

GLOSSARY

Glossary

Annular solar eclipse:

a solar eclipse in which the solar photosphere appears around the edge of the moon in a bright ring.

Asteroid:

one of the countless chunks of rock that orbit the sun mostly between Mars and Jupiter in a belt approximately 250 million kilometers wide. Asteroids range in size from boulder-size to several hundred kilometers across. Some scientists think they are remnants of the gas and dust that condensed into planets during the formation of the solar system.

Atmosphere:

a mixture of gases that surround a planet or other body in the solar system. Earth's atmosphere consists mainly of nitrogen and oxygen. All the planets and a few of their moons have atmospheres—ranging from a trace on Mercury and Pluto to the thick atmospheres of Venus, Jupiter, Saturn, Uranus, and Neptune.

Aurora:

a colorful display of glowing, flickering lights in the night sky near Earth's polar regions. Auroras are probably caused by the collision of charged particles streaming from the sun with molecules in the upper atmosphere above the poles.

Axis:

an imaginary line that passes through the Earth from the North to the South Pole. Like a spinning top, Earth rotates on its axis, which is tilted at an angle of 23.5 degrees. Because of this tilt, different parts of the Earth receive more direct rays at different times during its yearly revolution around the sun. This accounts for the seasons.

Binary star:

two stars orbiting a common center of gravity.

Black hole:

in theory, a formerly massive, now collapsed star, with a gravitational field so strong that no light or matter can escape it.

Central peaks:

the area of raised terrain in the center of an impact crater.

Chromosphere:

a region of the sun's atmosphere composed mostly of hydrogen.

Comet:

one of many small bodies composed of frozen gases, frozen water, and dust that orbit the sun on the fringes of the solar system. The few that are visible have highly elliptical orbits that bring them periodically into the inner solar system. As comets approach the sun, some of the gas and dust is vaporized and blown off into "tails" by the solar wind.

Constellation:

a pattern of stars; one of 88 areas into which the night sky is typically divided.

Convection:

the movement of heat and matter because of differences in density, usually resulting from differences in temperature.

Convection cell:

area of vertical circular motion of a fluid caused by convection.

Convection zone:

an interior region of the sun where energy is transferred by convection. Hot gases from the interior rise toward the cooler surface, where they release energy. The cooled gases then sink back down to be heated again.

Core:

the central region of the sun that produces most of the sun's energy.

Corona:

the outermost layer of the sun's atmosphere, which extends even beyond Earth's orbit.

Craters:

circular rocky formations found on the surfaces of the terrestrial planets and outer planet satellites. Most are caused by impacts of meteorites, but some are remnants of volcanoes.

Dark side of the moon:

the hemisphere of the moon that is not illuminated by sunlight.

Density:

the mass of a substance divided by the amount of space it occupies. Density is a measure of how tightly matter is packed.

Eclipse:

a total or partial blocking of light caused by the passing of one celestial body into the shadow of another; also the hiding of one celestial body by another. A lunar eclipse occurs when the Earth passes between the sun and moon, blocking out the sun's light reflected by the moon. Eclipses can be total or partial and are visible on only a small area of the Earth.

Ecliptic:

the apparent path of the sun and planets across the sky. Since the orbits of the planets around the sun lie in roughly the same plane (except for Pluto), the sun and other planets appear to follow the same path across the sky when viewed from Earth.

Ejecta:

pulverized rock scattered by meteorite impacts on a planetary surface.

Elliptical:

the shape of the orbits of the planets. An ellipse is obtained by passing a plane completely through a circular cone.

Elliptical galaxies:

a galaxy whose visible shape forms an ellipse. Elliptical galaxies contain little gas or dust and few hot bright stars.

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Far side:

the side of the moon that is never facing Earth, due to the fact that the moon's orbital period and rotational period are the same.

First quarter:

the phase of the moon when its western half is illuminated by sunlight and thus visible to an observer on Earth.

Flare:

a brief, violent explosion in an active region of the sun's chromosphere. Scientists believe that flares occur when energy trapped in magnetic fields suddenly erupts, releasing high-energy particles into space.

Full moon:

the phase of the moon when its near-side is completely illuminated by the sun.

Galaxy:

a system containing billions of stars and interstellar material held together by gravitational attraction. Our sun and solar system, as well as most of the stars we can see with the naked eye, are part of the spiral-shaped Milky Way galaxy. Billions more galaxies exist throughout the universe.

Gas giants:

the planets Jupiter, Saturn, Uranus, and Neptune. Their atmospheres consist mostly of hydrogen with some helium. The atmospheres of Uranus and Neptune also contain a significant amount of methane.

Globular clusters:

compact, old, spherically symmetrical clusters of stars containing tens of thousands to a million stars.

Gravitation:

The natural attraction that massive bodies exert on one another.

Gravity:

The force of attraction that every object in the universe exerts on every other object. The strength of the gravitational attraction between two objects depends on the amount of material (or mass) in each and the distance between them. The greater the mass and the shorter the distance, the more powerful the force exerted. Gravitational forces hold our solar system and the entire universe together.

Hertzsprung–Russell diagram:

diagram that expresses the relationship between the brightness and temperature of stars. Most stars lie on a band running diagonally across the graph from bright, hot, and white stars, through average yellow ones like our sun, to dim, cool, red ones. We call such stars main-sequence stars. A small fraction of stars, such as cool, but bright, red giants and hot, but dim, white dwarfs cannot be plotted on the main sequence. These stars are at advanced stages of their existence.

Highlands:

the relatively bright, heavily cratered terrain on the moon.

High tide:

the time at which sea level is highest at a given point on the Earth's surface. Occurs when the bulge in the Earth's oceans caused by the gravitational pull of the moon and sun passes that point.

Inclined orbit:

an orbit in which the angle between the orbital plane and the plane of the ecliptic is greater than zero.

Irregular galaxies:

galaxies of rather low mass and no specific shape.

Kelvin:

a unit of thermal measurement used by astronomers to describe temperatures, such as those of the sun and other stars. Celsius may also be used.

Kuiper belt:

a zone outside the orbit of Pluto, but closer to the sun than the Oort cloud, containing many asteroid-size objects composed of ice and rock.

Last quarter:

the phase of the moon when its eastern half is illuminated by sunlight and thus visible to an observer on Earth.

Light-year:

the distance that light travels in one year, approximately 9.46 trillion kilometers or 5.88 trillion miles.

Low tide:

the time at which sea level is lowest at a given point on the Earth's surface. Occurs when the bulge in the Earth's oceans caused by the gravitational pull

of the moon and sun is farthest away from that point.

Lunar eclipse:

when the moon enters the shadow of the Earth.

Maria:

relatively dark, low-lying, smooth and somewhat circular areas of terrain on the moon. Formed by eruption of lava onto the surface.

Mariner:

a program of ten unmanned spacecraft launched to study the inner planets. In 1962, *Mariner 2* flew past Venus, becoming the first successful interplanetary spacecraft. *Mariner 9* became the first spacecraft to orbit another planet: It sent back pictures from its almost yearlong orbit around Mars in 1971. *Mariner 10* is the only spacecraft ever to visit Mercury.

Mass:

the total amount of matter in an object. Mass should not be confused with volume, the amount of space occupied by an object.

Meteor:

a fragment of asteroidal or cometary debris that has entered Earth's atmosphere.

Meteoroid:

one of the countless metal or stony particles, ranging in size from dust grains to boulders, that revolve around the sun. Some enter Earth's atmosphere, where friction causes them to glow. Sometimes referred to as "shooting

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stars," these glowing fragments are more correctly called meteors. When these particles crash onto the surface of the Earth or any planet or body in the solar system, they are called meteorites.

Moon:

a natural satellite that revolves around a planet. All the planets except Mercury and Venus have moons. The United States has landed six manned spacecraft on Earth's moon.

Neap tide:

the lowest tide level that occurs when the moon is near first quarter or last quarter phase.

Near side:

the side of the moon that is always facing Earth.

Nebula:

a cloud of interstellar gas and dust that is the birthplace of stars. The word is derived from the Latin word for "cloud"; its plural is nebulae.

Neutron star:

a rapidly spinning star of extremely small size and high density, thought to be the result of a supernova explosion. The inward pressure of a neutron star is so great that its electrons and protons have been forced together, creating a body composed mainly of neutrons. Rotating neutron stars are believed to account for pulsars.

New moon:

the phase of the moon when the moon is between the Earth and the sun, and so the illuminated side is facing away from Earth.

Nova:

a star that suddenly explodes, temporarily increasing its brightness; the plural is novae.

Nuclear fusion:

a process in which two or more nuclei are joined to form a single, heavier one. Stars produce energy by this process.

Oort cloud:

a region at the far edge of the solar system that slowly orbits the sun and contains many comets. From time to time, the gravitational pull of a passing star will draw a comet out of the cloud and into closer orbit around the sun. Named for Dutch astronomer Jan H. Oort.

Orbit:

the path of one body around another. In our solar system, each planet has its own distinctive orbit around the sun, and moons orbit most of the planets. The orbits of all the planets are slightly elliptical. Pluto's orbit is so eccentric, however, that for periods of time it is actually inside the orbit of Neptune. In fact, Pluto's orbit has been inside Neptune's since 1979, and it will remain that way until 1999. The orbits of most of the planets lie in the same plane, as if they were on a flat wheel. Mercury's orbit is slightly tilted, however, and Pluto's is even more so.

Partial solar eclipse:

a solar eclipse in which the sun's disk is not completely blocked from view by the moon.

Penumbra:

in a solar eclipse, the part of the moon's shadow from which part of the solar disk is visible.

Photosphere:

the luminous layer of gas commonly called the surface of the sun.

Planet:

one of the nine largest bodies that orbit the sun.

Prominence:

any variety of cloud-like extensions of chromospheric gas that rise into the corona—the outermost layer of the sun's atmosphere. Some hang for days or even months above the chromosphere, their luminous gases arching along the magnetic lines of force that control their behavior. Others can erupt violently and propel gas outward into space.

Quasar:

a mysterious, "quasi-stellar," or star-like object in a galaxy's core—very small, bright, and distant. Most quasars are strong sources of radio energy.

Radiation:

stars produce electromagnetic radiation, which can be thought of as energy traveling in waves. The various kinds of electromagnetic radiation—visible light, gamma rays, X rays, ultraviolet, infrared, and radio waves—differ in wavelength and in energy. The array of radiation of all wavelengths is called the electromagnetic spectrum.

Radiation zone:

an interior region of the sun where the sun's energy is transmitted by radiation.

Red giant:

a star in the intermediate stage of its evolution, with a diameter up to 100 times greater than that of the sun and a relatively low surface temperature of 2000 to 3000 kelvins.

Retrograde:

motion means a planet rotates in a clockwise direction when viewed from above the North Pole.

Revolution:

the motion of one body in its orbit around another. All the planets revolve around the sun in the same direction; the closer the planet is to the sun, the faster its revolution.

Rotation:

the spinning of a body on its axis. All the planets except Venus, Uranus, and Pluto rotate in the same direction.

Single star:

a star that does not share a common center of gravity with another star.

Solar eclipse:

the obscuration of the light of the sun by the moon. The eclipse can be either partial or total, depending on whether the moon completely blocks the sun's

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Solar system:

the sun and the celestial bodies that revolve around it.

Solar wind:

a stream of charged particles ejected into space from the surface of the sun. The solar wind blows past Earth constantly at speeds of about 300 kilometers per second, but a flare or other violent activity can speed the wind to 1000 kilometers per second and reach beyond the orbit of Uranus. The magnetic fields around Earth and a few of the other planets protect them to some extent from the effects of the solar wind. A disturbance in Earth's magnetic field caused by intense solar wind may cause a magnetic storm, triggering auroral displays and disrupting radio communications.

Spring tide:

the highest tide, produced when the Earth, moon, and sun are aligned, and the moon is new or full.

Star:

a huge ball of gas that emits radiation and light (or once did) because of nuclear reactions in its core.

Sunspot:

a dark, irregular patch on the sun's surface. Sunspots appear dark because they are about 2,000 degrees Celsius cooler than surrounding gases. Sunspots are areas with intense magnetic site polarity. Sunspots wax and wane over an 11-year cycle—a period that has also been observed for other dynamic solar events such as flares and prominences.

Supernova:

a stellar explosion that makes the star many thousands of times brighter than a nova.

Terrestrial planets:

Mercury, Venus, Earth, and Mars. All have hard-rock crusts and metal cores.

Total solar eclipse:

a solar eclipse in which the sun's disk is completely blocked from view by the moon.

Umbra:

in a solar eclipse, the part of the moon's shadow from which the solar disk is completely hidden.

Variable star:

a star with brightness that changes over time.

Venera:

a Soviet space program. In 1975 *Venera 9* and *10* withstood the fierce heat and intense pressure of Venus's surface long enough to transmit pictures to Earth.

Voyager project:

unmanned *Voyager 1* and *Voyager 2* were launched in 1977, at a time when the four outer giant planets were fortuitously aligned to allow a sequential visit to all of them. Both spacecraft visited Jupiter and Saturn, sending back invaluable information. Using Saturn's gravity to boost it toward Uranus, *Voyager 2* arrived at that planet in 1986 and at Neptune in 1989. Both spacecrafts are now heading out of the solar system; they will continue to send back data for many more years.

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Waning crescent:

the phase of the moon between last quarter and new moon.

Waning gibbous:

the phase of the moon between full moon and last quarter.

Waxing crescent: the phase of the moon between new moon and first quarter.

Waxing gibbous:

the phase of the moon between first quarter and full moon.

White dwarf:

a dying star that is very faint in color, having undergone gravitational collapse to about the size of the Earth.