advocate award. Fans of astronomy outreach, like many members of Night Sky network clubs, can pursue the Outreach Observing Award - and snag another pin to feature alongside their NSN award pins! You don't even need a telescope to participate in an observing program,; there are programs for naked-eye observations and binocular-wielding observers. Participants aren't even necessarily restricted by observing in visible light, as there is even a Radio Astronomy Observing Program.

**There are many,** many more programs you can find on their program list. Find one today and take up the challenge. Keep it up and one day you too will become a recognized as a master observer!

**Members of the Lima Astronomical Society are automatically enrolled in the Astronomical League and are eligible to complete the Observing Programs!**

**Speak with a club officer for more information.**



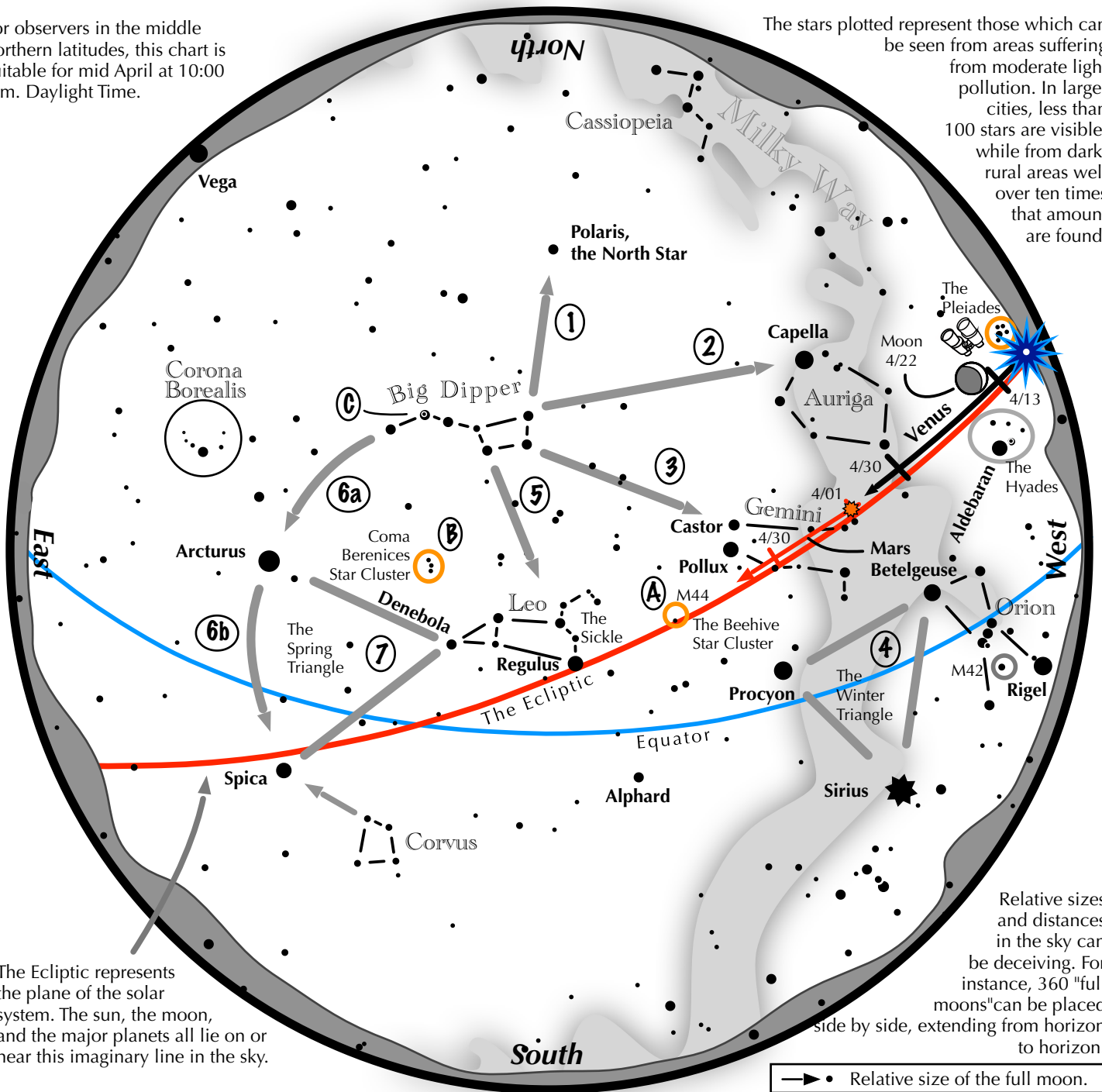
Pins and logos from the Astronomical League's many excellent observing programs- there are even more than seen here!

*Image Credit: The Astronomical League.*

# Navigating the April Night Sky, Northern Hemisphere

For observers in the middle northern latitudes, this chart is suitable for mid April at 10:00 p.m. Daylight Time.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

→ • Relative size of the full moon.

## Navigating the April night sky: Simply start with what you know or with what you can easily find.

- 1 Extend an imaginary line north from the two stars at the tip of the Big Dipper's bowl. It passes Polaris, the North Star.
- 2 Draw another imaginary line west across the top two stars of the Dipper's bowl. It strikes Capella low in the northwest.
- 3 Through the two diagonal stars of the Dipper's bowl, draw a line pointing to the twin stars of Castor and Pollux in Gemini.
- 4 Look in the west-southwest for the bright Winter Triangle stars of Sirius, Procyon, and Betelgeuse.
- 5 Directly below the Dipper's bowl reclines the constellation Leo with its primary star, Regulus.
- 6 Follow the arc of the Dipper's handle. It first intersects Arcturus, then continues to Spica.
- 7 Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.

### Binocular Highlights

- A: M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux.
- B: Look nearly overhead for the loose star cluster of Coma Berenices.
- C: In the Big Dipper's handle shines Mizar next to a dimmer star, Alcor.



Astronomical League  
[www.astroleague.org/outreach](http://www.astroleague.org/outreach)

## Observing Lists

### Top ten deep-sky objects for April

M 65	M 105
M 66	M 108
M 95	NGC 3115
M 96	NGC 3242
M 97	NGC 3628

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M 65	M 105
M 66	M 108
M 95	M 109
M 96	NGC 3115
M 97	NGC 3242

### Challenge deep-sky object for April

#### Leo I

A dwarf spheroidal galaxy in the constellation Leo. It lies approximately 820,000 light-years away with a diameter of ~2,000 LY and a mass of ~25 million Suns.

Apparent size (V): 9'.8 × 7'.4

Apparent magnitude: +11.2

## The Planets in April

**Mercury:** Displays its **best evening apparition of the year for Northern Hemisphere observers** in the first half of the month. Shines brightly near mag. -1 as April begins, gradually fading a full magnitude as it achieves greatest eastern elongation of 19° on the 11<sup>th</sup>, and continues to fade rapidly in the days that follow as its phase angle decreases. By its conjunction with the thin waxing crescent Moon on the 21<sup>st</sup>, it will itself be a crescent that has dimmed to mag. +2 making for an extremely challenging observation just 15° from the Sun.

**Venus:** Its fine evening show continues all month, with the approaching planet gaining in brightness and elongation from the Sun while achieving ever more favorable declination for Northern Hemisphere observers. In the eyepiece, its apparent diameter grows even as its phase (waning gibbous) decreases. The waxing crescent Moon passes 1.3° to the north on the 23<sup>rd</sup>, with Eastern Hemisphere observers favored for the closest approach.

**Mars:** Spends the month high in the evening sky among the stars of Gemini, fading from mag. 1.0 on the 1<sup>st</sup> to 1.3 on the 30<sup>th</sup>, when it will be midway in brightness between nearby Pollux and Castor. The waxing crescent Moon passes 3° to its north on the 26<sup>th</sup>.

**Jupiter:** Too close to the Sun to be seen. In solar conjunction on the 11<sup>th</sup>.

**Saturn:** Situated in central Aquarius, it shines at mag. +1.0 all month as it gradually gains separation from the Sun in the dawn sky, its elongation growing from 35° to 65° during the month. The waning crescent Moon passes 3° to its south on the 16<sup>th</sup>.

**Uranus:** Quickly fading into evening twilight.

**Neptune:** Gradually emerging in morning twilight among the stars of northeastern Aquarius for telescopic observers, it creeps across the border from Aquarius into Pisces late in the month.

## Historical Astronomical Events This Month

- Charles Messier discovered the open cluster M50 in Monoceros on April 5, 1772.
- Charles Messier discovered the spiral galaxy M58 in Virgo on April 15, 1772.
- Johann Koehler discovered the elliptical galaxies M59 and M60 in Virgo on April 11, 1779.
- Caroline Herschel discovered C/1790 H1 (Herschel) on April 18, 1790.
- The first photograph of the Sun was taken on April 2, 1845.
- The first radar signal was bounced off of the Sun on April 7, 1959.
- The Hubble Space Telescope was placed in orbit on April 25, 1990.
- The Compton Gamma Ray Observatory achieved orbit on April 7, 1991.

# April 2023 Astronomy Events Calendar

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
						1
2	3	4	5	6 Full Moon	7 <b>LAS Meeting @ 8pm</b> Moon at descending node	8
9	10 Antares 1.5° S of Moon	11 Mercury at greatest heliocentric lat. N Jupiter in conjunction with the Sun <b>Mercury greatest elongation E (19°)</b>	12	13 Last quarter Moon	14	15
16 Moon at perigee Saturn 3° N of Moon	17 Venus at perihelion <b>Neptune 2° N of Moon</b>	18	19	20 New Moon Moon at ascending node	21 <b>Mercury 1.9° N of Moon</b> <b>Uranus 1.7° S of Moon</b> Mercury stationary	22 Mars at greatest heliocentric lat. N <b>Moon 1.8° S of Pleiades (M45)</b>
23 Lyrid meteors Peak <b>Venus 1.3° S of Moon</b>	24 Vesta in conjunction with the Sun	25	26 Mars 3° S of Moon <b>Pollux 1.5° N of Moon</b>	27 First Quarter Moon	28 Moon at apogee	29
30						

# ASTRONOMY CALENDAR TERMINOLOGY

**Aphelion** – The point in the orbit of a planet, asteroid, or comet at which it is furthest from the Sun.

**Apogee** – The point in the orbit of the Moon, planet, or satellite at which it is furthest from the Earth.

**Ascending Node** – The point along a planet's orbit where it crosses the ecliptic (Earth's orbital plane) from S to N.

**Conjunction** – When the Moon or a planet appears especially close to another planet or bright star.

**Descending Node** – The point along a planet's orbit where it crosses the ecliptic (Earth's orbital plane) from N to S.

**Elongation** – The angular distance the Moon or a planet is from the Sun. Mercury and Venus are best seen when at "greatest" elongation, and will appear at their highest position above the horizon before sunrise or sunset.

**Heliocentric Latitude** – The longitude of a heavenly body, as seen from the Sun's center (the Sun is at the center in the heliocentric model of the solar system). Essentially, if you could stand in the center of the Sun and draw a plane straight out in front of you (this would be  $0.0^\circ$ ), heliocentric latitude is the number of degrees above or below that plane where the planet appears.

**Inferior Conjunction** – When a planet (Mercury or Venus) passes between the Earth and the Sun.

**Occultation** – When the Moon or a planet passes directly in front of a more distant planet or star. (*Occult, as a verb, means to obscure the view of an object*).

**Opposition** – When a planet or asteroid is directly *opposite* the Sun in the sky. Just like the Full Moon, a planet will appear brighter and fully lit during this time.

**Perigee** – the point in the orbit of the Moon, planet, or satellite at which it is nearest to the Earth.

**Perihelion** – the point in the orbit of a planet, asteroid, or comet at which it is closest to the Sun.

**Superior Conjunction** – When a planet (Mercury or Venus) passes behind the Sun, out of our view.

**Transit** – When a smaller object passes in front of a larger object. Such as when Mercury or Venus pass in front of the Sun, silhouetting them against the disc; or when one of Jupiter's Galilean moons pass in front of the planet.

**Zodiacal Light** – Sunlight that is reflected off celestial dust that is concentrated in the plane of the Solar System. It appears as a faint glow in the sky extending from the horizon in late winter/early spring, and requires the darkest skies to be observed. In the darkest sky conditions, zodiacal light can cast very faint shadows.

## Examples

### **Mars 1.1° S of Moon, occultation**

On this night, Mars would appear in the sky very close to the Moon - only 1.1 degrees away from it. At a point during this night the Moon would pass in front of Mars, hiding it from view.

### **Double shadow transit on Jupiter**

On this night, two of Jupiter's Galilean moons will cast shadows on the surface of Jupiter simultaneously, appearing as two dark discs moving across the face of the planet. If you were standing on the surface of Jupiter as one of these shadows passed over, you would witness a solar eclipse.

### **Mercury greatest elongation E**

On this night, Mercury will be at a point in its orbit where it appears highest in the sky. From our point of view, this is the furthest apart Mercury and the Sun will appear from each other. E or W indicate which side of the Sun the planet appears on in its orbital cycle, and can also tell you when to look for Mercury. The planet can be found in the evening sky during the greatest elongation E, and in the morning sky in the greatest elongation W.