

# Glossary

- Ablation** A process whereby the atmosphere melts away the surface material of an incoming meteorite
- Absolute magnitude** Brightness of a star or celestial object if seen from a standard distance of 10 parsecs
- Achondrite** A stony meteorite lacking chondrules
- Albedo** The ratio of the light reflected in all directions by a surface to the light incident on it. A perfectly reflecting surface has an albedo of 1, a perfectly absorbing surface has an albedo of 0
- Altitude** The angular distance between the direction to an object and the horizon. Altitude ranges from  $0^\circ$  for an object on the horizon to  $90^\circ$  for an object directly overhead
- Amino acid** A carbon-based molecule from which protein molecules are assembled
- Amor asteroid** A member of a class of asteroids having orbits that cross the orbital distance of Earth
- Angular momentum** The momentum of a body associated with its rotation or revolution. For a body in a circular orbit, angular momentum is the product of orbital distance, orbital speed, and mass. When two bodies collide or interact, angular momentum is conserved
- Annihilation** The mutual destruction of a matter-antimatter pair of particles. The charges on the two particles cancel, and the mass of the particles is entirely converted to energy
- Annular eclipse** A solar eclipse in which the Moon is too far from Earth to block the entire Sun from view and a thin ring of sunlight appears around the Moon
- Antimatter** A type of matter that annihilates ordinary matter on contact. For every particle, there is a corresponding antimatter particle. For example, the antimatter counterpart of the proton is the antiproton
- Aperture** The diameter of the main light-gathering lens or mirror, given in inches, centimeters, or meters

- Apex** The direction in the sky toward which the Sun is moving. Because of the Sun's motion, nearby stars appear to diverge from the apex
- Aphelion** The point in the orbit of a Solar System body where it is farthest from the Sun
- Apogee** The point, in an orbit about Earth, that is furthest from Earth
- Apollo asteroid** A member of a class of asteroids having orbits that cross the orbital distance of Earth
- Apparent magnitude** Brightness of a star or celestial object when observed at its great distance from Earth
- Asteroid** A small, planet-like Solar System body. Most asteroids are rocky in makeup and have orbits of low eccentricity and inclination
- Asteroid Belt** The region of the Solar System lying between 2.1 and 3.3 astronomical units (AU) from the Sun. The great majority of asteroids are found in the Asteroid Belt
- Astronomical unit (AU)** The mean Earth-Sun distance, about 150,000,000 km
- Aten asteroid** An asteroid having an orbit with semi-major axis smaller than 1 AU
- Atom** A particle consisting of a nucleus and one or more surrounding electrons
- Atomic number** The number of protons in the nucleus of an atom. Unless the atom is ionized, the atomic number is also the number of electrons orbiting the nucleus of the atom
- Aurora Australis** Light emitted by atoms and ions in the upper atmosphere near the south magnetic pole. The emission occurs when atoms and ions are struck by energetic particles from the Sun
- Aurora Borealis** Light emitted by atoms and ions in the upper atmosphere near the north magnetic pole. The emission occurs when atoms and ions are struck by energetic particles from the Sun
- Axis** The imaginary line that an object, usually a planet, rotates around
- Azimuth** The angular distance between the north point on the horizon eastward around the horizon to the point on the horizon nearest to the direction to a celestial body
- Barred spiral galaxy** A spiral galaxy in which the nucleus is crossed by a bar. The spiral arms start at the ends of the bar
- Barycenter** The center of mass of a system of bodies
- Basalt** An igneous rock often produced in volcanic eruptions
- Big Bang** The theory that suggests that the universe was formed from a single point in space during a cataclysmic explosion
- Big Crunch** The theory that states that the universe will expand to its maximum point, then contract until it explodes
- Black hole** A region of space from which no matter or radiation can escape. A black hole is a result of the extreme curvature of space by a massive compact body

- Bolide** A term used to describe an exceptionally bright meteor, possibly accompanied by a sonic boom
- Bow shock** The region where the solar wind is slowed as it impinges on Earth's magnetosphere
- Brightness** Intensity of light received by an observer from a celestial object
- C-type asteroid** One of a class of very dark asteroids whose reflectance spectra show no absorption features due to the presence of minerals
- Capture theory** The theory of the origin of the Moon that holds that the Moon formed elsewhere in the Solar System and then was captured into orbit around Earth
- Carbonaceous chondrite** A stony meteorite that contains carbon-rich material. Carbonaceous chondrites are thought to be primitive samples of material from the early Solar System
- Cassini's division** A conspicuous 1800-km-wide gap between the outermost rings of Saturn
- Celestial equator** The circle where Earth's equator, if extended outward into space, would intersect the celestial sphere
- Celestial horizon** The circle on the celestial sphere which is  $90^\circ$  from the zenith. The celestial horizon is approximately the boundary between Earth and the sky
- Celestial mechanics** The part of physics and astronomy that deals with the motions of celestial bodies under the influence of their mutual gravitational attraction
- Celestial pole** The celestial poles are imaginary lines that trace Earth's rotation axis in space
- Celestial sphere** An imaginary sphere surrounding Earth. The celestial bodies appear to carry out their motions on the celestial sphere
- Centaurs** Small astronomical bodies that generally orbit the Sun between Jupiter and Neptune. Centaurs cross the orbital paths of the major planets
- Charge coupled device (CCD)** An array of photosensitive electronic elements that can be used to record an image falling upon it. CCD cameras are composed of silicon chips that are light sensitive, changing detected photons of light into electronic signals that in turn can be used to create images of astronomical objects
- Chondrite** A meteorite containing chondrules
- Chondrule** A small spherical body embedded in a meteorite. Chondrules are composed of iron, aluminum, and magnesium silicate rock
- Chromosphere** The part of the Sun's atmosphere between the photosphere and the corona
- Circumpolar stars** Circumpolar stars never set or go below the horizon for observers from specific latitudes

- Close pair** A binary system in which the two stars are close enough together that they transfer matter to one another during some stages of their evolution
- Cluster of galaxies** A group of galaxies held together by their mutual gravitational attraction
- Cluster of stars** A group of stars held together by their mutual gravitational attraction
- Coma** A spherical gaseous region that surrounds the nucleus of a comet. The coma of a comet may be 100,000 km or more in diameter
- Comet** A small, icy body in orbit around the Sun. When a comet is near the Sun, it displays a coma and a tail
- Concretions** A common geologic phenomenon where hard bodies form in sediments before they become sedimentary rocks
- Conjunction** The appearance of two celestial bodies, often a planet and the Sun, in approximately the same direction
- Constellation** One of 88 regions into which the celestial sphere is divided
- Continuous spectrum** A spectrum containing neither emission nor absorption lines
- Convection** The process of energy transport in which heat is carried by hot, rising and cool, falling currents or bubbles of liquid or gas
- Core** The innermost region of the interior of Earth or another planet
- Coriolis effect** The acceleration which a body experiences when it moves across the surface of a rotating body. The acceleration results in a westward deflection of projectiles and currents of air or water when they move toward Earth's equator and an eastward deflection when they move away from the equator
- Corona** The outermost layer of the Sun's atmosphere. Gases in the corona are tenuous and hot
- Coronal hole** A low density, dim region in the Sun's corona. Coronal holes occur in regions of open magnetic field lines where gases can flow freely away from the Sun to form the solar wind
- Coronal mass ejection** A blast of gas moving outward through the Sun's corona and into interplanetary space following the eruption of a prominence
- Cosmic background radiation (CBR)** Radiation observed to have almost perfectly uniform brightness in all directions in the sky. The CBR is highly red-shifted radiation produced about a million years after the universe began to expand
- Cosmic ray** Extremely energetic ions and electrons that travel through space at almost the speed of light. Most cosmic rays come from great distances and may be produced in supernovas and pulsars
- Cosmic string** A tube-like configuration of energy that is believed to have existed in the early universe
- Cosmology** The study of the universe as a whole

- Crater** A roughly circular feature on the surface of a Solar System body caused by the impact of an asteroid or a comet
- Crater density** The number of craters of a given size per unit area of the surface of a Solar System body
- Crescent phase** The phase of the Moon at which only a small, crescent-shaped portion of the near side of the Moon is illuminated by sunlight. Crescent phase occurs just before and after a new Moon
- Critical density** The value that the average density of the universe must equal or exceed if the universe is closed. If the density of the universe is less than the critical density, the universe will continue to expand forever
- Crust** The outermost layer of a planet or satellite
- Dark matter** Matter that cannot be detected or has not yet been detected by the radiation it emits. The presence of dark matter can be deduced from its gravitational interaction with other bodies
- Declination** The angular distance of a celestial body north or south of the celestial equator. Declination is analogous to latitude in the terrestrial coordinate system
- Degree** A unit used to measured angles. There are  $360^\circ$  in a circle
- Density** The mass of a body divided by its volume
- Differential rotation** Rotation in which the rotation period of a body varies with latitude. Differential rotation occurs for gaseous bodies like the Sun or for planets with thick atmospheres
- Differentiation** The gravitational separation of the interior of a planet into layers according to density. When differentiation occurs inside a molten body, the heavier materials sink to the center and the light materials rise to the surface
- Doppler effect** The change in the frequency of a wave (such as electromagnetic radiation) caused by the motion of the source and observer toward or away from each other
- Dust tail** A comet tail that is luminous because it contains dust that reflects sunlight. The dust in a comet tail is expelled from the nucleus of the comet
- Eclipse** The obscuration of the light from the Sun when the observer enters the Moon's shadow or the Moon when it enters Earth's shadow. Also, the obscuration of a star when it passes behind its binary companion
- Ecliptic** The plane of Earth's orbit around the Sun. As a result of Earth's motion, the Sun appears to move among the stars, following a path that is also called the ecliptic
- Electromagnetic wave** A periodic electrical and magnetic disturbance that propagates through space and transparent materials at the speed of light. Light is an example of an electromagnetic wave
- Electron** A low mass, negatively charged particle that can either orbit a nucleus as part of an atom, or exist independently as part of a plasma

- Element** A substance that cannot be broken down into a simpler chemical substance. Oxygen, nitrogen, and silicon are examples of the approximately 100 known elements
- Ellipse** A closed, elongated curve describing the shape of the orbit that one body follows around another
- Elliptical galaxy** A galaxy having an ellipsoidal shape and lacking spiral arms
- Elongation** Angular distance of a celestial object from the Sun in the sky
- Ephemeris** A tabulation of the positions of a celestial object in sequence for a succession of dates
- Equator** The line around the surface of a rotating body that is midway between the rotational poles. The equator divides the body into northern and southern hemispheres
- Equatorial jet** The high-speed, eastward, zonal wind in the equatorial region of Jupiter's atmosphere
- Equatorial system** A coordinate system, using right ascension and declination as coordinates, used to describe the angular location of bodies in the sky
- Equinox** Either of the two points on the celestial sphere where the ecliptic intersects the celestial equator
- Escape velocity** The speed that an object must have to achieve a parabolic trajectory and escape from its parent body
- Event horizon** The boundary of a black hole. No matter or radiation can escape from within the event horizon
- Exosphere** The outer part of the thermosphere. Atoms and ions can escape from the exosphere directly into space
- Eyepiece** The lens at the viewing end of a telescope
- Fermi paradox** The question that given the known size of the universe, why have we not been contacted and are still alone? Named after Italian physicist Enrico Fermi (1901–1954)
- Filament** A dark line on the Sun's surface when a prominence is seen projected against the solar disk
- Fireball** An especially bright streak of light in the sky produced when an interplanetary dust particle enters Earth's atmosphere, vaporizing the particle and heating the atmosphere
- Focal length** The distance between a mirror or lens and the point at which the lens or mirror brings light to a focus
- Focal plane** The surface where the objective lens or mirror of a telescope forms the image of an extended object
- Focal point** The spot where parallel beams of light striking a lens or mirror are brought to a focus
- Fusion** A nuclear reaction in which two nuclei merge to form a more massive nucleus

- Galactic bulge** A somewhat flattened distribution of stars surrounding the nucleus of the Milky Way
- Galactic disk** A disk of matter containing most of the stars and interstellar matter in the Milky Way
- Galactic equator** The great circle around the sky that corresponds approximately to the center of the glowing band of the Milky Way
- Galactic halo** The roughly spherical outermost component of the Milky Way
- Galactic nucleus** The central region of the Milky Way
- Galaxy** A massive system of stars, gas, and dark matter held together by its own gravity
- Gamma ray** The part of the electromagnetic spectrum having the shortest wavelengths
- Geosynchronous orbit** An orbit in which a satellite's orbital velocity is matched to the rotational velocity of the planet
- Globular cluster** A tightly packed, spherically shaped group of thousands to millions of old stars
- Granule** A bright convective cell or current of gas in the Sun's photosphere. Granules appear bright because they are hotter than the descending gas that separates them
- Gravitational lens** A massive body that bends light passing near it. A gravitational lens can distort or focus the light of background sources of electromagnetic radiation
- Gravity** The force of attraction between two bodies generated by their masses
- Great Attractor** A great concentration of mass toward which everything in our part of the Universe apparently is being pulled
- Greenhouse effect** The blocking of infrared radiation by a planet's atmospheric gases. Because its atmosphere blocks the outward passage of infrared radiation emitted by the ground and lower atmosphere, the planet cannot cool itself effectively and becomes hotter than it would be without an atmosphere
- Habitable zone** The range of distances from a star within which liquid water can exist on the surface of an Earth-like planet
- Helioseismology** A technique used to study the internal structure of the Sun by measuring and analyzing oscillations of the Sun's surface layers
- Heliosphere** The region of space dominated by the solar wind and the Sun's magnetic field
- Hilda asteroids** A group of asteroids with a 3:2 orbital resonance with Jupiter
- Hubble's law** The linear relationship between the recession speeds of galaxies and their distances. The slope of Hubble's law is Hubble's constant
- Hyperbola** A curved path that does not close on itself. A body moving with a speed greater than escape velocity follows a hyperbola

- Igneous rock** A rock formed by solidification of molten material
- Inclination** The tilt of the rotation axis or orbital plane of a body
- Inertia** The tendency of a body at rest to remain at rest and a body in motion to remain in motion at a constant speed and in a constant direction
- Inertial motion** Motion in a straight line at constant speed followed by a body when there are no unbalanced forces acting on it
- Inferior planet** A planet whose orbit lies inside Earth's orbit
- Infrared** The part of the electromagnetic spectrum having wavelengths longer than visible light but shorter than radio waves
- Interferometry** The use of two or more telescopes connected together to operate as a single instrument. Interferometers can achieve high angular resolution if the individual telescopes of which they are made are widely separated
- Interstellar matter** Gas and dust in the space between the stars
- Ion** An atom from which one or more electrons has been removed
- Ionization** The removal of one or more electrons from an atom
- Inferior conjunction** A conjunction of an inferior planet that occurs when the planet is lined up directly between Earth and the Sun
- Ionosphere** The lower part of the thermosphere of a planet in which many atoms have been ionized by ultraviolet solar photons
- Iron meteorite** A meteorite composed primarily of iron and nickel
- Isotopes** Nuclei with the same number of protons but different numbers of neutrons
- Jets (comets & galaxies)** Venting of gas from weakened areas of a comet's nucleus. Also, a narrow beam of gas ejected from a star or the nucleus of an active galaxy
- Kardashev scale** A method of measuring a civilization's level of technological advancement, formulated by Russian astronomer Nikolai Kardashev
- Kepler's laws of planetary motion** Three laws, discovered by Kepler, that describe the motions of the planets around the Sun
- Kinetic energy** Energy of motion. Kinetic energy is given by one half the product of a body's mass and the square of its speed
- Kirkwood gaps** Regions in the Asteroid Belt where a decreased number of asteroids are found, possibly the result of gravitational interactions with Jupiter. Named after astronomer Daniel Kirkwood (1814–1895), who first observed these gaps
- Kuiper Belt** A region beyond Neptune within which a large number of comets are believed to orbit the Sun. Short period comets are thought to originate in the Kuiper Belt
- Lagrangian points** Positions in an orbital configuration where a small body, under the gravitational influence of two larger ones, will remain approximately at rest relative to them. Named after 18th century

- Italian astronomer and mathematician Joseph-Louis Lagrange (1736–1813)
- Latitude** The angular distance of a point north or south of the equator of a body as measured by a hypothetical observer at the center of a body
- Lava** Molten rock at the surface of a planet or satellite
- Libration points** See Lagrangian points
- Light** The visible form of electromagnetic radiation
- Light curve** A plot of the brightness of a body versus time
- Light year** A unit of length equal to the distance that light travels in one year in a vacuum, about 9.46 trillion km
- Limb** The apparent edge of the disk of a celestial body
- Lithosphere** The rigid outer layer of a planet or satellite, composed of the crust and upper mantle
- Local Group** The small cluster of galaxies of which the Milky Way is a member
- Longitude** The angular distance around the equator of a body from a zero point to the place on the equator nearest a particular point as measured by a hypothetical observer at the center of a body
- Luminosity** The rate of total radiant energy output of a body
- Luminosity class** The classification of a star's spectrum according to luminosity for a given spectral type. Luminosity class ranges from 'I' for a supergiant to 'V' for a dwarf (main sequence star)
- Luminosity function** The distribution of stars or galaxies according to their luminosities. A luminosity function is often expressed as the number of objects per unit volume of space that are brighter than a given absolute magnitude or luminosity
- Lunar eclipse** The darkening of the Moon that occurs when the Moon enters Earth's shadow
- M-type asteroid** One of a class of asteroids that have reflectance spectra like those of metallic iron and nickel
- Magellanic Clouds** Two irregular galaxies that are among the nearest neighbors of the Milky Way
- Magma** Molten rock within a planet or satellite
- Magnetosphere** The outermost part of the atmosphere of a planet, within which a very thin plasma is dominated by the planet's magnetic field
- Magnitude** A number, based on a logarithmic scale, used to describe the brightness of a star or other luminous body. Apparent magnitude describes the brightness of a star as we see it. Absolute magnitude describes the intrinsic brightness of a star
- Mantle** The part of a planet lying between its crust and its core
- Maria** A dark, smooth region on the Moon formed by flows of basaltic lava
- Mass** A measure of the amount of matter a body contains. Mass is also a measure of the inertia of a body

- Maunder minimum** A period of few sunspots and low solar activity that occurred between 1640 and 1700
- Mean solar time** Time kept according to the average length of the solar day
- Meridian** The circle on the celestial sphere that passes through the zenith and both celestial poles
- Mesosphere** The layer of a planet's atmosphere above the stratosphere. The mesosphere is heated by absorbing solar radiation
- Messier Objects** List of deep sky objects compiled by Charles Messier (1730–1817)
- Metallic hydrogen** A form of hydrogen in which the atoms have been forced into a lattice structure typical of metals. In the Solar System, the pressures and temperatures required for metallic hydrogen to exist only occur in the cores of Jupiter and Saturn
- Metamorphic rock** A rock that has been altered by heat and pressure
- Meteor** A streak of light produced by a meteoroid moving rapidly through Earth's atmosphere. Friction vaporizes the meteoroid and heats atmospheric gases along the path of the meteoroid
- Meteor shower** A temporary increase in the normal rate at which meteors occur. Meteor showers last for a few hours or days and occur on about the same date each year
- Meteorite** The portion of a meteoroid that reaches Earth's surface
- Meteoroid** A solid interplanetary particle passing through Earth's atmosphere
- Microlensing event** The temporary brightening of a distant object that occurs because its light is focused on Earth by the gravitational lensing of a nearer body
- Micrometeorite** A meteoritic particle less than a 50 millionths of a meter in diameter. Micrometeorites are slowed by atmospheric gas before they can be vaporized, so they drift slowly to the ground
- Milky Way** The galaxy to which the Sun and Earth belong. Seen as a pale, glowing band across the sky
- Mineral** A solid chemical compound
- Minor Planet** Another name for asteroid
- Molecular cloud** A relatively dense, cool interstellar cloud in which molecules are common
- Momentum** A quantity, equal to the product of a body's mass and velocity, used to describe the motion of the body. When two bodies collide or otherwise interact, the sum of their momenta is conserved
- Near Earth Asteroid (NEA) Near Earth Object (NEO)** Bodies who orbits come into close proximity with Earth
- Neutral gas** A gas containing atoms and molecules but essentially no ions or free electrons

- Neutrino** A particle with no charge and probably no mass that is produced in nuclear reactions. Neutrinos pass freely through matter and travel at or near the speed of light
- Neutron** A nuclear particle with no electric charge
- Neutron star** A star composed primarily of neutrons and supported by the degenerate pressure of the neutrons
- Neutronization** A process by which, during the collapse of the core of a star, protons and electrons are forced together to make neutrons
- North celestial pole** The point above Earth's North Pole where the polar axis, if extended outward into space, would intersect the celestial sphere
- Nova** An explosion on the surface of a white dwarf star in which hydrogen is abruptly converted into helium
- Nucleus** An irregularly shaped, loosely packed lump of dirty ice several kilometers across that is a permanent part of a comet
- Objective** The main lens or mirror of a telescope
- Occultation** An event that occurs when one celestial body conceals or obscures another
- Oort Cloud** The region beyond the planetary system, extending to 100,000 AU or more, within which a vast number of comets orbit the Sun. When comets from the Oort Cloud enter the inner Solar System, they become new comets
- Opposition** The configuration of a planet or other body when it appears opposite the Sun in the sky
- Orbit** The elliptical or circular path followed by a body that is bound to another body by the two bodies' mutual gravitational attraction
- Organic molecule** A molecule containing carbon
- Oscillating universe** A theory that the universe goes through continual phases of expansion and contraction
- Outgassing** The release of gas from the interior of a planet or satellite
- Ozone** A molecule consisting of three oxygen atoms. Ozone molecules are responsible for the absorption of solar ultraviolet radiation in Earth's atmosphere
- Parabola** A geometric curve followed by a body that moves with a speed exactly equal to escape velocity
- Parallax** The shift in the direction of a star caused by the change in the position of Earth as it moves around the Sun
- Parsec** A unit of distance equal to about 3.26 light-years
- Penumbra** The outer part of the shadow of a body where sunlight is partially blocked by the body
- Perigee** The point, in an orbit around Earth, that an object is nearest to Earth
- Perihelion** The point in the orbit of a body when the body is closest to the Sun

- Perturbation** A deviation of the orbit of a Solar System body from a perfect ellipse due to the gravitational attraction of one of the planets
- Photon** A massless particle of electromagnetic energy
- Photometry** The measurement of the light emitting from astronomical objects
- Photosphere** The visible region of the atmosphere of the Sun or another star
- Planetesimal** A primordial Solar System body of intermediate size that accreted with other planetesimals to form planets or satellites
- Plasma** A fully or partially ionized gas
- Plasma tail** A narrow, ionized comet tail pointing directly away from the Sun
- Potentially hazardous asteroid (PHA)** Group of asteroids that carry a collision potential with Earth
- Precession** The slow, periodic conical motion of the rotation axis of Earth or another rotating body
- Prominence** A region of cool gas embedded in the corona. Prominences are bright when seen above the Sun's limb, but appear as dark filaments when seen against the Sun's disk
- Proper motion** The rate at which a star appears to move across the celestial sphere with respect to very distant objects
- Protein** A large molecule, consisting of a chain of amino acids, that make up the bodies of organisms
- Proton** A positively charged nuclear particle
- Protostar** A star in the process of formation
- Pulsar** A rotating neutron star with beams of radiation emerging from its magnetic poles. When the beams sweep past Earth, we see "pulses" of radiation
- Quantum mechanics** The branch of physics dealing with the structure and behavior of atoms and their interaction with light
- Quasar** A distant galaxy, seen as it was in the remote past, with a very small, luminous nucleus
- Radial Velocity** The part of the velocity of a body that is directed toward or away from an observer. The radial velocity of a body can be determined by the Doppler shift of its spectral lines
- Radiant** The point in the sky from which the meteors in a meteor shower seem to originate
- Radio galaxy** A galaxy that is a strong source of radio radiation
- Radioactivity** The spontaneous disintegration of the unstable nucleus of an atom
- Reflectivity** **The ability of a surface to reflect electromagnetic waves. The reflectivity of a surface ranges from 0% for a surface that reflects no light to 100% for a surface that reflects all the light falling on it**
- Reflector** A telescope in which the objective is a mirror
- Refractor** A telescope in which the objective is a lens

- Regolith** The surface layer of dust and fragmented rock, caused by meteoritic impacts, on a planet, a satellite, or an asteroid
- Resolution** The ability of a telescope to distinguish fine details of an image
- Resonance** The repetitive gravitational tug of one body on another when the orbital period of one is a multiple of the orbital period of the other
- Retrograde motion** The westward revolution of a Solar System body around the Sun
- Right ascension (RA)** The angular distance of a body along the celestial equator from the vernal equinox eastward to the point on the equator nearest the body. Right ascension is analogous to longitude in the terrestrial coordinate system
- Roche limit or Roche radius** The distance from a planet or other celestial body within which tidal forces from the body would disintegrate a smaller object. Term formulated by French mathematician Édouard Roche (1820-1833)
- S-type asteroid** One of a class of asteroids whose reflectance spectra show an absorption feature due to the mineral olivine
- Sedimentary rock** A rock formed by the accumulation of small mineral grains carried by wind, water, or ice to the spot where they were deposited
- Search for Extra-Terrestrial Intelligence (SETI)** NASA-led project to search for signs of extra-terrestrial intelligence
- Seismic wave** Wave that travels through the interior of a planet or satellite and is produced by an earthquake or its equivalent
- Sidereal clock** A clock that marks the local hour angle of the vernal equinox
- Silicate** A mineral whose crystalline structure is dominated by silicon and oxygen atoms
- Solar constant** The solar energy received by a square meter of surface oriented at right angles to the direction to the Sun at Earth's average distance (1 AU) from the Sun. The value of the solar constant is 1372 watts per square meter
- Solar flare** A brief, sudden brightening of a region of the Sun's atmosphere, probably caused by the abrupt release of magnetic energy
- Spectral class** A categorization, based on the pattern of spectral lines of stars, that groups stars according to their surface temperatures
- Spectrograph** A device used to produce and record a spectrum
- Spectroscopy** The recording and analysis of spectra
- Spicule** A hot jet of gas moving outward through the Sun's chromosphere
- Spiral arm** A long, narrow feature of a spiral galaxy in which interstellar gas, young stars, and other young objects are found

- Spiral galaxy** A flattened galaxy in which hot stars, interstellar clouds, and other young objects form a spiral pattern
- Star** A massive gaseous body that has used, is using, or will use nuclear fusion to produce the bulk of the energy it radiates into space
- Starburst galaxy** A galaxy in which a very large number of stars have recently formed
- Steady state theory** A cosmological theory in which the universe always remains the same in its essential features, such as average density. In order to maintain constant density while expanding, the steady state theory required the continual creation of new matter
- Stellar occultation** The obstruction of the light from a star when a Solar System body passes between the star and the observer
- Stellar parallax** The shift in the direction of a star caused by the change in the position of Earth as it moves around the Sun
- Stellar population** A group of stars that are similar in spatial distribution, chemical composition, and age
- Stony meteorite** A meteorite made of silicate rock
- Stony-iron meteorite** A meteorite made partially of stone and partially of iron and other metals
- Stratosphere** The region of the atmosphere of a planet immediately above the troposphere
- Sublimation** The change of a solid directly into a gaseous state
- Sunspot** A region of the Sun's photosphere that appears darker than its surroundings because it is cooler
- Sunspot cycle** The regular waxing and waning of the number of spots on the Sun. The amount of time between one sunspot maximum and the next is about 11 years
- Sunspot group** A cluster of sunspots
- Superior conjunction** A conjunction that occurs when a planet passes behind the Sun and is on the opposite side of the Sun from Earth
- Supernova** An explosion in which a star's brightness temporarily increases by as much as 1 billion times. Type I supernovas are caused by the rapid fusion of carbon and oxygen within a white dwarf. Type II supernovas are produced by the collapse of the core of a star
- Synchronous rotation** Rotation for which the period of rotation is equal to the period of revolution. An example of synchronous rotation is the Moon, for which the period of rotation and the period of revolution around the Earth are both 1 month
- Synodic month** The length of time (29.53 days) between successive occurrences of the same phase of the Moon
- Synodic period** The length of time it takes a Solar System body to return to the same configuration (opposition to opposition, for example) with respect to Earth and the Sun
- Tektite** A small, glassy material formed by the impact of a large body, usually a meteor or an asteroid

- Terminal velocity** The speed with which a body falls through the atmosphere of a planet when the force of gravity pulling it downward is balanced by the force of air resistance
- Thermosphere** The layer of the atmosphere of a planet lying above the mesosphere. The lower thermosphere is the ionosphere. The upper thermosphere is the exosphere
- Transverse velocity** The part of the orbital speed of a body perpendicular to the Sun between the body and the Sun
- Trojan asteroid** One of a group of asteroids that orbit the Sun at Jupiter's distance and lie  $60^\circ$  ahead of or behind Jupiter in its orbit
- Troposphere** The lowest layer of the atmosphere of a planet, within which convection produces weather
- Ultraviolet** The part of the electromagnetic spectrum with wavelengths longer than X-rays but shorter than visible light
- Umbra** The inner portion of the shadow of a body, within which sunlight is completely blocked
- Universe** All matter and space
- V-type asteroid** The asteroid Vesta, which is unique in having a reflectance spectra resembling those of basaltic lava flows
- Van Allen Belts** Two doughnut-shaped regions in Earth's magnetosphere within which many energetic ions and electrons are trapped
- Velocity** A physical quantity that gives the speed of a body and the direction in which it is moving
- Visual binary star** A pair of stars orbiting a common center of mass in which the images of the components can be distinguished using a telescope and which have detectable orbital motion
- Wavelength** The distance between crests of a wave. For visible light, wavelength determines color
- WIMPS** Weakly interacting massive particles, 10–100 times the mass of a proton
- Wormhole** A speculative feature of a black hole that supposedly connects our universe with another universe
- X-ray** The part of the electromagnetic spectrum with wavelengths longer than gamma rays but shorter than ultraviolet
- X-ray burst** Sporadic burst of x-rays originating in the rapid consumption of nuclear fuels on the surface of the neutron star in a binary system
- Zenith** The point on the celestial sphere directly above an observer
- Zodiacal constellations** The band of constellations along the ecliptic. The Sun appears to move through the twelve zodiacal constellations during a year
- Zodiacal light** The faint glow extending away from the Sun caused by the scattering of sunlight by interplanetary dust particles lying in and near the ecliptic

**Zonal winds** The pattern of winds in the atmosphere of a planet in which the pattern of wind speeds varies with latitude

**Zone of convergence** According to plate tectonics, a plate boundary at which the crustal plates of a planet are moving toward one another. Crust is destroyed in zones of convergence

**Zone of divergence** According to plate tectonics, a plate boundary at which the crustal plates of a planet are moving away from one another. Crust is created in zones of divergence

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