

## **“Sky and Telescope” magazine – Glossary of Astronomical terms**

### **Angular Size and Distance**

The apparent size of an object in the sky, or the distance between two objects, measured as an angle. Your index finger held at arm’s length spans about  $1^\circ$ , your fist about  $10^\circ$ .

### **Aperture**

The diameter of a telescope’s main lens or mirror — and the scope’s most important attribute. As a rule of thumb, a telescope’s maximum useful magnification is 50 times its aperture in inches (or twice its aperture in millimeters).

### **Asterism**

Any prominent star pattern that isn’t a whole constellation, such as the Northern Cross or the Big Dipper.

### **Asteroid (Minor Planet)**

A solid body orbiting the Sun that consists of metal and rock. Most are only a few miles in diameter and are found between the orbits of Mars and Jupiter, too small and far away to be seen easily in a small telescope. A few venture closer to the Sun and cross Earth’s orbit.

### **Astronomical Unit**

The average distance from Earth to the Sun, slightly less than 93 million miles.

### **Averted Vision**

Viewing an object by looking slightly to its side. This technique can help you detect faint objects that are invisible when you stare directly at them.

### **Barlow Lens**

A lens that’s placed into the focusing tube to effectively double or triple a telescope’s focal length and, in turn, the magnification of any eyepiece used with it.

### **Black Hole**

A concentration of mass so dense that nothing — not even light — can escape its gravitational pull once swallowed up. Many galaxies (including ours) have supermassive black holes at their centers.

### **Blue Moon**

Traditionally, something that happens rarely or never. More recently, this has come to mean the second full Moon in a single calendar month.

### **Celestial Coordinates**

A grid system for locating things in the sky. It’s anchored to the celestial poles (directly above Earth’s north and south poles) and the celestial equator (directly above Earth’s equator). Declination and right ascension are the celestial equivalents of latitude and longitude.

**Circumpolar**

Denotes an object near a celestial pole that never dips below the horizon as Earth rotates and thus does not rise or set.

**Collimation**

Aligning the optical elements of a telescope so that they all point in the proper direction. Most reflectors and compound telescopes require occasional collimation in order to produce the best possible images.

**Comet**

A “dirty snowball” of ice and rocky debris, typically a few miles across, that orbits the Sun in a long ellipse. When close to the Sun, the warmth evaporates the ice in the nucleus to form a coma (cloud of gas) and a tail. Named for their discoverers, comets sometimes make return visits after as little as a few years or as long as tens of thousands of years.

**Compound Telescope**

A telescope with a mirror in the back and a lens in the front. The most popular designs are the Schmidt-Cassegrain telescope (SCT) and the Maksutov-Cassegrain telescope (commonly called a “Mak”).

**Conjunction**

When the Moon or a planet appears especially close either to another planet or to a bright star.

**Constellation**

A distinctive pattern of stars used informally to organize a part of the sky. There are 88 official constellations, which technically define sections of the sky rather than collections of specific stars.

**Culmination**

The moment when a celestial object crosses the meridian and is thus at its highest above the horizon.

**Dark Adaptation**

The eyes’ transition to night vision, in order to see faint objects. Dark adaptation is rapid during the first 5 or 10 minutes after you leave a well-lit room, but full adaptation requires at least a half hour — and it can be ruined by a momentary glance at a bright light.

**Declination (Dec.)**

The celestial equivalent of latitude, denoting how far (in degrees) an object in the sky lies north or south of the celestial equator.

**Dobsonian (“Dob”)**

A type of Newtonian reflector, made popular by amateur astronomer John Dobson, that uses a simple but highly effective wooden mount. Dobs provide more aperture per dollar than any other telescope design.

**Double Star (Binary Star)**

Two stars that lie very close to, and are often orbiting, each other. Line-of-sight doubles are a consequence of perspective and aren't physically related. Many stars are multiples (doubles, triples, or more) gravitationally bound together. Usually such stars orbit so closely that they appear as a single point of light even when viewed through professional telescopes.

**Earthshine**

Sunlight reflected by Earth that makes the otherwise dark part of the Moon glow faintly. It's especially obvious during the Moon's thin crescent phases.

**Eccentricity**

The measure of how much an orbit deviates from being circular.

**Eclipse**

An event that occurs when the shadow of a planet or moon falls upon a second body. A solar eclipse occurs when the Moon's shadow falls upon Earth, which we see as the Moon blocking the Sun. When Earth's shadow falls upon the Moon, it causes a lunar eclipse.

**Ecliptic**

The path among the stars traced by the Sun throughout the year. The Moon and planets never stray far from the ecliptic.

**Elongation**

The angular distance the Moon or a planet is from the Sun. The inner planets of Mercury and Venus are best seen when at maximum elongation, and thus are highest above the horizon before sunrise or after sunset.

**Ephemeris**

A timetable with celestial coordinates that indicates where a planet, comet, or other body moving in relation to background stars will be in the sky. Its plural is ephemerides (pronounced eff-uh-MEHR-ih-deez).

**Equinox**

The two times each year, near March 20th and September 22nd, when the Sun is directly overhead at noon as seen from Earth's equator. On an equinox date, day and night are of equal length.

**Eyepiece**

The part of a telescope that you look into. A telescope's magnification can be changed by using eyepieces with different focal lengths; shorter focal lengths yield higher magnifications. Most eyepieces have metal barrels that are 1¼ inches in diameter; other standard sizes are 0.965 and 2 inches across.

**Field of View**

The circle of sky that you see when you look through a telescope or binoculars. Generally, the lower the magnification, the wider the field of view.

**Finderscope**

A small telescope used to aim your main scope at an object in the sky. Finderscopes have low magnifications, wide fields of view, and (usually) crosshairs marking the center of the field.

**Focal Length**

The distance (usually expressed in millimeters) from a mirror or lens to the image that it forms. In most telescopes the focal length is roughly equal to the length of the tube. Some telescopes use extra lenses and/or mirrors to create a long effective focal length in a short tube.

**Focal Ratio (f/number)**

A lens or mirror's focal length divided by its aperture. For instance, a telescope with an 80-mm-wide lens and a 400-mm focal length has a focal ratio of f/5.

**Galaxy**

A vast collection of stars, gas, and dust, typically 10,000 to 100,000 light-years in diameter and containing billions of stars (from galaxias kuklos, Greek for "circle of milk," originally used to describe our own Milky Way).

**Gibbous**

When the Moon or other body appears more than half, but not fully, illuminated (from gibbus, Latin for "hump").

**Histogram**

A plot of the number of pixels in an image at each brightness level. It's a useful tool for determining the optimum exposure time; the histogram of a properly exposed image generally peaks near the middle of the available brightness range and falls to zero before reaching either end.

**Inclination**

The angle between the plane of an orbit and a reference plane. For example, NASA satellites typically have orbits inclined 28° to Earth's equator.

**Libration**

A slight tipping and tilting of the Moon from week to week that brings various features along the limb into better view. The main causes are two aspects of the Moon's orbit: its elliptical shape and inclination to the ecliptic.

**Light Pollution**

A glow in the night sky or around your observing site caused by artificial light. It greatly reduces how many stars you can see. Special light-pollution filters can be used with your telescope to improve the visibility of celestial objects.

**Light-year**

The distance that light (moving at about 186,000 miles per second) travels in one year, or about 6 trillion miles.

**Limb**

The edge of a celestial object's visible disk.

**Magnification (power)**

The amount that a telescope enlarges its subject. It's equal to the telescope's focal length divided by the eyepiece's focal length.

**Magnitude**

A number denoting the brightness of a star or other celestial object. The higher the magnitude, the fainter the object. For example, a 1st-magnitude star is 100 times brighter than a 6th-magnitude star.

**Meridian**

The imaginary north-south line that passes directly overhead (through the zenith).

**Messier object**

An entry in a catalog of 103 star clusters, nebulas, and galaxies compiled by French comet hunter Charles Messier (mess-YAY) between 1758 and 1782. The modern-day Messier catalog contains 109 objects.

**Meteor**

A brief streak of light caused by a small piece of solid matter entering Earth's atmosphere at tremendous speed (typically 20 to 40 miles per second). Also called a "shooting star." If material survives the trip through the atmosphere, it's called a meteorite after landing on Earth's surface.

**Meteor Shower**

An increase in meteor activity at certain times of the year due to Earth passing through a stream of particles along a comet's orbit around the Sun.

**Milky Way**

A broad, faintly glowing band stretching across the night sky, composed of billions of stars in our galaxy too faint to be seen individually. It's invisible when the sky is lit up by artificial light or bright moonlight.

**Mount**

The device that supports your telescope, allows it to point to different parts of the sky, and lets you track objects as Earth rotates. A sturdy, vibration-free mount is every bit as important as the telescope's optics. A mount's top, or head, can be either alt-azimuth (turning side to side, up and down) or equatorial (turning parallel to the celestial coordinate system). "Go To" mounts contain computers that can find and track celestial objects automatically once the mounts have been aligned properly.

**Nebula**

Latin for “cloud.” Bright nebulas are great clouds of glowing gas, lit up by stars inside or nearby. Dark nebulas are not lit up and are visible only because they block the light of stars behind them.

**Objective**

A telescope’s main light-gathering lens or mirror.

**Occultation**

When the Moon or a planet passes directly in front of a more distant planet or star. A grazing occultation occurs if the background body is never completely hidden from the observer.

**Opposition**

When a planet or asteroid is opposite the Sun in the sky. At such times the object is visible all night — rising at sunset and setting at sunrise.

**Parallax**

The apparent offset of a foreground object against the background when your perspective changes. At a given instant, the Moon appears among different stars for observers at widely separated locations on Earth. Astronomers directly calculate the distance to a nearby star by measuring its incredibly small positional changes (its parallax) as Earth orbits the Sun.

**Phase**

The fraction of the Moon or other body that we see illuminated by sunlight.

**Planisphere (Star Wheel)**

A device that can be adjusted to show the appearance of the night sky for any time and date on a round star map. Planispheres can be used to identify stars and constellations but not the planets, whose positions are always changing.

**Reflector**

A telescope that gathers light with a mirror. The Newtonian reflector, designed by Isaac Newton, has a small second mirror mounted diagonally near the front of the tube to divert the light sideways and out to your eye.

**Refractor**

A telescope that gathers light with a lens. The original design showed dramatic rainbows, or “false color,” around stars and planets. Most modern refractors are achromatic, meaning “free of false color,” but this design still shows thin violet fringes around the brightest objects. The finest refractors produced today are apochromatic, meaning “beyond achromatic.” They use expensive, exotic kinds of glass to reduce false color to nearly undetectable levels.

**Retrograde**

When an object moves in the reverse sense of “normal” motion. For example, most bodies in the solar system revolve around the Sun and rotate counterclockwise as seen from above (north of) Earth’s orbit; those that orbit or spin clockwise have retrograde motion. This term also describes

the period when a planet or asteroid appears to backtrack in the sky because of the changing viewing perspective caused by Earth's orbital motion.

### **Right Ascension (R.A.)**

The celestial equivalent of longitude, denoting how far (in 15°-wide "hours") an object lies east of the Sun's location during the March equinox.

### **Seeing**

A measure of the atmosphere's stability. Poor seeing makes objects waver or blur when viewed in a telescope at high magnification. The best seeing often occurs on hazy nights, when the sky's transparency is poor.

### **Solar Filter**

Material that allows safe viewing of the Sun by blocking nearly all of its light. Proper filters should completely cover the front aperture of a telescope and should never be attached to the eyepiece; they range from glass used by welders to special plastic film. White-light filters will show sunspots, while hydrogen-alpha (H $\alpha$ ) filters let certain red light through that reveals the Sun's streaming hot gases.

### **Solstice**

The two times each year, around June 20th and December 21st, when the Sun is farthest north or south in the sky. At the summer solstice, the day is longest and the night is shortest, and vice versa at the winter solstice.

### **Star**

A massive ball of gas that generates prodigious amounts of energy (including light) from nuclear fusion in its hot, dense core. The Sun is a star.

### **Star Cluster**

A collection of stars orbiting a common center of mass. Open clusters typically contain a few hundred stars and may be only 100 million years old or even less. Globular clusters may contain up to a million stars, and most are at least 10 billion years old (almost as old as the universe itself).

### **Star Diagonal**

A mirror or prism in an elbow-shaped housing that attaches to the focuser of a refractor or compound telescope. It lets you look horizontally into the eyepiece when the telescope is pointed directly overhead.

### **Star Party**

A group of people who get together to view the night sky. Astronomy clubs often hold star parties to introduce stargazing to the public.

### **Sunspot**

A temporary dark blemish on the surface of the Sun that is a planet-size region of gas cooler than its surroundings. Sunspots can be viewed safely using a solar filter.

**Supernova**

A star ending its life in a huge explosion. In comparison, a nova is a star that explosively sheds its outer layers without destroying itself.

**Terminator**

The line on the Moon or a planet that divides the bright, sunlit part from the part in shadow. It's usually the most exciting and detailed region of the Moon to view through a telescope.

**Transit**

When Mercury or Venus crosses the disk of the Sun, making the planet visible as a black dot in silhouette, or when a moon passes across the face of its parent planet. Transit also refers to the instant when a celestial object crosses the meridian and thus is highest in the sky.

**Transparency**

A measure of the atmosphere's clarity — how dark the sky is at night and how blue it is during the day. When transparency is high, you see the most stars. Yet crystal-clear nights with superb transparency often have poor seeing.

**Twilight**

The time after sunset or before sunrise when the sky is not fully dark. Astronomical twilight ends after sunset (and begins before sunrise) when the Sun is  $18^\circ$  below the horizon.

**Unit-Power Finder**

A device for aiming your telescope that shows the sky as it appears to your unaided eye, without magnification. The simplest type is a pair of notches or circles that you line up with your target. Other versions use an LED to project a red dot or circle onto a viewing window.

**Universal Time (UT)**

Greenwich Mean Time, expressed in the 24-hour system. For example, 23:00 UT is 7:00 p.m. Eastern Daylight Time (or 6:00 p.m. Eastern Standard Time). Astronomers use Universal Time to describe when celestial events happen in a way that is independent of an observer's time zone.

**Variable Star**

A star whose brightness changes over the course of days, weeks, months, or years.

**Waning**

The changing illumination of the Moon (or other body) over time. The Moon waxes, growing more illuminated, between its new and full phases, and wanes, becoming less illuminated, between its full and new phases.

**Waxing**

The changing illumination of the Moon (or other body) over time. The Moon waxes, growing more illuminated, between its new and full phases, and wanes, becoming less illuminated, between its full and new phases.

**Zenith**

The point in the sky that's directly overhead.

**Zodiac**

Greek for "circle of animals." It's the set of constellations situated along the ecliptic in the sky, through which the Sun, Moon, and planets move.

See more at: <http://www.skyandtelescope.com/astronomy-terms>