

Glossary

absolute magnitude The actual brightness of a star. A very bright star that is far from Earth may appear dimmer than a less bright star that is closer to Earth. Absolute magnitude describes how bright a star would be if all stars were the same distance from Earth.

acceleration A change in an object's speed or direction. Acceleration happens when an object's speed changes or when its direction changes. On Earth, an object that is falling accelerates 9.8 meters per second, per second (9.8 m/s^2). This means that every falling object, regardless of its mass, falls at a speed of 9.8 m/s during the first second, 19.6 m/s during the second second, 28.4 m/s during the third second, and so on. This rate of acceleration is the same for all objects, ignoring air friction.

apparent magnitude The brightness of a star as viewed from Earth. Apparent magnitude describes how bright a star is in Earth's night sky. The brightest stars have the lowest numbers, including negative numbers. A star with an apparent magnitude of 2 appears dimmer than a star with an apparent magnitude of 1. A star with an apparent magnitude of -0.8 is brighter than one with an apparent magnitude of 0. The Sun's apparent magnitude is about -26.5 .

asteroids Thousands of rocky objects, most of which orbit in a belt between Mars and Jupiter. More than 90,000 asteroids have been identified.

astronomical unit The average distance from Earth to the Sun, or 150 million kilometers (93 million miles). Earth is 1 AU from the Sun. The closest planet to the Sun, Mercury, is 0.39 AU. The farthest planet from the Sun, Pluto, is 39.48 AU.

comet An object made of frozen gases, dust, and bits of rock, which orbits the Sun. Comets have long, bright tails when they pass near the Sun. The tails always point away from the Sun, no matter what direction the comet is moving.

constellation A group of stars that forms a pattern in the sky. Ancient stargazers named the constellations after mythical heroes, animals, or objects. Orion, for example, was named after a hunter in Greek mythology. Today, astronomers use constellations as a map to locate objects in the sky. There are 88 recognized constellations, some of which are visible only from the Southern Hemisphere.

controlled variable Factor that does not change in an experiment. Most experiments have several controlled variables. Controlled variables must stay the same so that you can be certain which factor is causing the results that you see.

dependent variable Factor that is measured in an experiment. The dependent variable changes as a result of changes to the independent variable. For example, if you wanted to see how the mass of a bottle rocket affects how high it can fly, you would vary the mass of the bottle rocket (the independent variable). The height the bottle rocket flies, however, would be the dependent variable, or the factor that was measured.

free fall Appearance of weightlessness that happens when an object is affected by only one force, gravity. Objects in orbit are in free fall. All objects in the space shuttle, including the astronauts, are falling at the same rate. Thus, they seem to float. Gravity still pulls on objects in free fall—if it did not, they would not stay in orbit.

Glossary (continued)

friction The force between two surfaces rubbing against each other, or between a surface and a fluid, such as air. Friction between air and a falling object slows the rate of fall of the object—particularly on objects that have a large surface area compared to their mass. The Moon has no air, so a feather and hammer would fall at the same rate on the Moon.

gravity The force of attraction that exists between all objects. The strength of gravity, also called gravitational force, depends on the distance between the objects and the masses of the objects. Gravity is stronger between objects that are closer together than between objects that are farther apart. Objects with more mass exert a stronger gravitational force than objects with less mass.

independent variable Factor in an experiment that changes. By changing only one variable at a time, and keeping the others the same, you can be more sure which variable is causing your results. Often, scientists repeat experiments, doing each step exactly the same in each test. This helps them to check the accuracy of their results.

Kelvin A temperature scale that begins at the coldest possible temperature, which is absolute zero, or 0 K. Scientists use the Kelvin scale for describing extreme temperatures, such as the temperatures of stars. On the Kelvin scale, 0 K equals -273°C . The degree symbol is not used with the Kelvin scale.

light-year The distance light travels in one year, or 9.5 trillion km (5.9 trillion miles). Light travels at a speed of 300,000 km/s (186,000 mi/s). The distance to the next closest star, Centauri Proxima, is 4.2 light-years. That means it takes 4.2 years for light from that star to reach Earth. It takes 8.5 minutes for light from the Sun to reach Earth.

meteor Rock that enters and burns up in Earth's atmosphere. Meteors are often called shooting stars because they flash across the night sky in a bright streak.

meteorite Rock that strikes the surface of a planet or moon. Meteorites can cause impact craters where they hit. The Barringer Crater in Arizona was formed by a meteorite. It is about 1.2 kilometers in diameter and 200 meters deep.

Newton's first law of motion An object will stay at rest or continue moving in a straight line at a constant speed unless a force acts on it. The tendency of an object to remain at rest or to continue moving is known as inertia. Objects with more mass have greater inertia than objects with less mass.

Newton's third law of motion For every action, there is an equal and opposite reaction. If you push an object, it pushes back with equal force. In the space shuttle, when an astronaut throws an object, the object pushes back on the astronaut. This sends the astronaut backward with a force equal to the throw.

planet A large object in space that, due to gravity, revolves around a nearby star. There are nine planets in our solar system. In order from the Sun, they are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto.

scale model A model that correctly shows relationships between size and distance, but is smaller or larger than the objects it represents. Scale models are often used in science to study very large or very small objects.

Glossary (continued)

solar system The Sun and the objects that orbit it, including the nine planets. The solar system formed some 4.6 billion years ago when a cloud of gas and dust contracted into a large, spinning disk. The Sun formed in the hot, dense center of the disk. The rest of the gas and dust eventually formed planets.

star An object in space that produces its own heat and light. Stars generate their own energy by the process of nuclear fusion. *Nuclear* refers to the nucleus of an atom. *Fusion* means to combine. During nuclear fusion, the nuclei of four hydrogen atoms combine to form the nucleus of one helium atom. Fusion releases enormous amounts of energy, including the light we see from the star.

weight The measure of the force of gravity on an object. Different planets and moons exert different gravitational forces on objects at their surface. For example, the Moon's gravitational force on an object is only about one-sixth that of Earth's. On the Moon, you would weigh only one-sixth as much as you weigh on Earth.