

Glossary

A

- aa** A slow-moving type of lava that hardens to form rough chunks; cooler than pahoehoe. (p. 187)
- abrasion** The grinding away of rock by other rock particles carried in water, ice, or wind. (pp. 266, 213)
- absolute age** The age of a rock given as the number of years since the rock formed. (p. 293)
- absolute magnitude** The brightness of a star if it were a standard distance from Earth. (p. 728)
- abyssal plain** A smooth, nearly flat region of the deep ocean floor. (p. 463)
- acid rain** Rain that is more acidic than normal, caused by the release of molecules of sulfur dioxide and nitrogen oxide into the air. (pp. 415, 507)
- active** Said of a volcano that is erupting or has shown signs of erupting in the near future. (p. 188)
- active solar system** A method of capturing the sun's energy and distributing it using pumps and fans. (p. 335)
- aftershock** An earthquake that occurs after a larger earthquake in the same area. (p. 163)
- air mass** A huge body of air that has similar temperature, pressure, and humidity throughout. (p. 560)
- air pressure** A force that is the result of the weight of a column of air pushing down on an area. (p. 510)
- alloy** A solid mixture of two or more metals. (p. 66)
- alluvial fan** A wide, sloping deposit of sediment formed where a stream leaves a mountain range. (p. 257)
- altitude** Elevation above sea level. (p. 512)
- amphibian** A vertebrate that lives part of its life on land and part of its life in water. (p. 310)
- anemometer** An instrument used to measure wind speed. (p. 537)
- aneroid barometer** An instrument that measures changes in air pressure without using a liquid. Changes in the shape of an airtight metal box cause a needle on the barometer dial to move. (p. 511)
- anticline** An upward fold in rock formed by compression of Earth's crust. (p. 150)
- anticyclone** A high-pressure center of dry air. (p. 566)
- apparent magnitude** The brightness of a star as seen from Earth. (p. 727)
- aquaculture** The farming of saltwater and freshwater organisms. (p. 481)
- aquifer** An underground layer of rock or soil that holds water. (p. 380)
- artesian well** A well in which water rises because of pressure within the aquifer. (p. 381)
- asteroid belt** The region of the solar system between the orbits of Mars and Jupiter, where many asteroids are found. (p. 702)

- asteroids** Objects revolving around the sun that are too small and too numerous to be considered planets. (p. 702)
- asthenosphere** The soft layer of the mantle on which the lithosphere floats. (p. 111)
- astronomy** The study of the moon, stars, and other objects in space. (p. 637)
- astronomer** A scientist who studies the universe beyond Earth. (p. 11)
- atmosphere** The mixture of gases that surrounds Earth. The outermost of the four spheres into which scientists divide Earth. (pp. 22, 498)
- atoll** A ring-shaped coral island found far from land. (pp. 89, 474)
- atom** The smallest unit of an element that retains the properties of that element. (p. 299)
- aurora borealis** A colorful, glowing display in the sky caused when particles from the sun strike oxygen and nitrogen atoms in the ionosphere; also called the Northern Lights. (p. 520)
- autumnal equinox** The day of the year that marks the beginning of fall in the Northern Hemisphere. (p. 643)
- axis** An imaginary line that passes through Earth's center and the North and South poles, about which Earth rotates. (p. 637)

B

- barometer** An instrument used to measure changes in air pressure. (p. 510)
- basalt** A dark, dense, igneous rock with a fine texture, found in oceanic crust. (p. 79)
- base-isolated building** A building mounted on bearings designed to absorb the energy of an earthquake. (p. 166)
- batholith** A mass of rock formed when a large body of magma cooled inside the crust. (p. 197)
- beach** Wave-washed sediment along a coast. (p. 277)
- bedrock** The solid layer of rock beneath the soil. (p. 221)
- benthos** Organisms that live on the bottom of the ocean or another body of water. (p. 467)
- big bang** The initial explosion that resulted in the formation and expansion of the universe. (p. 742)
- binary star** A star system that contains two stars. (p. 737)
- bioluminescence** The production of light by living things. (p. 477)
- biomass fuel** Fuel made from things that once were alive. (p. 337)
- biosphere** All living things. One of the four spheres into which scientists divide Earth. (p. 22)
- black hole** The remains of an extremely massive star pulled into a small volume by the force of gravity. (p. 735)
- brackish** Water that is partly salty and partly fresh, characteristic of estuaries. (p. 470)

caldera The large hole at the top of a volcano formed when the roof of a volcano's magma chamber collapses. (p. 194)

carbon film A type of fossil consisting of an extremely thin coating of carbon on rock. (p. 289)

cast A fossil that is a copy of an organism's shape, formed when minerals seep into a mold. (p. 288)

cementation The process by which dissolved minerals crystallize and glue particles of sediment together into one mass. (p. 83)

chemical rock Sedimentary rock that forms when minerals crystallize from a solution. (p. 86)

chemical weathering The process that breaks down rock through chemical changes. (p. 215)

chlorofluorocarbons Chlorine compounds formerly used in air conditioners, refrigerators, and spray cans; also called CFCs. (p. 626)

chromosphere The middle layer of the sun's atmosphere. (p. 677)

cinder cone A steep, cone-shaped hill or mountain made of volcanic ash, cinders, and bombs piled up around a volcano's opening. (p. 194)

cirrus Wispy, feathery clouds made mostly of ice crystals that form at high levels, above about 6 kilometers. (p. 548)

clastic rock Sedimentary rock that forms when rock fragments are squeezed together under high pressure. (p. 84)

cleavage A mineral's ability to split easily along flat surfaces. (p. 53)

climate The average, year-after-year conditions of temperature, precipitation, winds, and clouds in an area. (pp. 448, 596)

coagulation The process by which particles in a liquid clump together; a step in the water treatment process. (p. 399)

combustion The burning of a fuel. (p. 327)

comet A ball of ice and dust whose orbit is a long, narrow ellipse. (p. 700)

compaction The process by which sediments are pressed together under their own weight. (p. 83)

composite volcano A tall, cone-shaped mountain in which layers of lava alternate with layers of ash and other volcanic materials. (p. 194)

compound A substance in which two or more elements are chemically joined. (p. 48)

compression Stress that squeezes rock until it folds or breaks. (p. 145)

concentration The amount of one substance in a certain volume of another substance. (p. 398)

condensation The process by which a gas, such as water vapor, changes to a liquid, such as water. (p. 547)

conduction The transfer of heat by from one substance to another by direct contact of particles of matter. (pp. 116, 534)

conservation The process of using a resource wisely so it will not be used up. (p. 406)

conservation plowing Soil conservation method in which the dead stalks are left in the ground to hold the soil in place. (p. 233)

constellation A pattern of stars in the sky. (p. 714)

continental (air mass) A dry air mass that forms over land. (p. 560)

continental climate The climate of the centers of continents, with cold winters and warm or hot summers. (p. 598)

continental drift The hypothesis that the continents slowly move across Earth's surface. (pp. 119)

continental glacier A glacier that covers much of a continent or large island. (p. 269)

continental shelf A gently sloping, shallow area of the ocean floor that extends outward from the edge of a continent. (p. 462)

continental slope An incline leading down from the edge of the continental shelf. (p. 462)

contour interval The difference in elevation from one contour line to the next. (p. 37)

contour line A line on a topographic map that connects points of equal elevation. (p. 37)

contour plowing Plowing fields along the curves of a slope to prevent soil loss. (p. 233)

control rod Cadmium rod used in a nuclear reactor to absorb neutrons from fission. (p. 342)

controlled experiment An experiment in which all factors except one are kept constant. (pp. 6, 759)

convection The transfer of heat by movements of a fluid. (pp. 116, 536)

convection current The movement of a fluid, caused by differences in temperature, that transfers heat from one part of the fluid to another. (p. 116)

convergent boundary A plate boundary where two plates move toward each other. (p. 136)

convex lens A piece of transparent glass curved so that the middle is thicker than the edges. (p. 716)

coral reef A structure of calcite skeletons built up by coral animals in warm, shallow ocean water. (p. 88)

core Earth's dense center, made up of the solid inner core and the molten outer core (p. 22); also, the central part of the sun, where nuclear fusion occurs. (p. 676)

Coriolis effect The way Earth's rotation makes winds in the Northern Hemisphere curve to the right and winds in the Southern Hemisphere curve to the left. (pp. 447, 541)

corona The outer layer of the sun's atmosphere. (p. 677)

crater A bowl-shaped area that forms around a volcano's central opening (p. 184); A round pit on the moon's surface. (p. 661)

crest The highest point of a wave. (p. 430)

crop rotation The planting of different crops in a field each year. (p. 234)

crust The layer of rock that forms Earth's outer surface. (pp. 23, 110)

crystal A solid in which the atoms are arranged in a pattern that repeats again and again. (p. 48)

cumulus Clouds that form less than 2 kilometers above the ground and look like fluffy, rounded piles of cotton. (p. 548)

current A large stream of moving water that flows through the ocean. (p. 447)

cyclone A swirling center of low air pressure. (p. 565)

D

data The facts, figures, and other evidence gained through observation. (p. 7)

decomposer An organism that breaks down wastes and dead organisms. (p. 225)

deep-ocean trench A deep valley along the ocean floor through which oceanic crust slowly sinks towards the mantle. (p. 128)

deflation Wind erosion that removes surface materials. (p. 279)

deformation A change in the volume or shape of Earth's crust. (p. 145)

degree A unit used to measure distances around a circle. One degree equals 1/360 of a full circle. (p. 28)

delta A landform made of sediment that is deposited where a river flows into an ocean or lake. (p. 257)

density The amount of mass in a given space; mass per unit volume. (pp. 116, 509)

deposition The process by which sediment settles out of the water or wind that is carrying it, and is deposited in a new location. (pp. 83, 247)

desalination The process of obtaining fresh water from salt water by removing the salt. (p. 408)

desert A region that receives less than 25 centimeters of rain a year. (p. 610)

desertification The advance of desertlike conditions into areas that previously were fertile. (p. 231)

development The construction of buildings, roads, dams, and other structures. (p. 230)

dew point The temperature at which condensation begins. (p. 547)

digitizing Converting information to numbers for use by a computer. (p. 34)

dike A slab of volcanic rock formed when magma forces itself across rock layers. (p. 196)

divergent boundary A plate boundary where two plates move away from each other. (p. 135)

divide A ridge of land that separates one drainage basin or watershed from another. (pp. 255, 369)

dormant Said of a volcano that does not show signs of erupting in the near future. (p. 188)

drainage basin The land area from which a river and its tributaries collect their water. (p. 255)

drought A water shortage caused by long periods of low precipitation in a particular area. (pp. 405, 554)

Dust Bowl The area of the Great Plains where wind erosion caused soil loss during the 1930s. (p. 232)

E

earthquake The shaking that results from the movement of rock beneath Earth's surface. (p. 144)

Earth science The science that focuses on planet Earth and its place in the universe. (p. 10)

eclipse The partial or total blocking of one object by another. (p. 649)

eclipsing binary A star system in which one star periodically blocks the light from another. (p. 738)

efficiency The percentage of energy that is used by a device to perform work. (p. 348)

El Niño An abnormal climate event that occurs every 2 to 7 years in the Pacific Ocean, causing changes in winds, currents, and weather patterns that can lead to dramatic climate changes. (pp. 451, 586)

electromagnetic radiation Energy that travels through space in the form of waves. (p. 715)

electromagnetic wave A form of energy that can travel through space. (p. 526)

element A substance composed of a single kind of atom. (p. 48, 299)

elevation Height above sea level. (p. 19)

ellipse An elongated circle, or oval shape; the shape of the planets' orbits. (p. 673)

elliptical galaxy A galaxy shaped like a flattened ball, containing only old stars. (p. 740)

energy The ability to do work or cause change. (p. 265)

energy conservation The practice of reducing energy use. (p. 347)

environmental scientist A scientist who studies the effects of human activities on Earth's land, air, water, and living things and also tries to solve problems relating to the use of resources. (p. 11)

epicenter The point on Earth's surface directly above an earthquake's focus. (p. 154)

epochs Subdivisions of the periods of the geologic time scale. (p. 305)

equinox The two days of the year on which neither hemisphere is tilted toward or away from the sun. (p. 643)

equator An imaginary line halfway between the North and South poles that circles Earth. (p. 27)

era One of the three long units of geologic time between the Precambrian and the present. (p. 304)

erosion The process by which water, ice, wind, or gravity moves fragments of rock and soil. (pp. 83, 247)

estuary A coastal inlet or bay where fresh water mixes with salty ocean water. (p. 470).

eutrophication The process by which nutrients in a lake build up over time, causing an increase in the growth of algae. (p. 375)

evacuate To move away temporarily. (p. 574)

evaporation The process by which molecules at the surface of a liquid, such as water, absorb enough energy to change to a gaseous state, such as water vapor. (pp. 545, 362)

evolution The process by which all the different kinds of living things have changed over time. (p. 290)

exosphere The outer layer of the thermosphere, extending outward into space. (p. 520)

extinct Said of a volcano that is unlikely to erupt again (p. 188); describes a type of organism that no longer exists anywhere on Earth. (p. 290)

extraterrestrial life Life that arises outside of Earth. (p. 704)

extrusion An igneous rock layer formed when lava flows onto Earth's surface and hardens. (p. 295)

extrusive rock Igneous rock that forms from lava on Earth's surface. (p. 79)

F

fallow Left unplanted with crops. (p. 234)

fault A break or crack in Earth's lithosphere along which the rocks move. (pp. 134, 146)

fault-block mountain A mountain that forms where a normal fault uplifts a block of rock. (p. 148)

filtration The process of passing water through a series of screens that allow the water through, but not larger solid particles. (p. 399)

flash flood A sudden, violent flood that occurs within a few hours, or even minutes, of a heavy rainstorm. (p. 580)

flocs Sticky globs created by adding a chemical such as alum during water treatment. (p. 399)

flood plain A broad, flat valley through which a river flows. (p. 256)

fluorescence The property of a mineral in which the mineral glows under ultraviolet light. (p. 54)

focus The point beneath Earth's surface where rock breaks under stress and causes an earthquake. (p. 154)

fold A bend in rock that forms where part of Earth's crust is compressed. (p. 149)

foliated Term used to describe metamorphic rocks whose grains are arranged in parallel layers or bands. (p. 91)

food web The pattern of overlapping food chains in a habitat or ecosystem. (p. 467)

footwall The block of rock that forms the lower half of a fault. (p. 146)

fossil The preserved remains or traces of living things. (pp. 120, 286)

fossil fuel An energy-rich substance (such as coal, oil, or natural gas) formed from the remains of organisms. (p. 328)

fracture The way a mineral looks when it breaks apart in an irregular way. (p. 53)

frequency The number of waves that pass a specific point in a given amount of time. (p. 430)

friction The force that opposes the motion of one surface as it moves across another surface. (p. 267)

front The area where air masses meet and do not mix. (p. 563)

fuel rod Uranium rod that undergoes fission in a nuclear reactor. (p. 342)



galaxy A giant structure that contains hundreds of billions of stars. (p. 723)

gas giants The name given to the first four outer planets: Jupiter, Saturn, Uranus, and Neptune. (p. 690)

gasohol A mixture of gasoline and alcohol. (p. 337)

gemstone A hard, colorful mineral that has a brilliant or glassy luster. (p. 63)

geocentric A description of the solar system in which all of the planets revolve around Earth. (p. 671)

geologic time scale A record of the geologic events and life forms in Earth's history. (p. 303)

geologist A scientist who studies the forces that make and shape planet Earth. (p. 10)

geology The study of the solid Earth. (p. 23)

geosynchronous orbit The orbit of a satellite that revolves around Earth at the same rate that Earth rotates. (p. 657)

geothermal energy Heat energy in Earth's interior from water or steam that has been heated by magma. (pp. 189, 337)

geyser A type of hot spring that builds up pressure underground and erupts at regular intervals as a fountain of water and steam. (p. 189)

giant star A very large star, much larger than the sun. (p. 726)

glacier A huge mass of ice and snow that moves slowly over the land. (p. 269)

Global Positioning System A method of finding latitude and longitude using satellites. (p. 39)

global warming A gradual increase in the temperature of Earth's atmosphere. (p. 624)

global winds Winds that blow steadily from specific directions over long distances. (p. 541)

globe A sphere that represents Earth's surface. (p. 25)

grain A particle of mineral or other rock that gives a rock its texture. (p. 75)

granite A usually light-colored rock that is found in continental crust. (p. 151)

gravity The attractive force between two objects; its magnitude depends on their masses and the distance between them. (p. 654)

greenhouse effect The process by which heat is trapped in the atmosphere by water vapor, carbon dioxide, methane, and other gases that form a "blanket" around Earth. (pp. 529, 686)

greenhouse gases Gases in the atmosphere that trap heat. (p. 624)

groin A stone or concrete wall built out from a beach to reduce erosion. (p. 433)

groundwater Water that fills the cracks and pores in underground soil and rock layers. (pp. 260, 361)

gully A large channel in soil formed by erosion. (p. 253)

H

habitat The place where an organism lives and that provides the things it needs to survive. (p. 366)

half-life The time it takes for half of the atoms of a radioactive element to decay. (p. 300)

hanging wall The block of rock that forms the upper half of a fault. (p. 146)

hardness The level of the minerals calcium and magnesium in water. (p. 398)

hazardous waste A material that can be harmful if it is not properly disposed of. (p. 239)

heat The energy transferred from a hotter object to a cooler one. (p. 533)

heat transfer The movement of energy from a warmer object to a cooler object. (p. 115, 533)

heliocentric A description of the solar system in which all of the planets revolve around the sun. (p. 672)

hemisphere One half of the sphere that makes up Earth's surface. (p. 27)

Hertzsprung-Russell diagram A graph relating the temperature and brightness of stars. (p. 728)

holdfast A bundle of rootlike strands that attaches algae to the rocks. (p. 474)

hot spot An area where magma from deep within the mantle melts through the crust above it. (p. 181)

hot spring A pool formed by groundwater that has risen to the surface after being heated by a nearby body of magma. (p. 189)

humid subtropical A wet and warm climate area on the edge of the tropics. (p. 612)

humidity A measure of the amount of water vapor in the air. (p. 546)

humus Dark-colored organic material in soil. (p. 222)

hurricane A tropical storm that has winds of 119 kilometers per hour or higher; typically about 600 kilometers across. (p. 572)

hydrocarbon A compound that contains carbon and hydrogen atoms. (p. 328)

hydroelectric power Electricity produced by the kinetic energy of water moving over a waterfall or dam. (pp. 336, 420)

hydrosphere Earth's water and ice. One of the four spheres into which scientists divide Earth. (p. 22)

hydrothermal vent An area where ocean water sinks through cracks in the ocean floor, is heated by the underlying magma, and rises again through the cracks. (p. 478)

hypothesis A possible explanation for a set of observations or answer to a scientific question. (pp. 6, 758)

I

ice ages Cold time periods in Earth's history, during which glaciers covered large parts of the surface. (pp. 270, 620)

ice wedging Process that splits rock when water seeps into cracks, then freezes and expands. (p. 214)

igneous rock A type of rock that forms from the cooling of molten rock at or below the surface. (p. 77)

impermeable Characteristic of materials through which water does not easily pass, such as clay and granite. (p. 379)

incineration The burning of solid waste. (p. 237)

index fossils Fossils of widely distributed organisms that lived during only one short period. (p. 296)

inertia The tendency of a moving object to continue in a straight line or a stationary object to remain in place. (p. 673)

inference An interpretation based on observation and prior knowledge. (p. 5)

infrared radiation A form of energy with wavelengths that are longer than visible light. (p. 527)

inner core A dense sphere of solid iron and nickel in the center of Earth. (p. 111)

inorganic Not formed from living things or the remains of living things. (p. 47)

insulation Building material that blocks heat transfer between the air inside and outside. (p. 349)

intertidal zone The area that stretches from the highest high-tide line on land out to the point on the continental shelf exposed by the lowest low tide. (p. 468)

intrusion An igneous rock layer formed when magma hardens beneath Earth's surface. (p. 295)

intrusive rock Igneous rock that forms when magma hardens beneath Earth's surface. (p. 79)

invertebrate An animal without a backbone. (p. 304)

ionosphere The lower part of the thermosphere, where electrically charged particles called ions are found. (p. 520)

irregular galaxy A galaxy that does not have a regular shape. (p. 740)

irrigation The process of supplying water to areas of land to make them suitable for growing crops. (p. 364)

island arc A string of islands formed by the volcanoes along a deep ocean trench. (p. 180)

isobars Lines on a map joining places that have the same air pressure. (p. 586)

isotherms Lines on a map joining places that have the same temperature. (p. 586)

J

jet streams Bands of high-speed winds about 10 kilometers above Earth's surface. (p. 544)

K

karst topography A type of landscape in rainy regions where there is limestone near the surface, characterized by caverns, sinkholes, and valleys. (p. 261)

kettle A small depression that forms when a chunk of ice is left in glacial till. (p. 272)

key A list of the symbols used on a map. (p. 26)

kinetic energy The form of energy an object has because of its motion. (pp. 265, 420)

L

land breeze The flow of air from land to a body of water. (p. 540)

landform A feature of topography formed by the processes that shape Earth's surface. (p. 19)

landform region A large area of land where the topography is similar. (p. 19)

land reclamation The process of restoring land to a more natural state. (p. 234)

latitude The distance north or south from the equator, measured in degrees. (pp. 28, 542)

lava Magma that reaches the surface; also the rock formed when liquid lava hardens. (p. 57, 178)

lava flow The area covered by lava as it pours out of a volcano's vent. (p. 184)

law of superposition The geologic principle that states that in horizontal layers of sedimentary rock, each layer is older than the layer above it and younger than the layer below it. (p. 294)

leachate Water that has passed through buried wastes in a landfill. (p. 235)

leach field The ground area around a septic tank through which wastewater filters after leaving the tank. (p. 403)

leeward The downwind side of mountains. (p. 601)

levee A long ridge formed by deposits of sediments alongside a river channel. (p. 371)

lightning A sudden spark, or energy discharge, caused when electrical charges jump between parts of a cloud or between a cloud and the ground. (p. 568)

light-year The distance that light travels in one year. (p. 724)

liquefaction The process by which an earthquake's violent movement suddenly turns loose soil into liquid mud. (p. 163)

lithosphere A rigid layer made up of the uppermost part of the mantle and the crust. One of four spheres into which scientists divide Earth. (pp. 22, 110)

litter The loose layer of dead plant leaves and stems on the surface of the soil. (p. 224)

load The amount of sediment that a river or stream carries. (p. 266)

loam Rich, fertile soil that is made up of about equal parts of clay, sand, and silt. (p. 222)

local winds Winds that blow over short distances. (p. 538)

loess A wind-formed deposit made of fine particles of clay and silt. (p. 280)

longitude The distance in degrees east or west of the prime meridian. (p. 29)

longshore drift The movement of water and sediment along a beach caused by waves coming into shore at an angle. (pp. 277, 432)

lunar eclipse The blocking of sunlight to the moon that occurs when Earth is directly between the sun and moon. (p. 651)

luster The way a mineral reflects light from its surface. (p. 51)

M

magma The molten mixture of rock-forming substances, gases, and water that makes up part of Earth's mantle. (pp. 57, 178)

magma chamber The pocket beneath a volcano where magma collects. (p. 184)

magnitude The measurement of an earthquake's strength based on seismic waves and movement along faults. (p. 157)

main sequence An area on the Hertzsprung-Russell diagram that runs from the upper left to the lower right and includes more than 90 percent of all stars. (p. 728)

mammal A warm-blooded vertebrate that feeds its young milk. (p. 317)

manipulated variable The one factor that a scientist changes during an experiment; also called the independent variable. (pp. 7, 759)

mantle The layer of hot, solid material between Earth's crust and core. (pp. 22, 110)

map A model of all or part of Earth's surface as seen from above. (p. 25)

map projection A framework of lines that helps to show landmasses on a flat surface. (p. 30)

maria Dark, flat regions on the moon's surface. (p. 661)

marine climate The climate of some coastal regions, with relatively warm winters and cool summers. (p. 598)

maritime (air mass) A humid air mass that forms over oceans. (p. 560)

mass extinction When many types of living things become extinct at the same time. (p. 311)

mass movement Any one of several processes by which gravity moves sediment downhill. (p. 247)

meander A looping curve formed in a river as it winds through its flood plain. (p. 256)

mechanical weathering The type of weathering in which rock is physically broken into smaller pieces. (p. 213)

meltdown A dangerous condition caused by overheating inside a nuclear reactor. (p. 343)

Mercalli scale A scale that rates earthquakes according to their intensity and how much damage they cause. (p. 157)

mercury barometer An instrument that measures changes in air pressure, consisting of a glass tube part filled with mercury, with its open end resting in a dish of mercury. Air pressure pushing on the mercury in the dish forces the mercury in the tube higher. (p. 510)

mesosphere The middle layer of Earth's atmosphere; the layer in which most meteoroids burn up. (p. 516)

metamorphic rock A type of rock that forms from an existing rock that is changed by heat, pressure, or chemical reactions. (p. 77)

meteor A streak of light in the sky produced by the burning of a meteoroid in Earth's atmosphere. (p. 703)

meteorite A meteoroid that has hit Earth's surface. (p. 703)

meteoroid A chunk of rock or dust in space. (p. 703)

meteorologists Scientists who study the causes of weather and try to predict it. (pp. 11, 584)

microclimate The climate characteristic of a small, specific area; it may be different from the climate of the surrounding area. (p. 601)

mid-ocean ridge The undersea mountain chain where new ocean floor is produced; a divergent plate boundary. (pp. 124, 463)

mineral A naturally occurring, inorganic solid that has a crystal structure and a definite chemical composition. (p. 47)

Mohs hardness scale A scale ranking ten minerals from softest to hardest; used in testing the hardness of minerals. (p. 49)

mold A fossil formed when an organism buried in sediment dissolves, leaving a hollow area. (p. 288)

moment magnitude scale A scale that rates earthquakes by estimating the total energy released by an earthquake. (p. 158)

monsoons Sea and land breezes over a large region that change direction with the seasons. (p. 540)

moraine A ridge formed by the till deposited at the edge of a glacier. (p. 271)

mountain A landform with high elevation and high relief. (p. 20)

mountain range A series of mountains that have the same general shape and structure. (p. 20)

municipal solid waste Waste produced in homes, businesses, and schools. (p. 235)

N

neap tide A tide with the least difference between low and high tide that occurs when the sun and moon pull at right angles to each other. (p. 437)

nebula A large amount of gas and dust in space, spread out in an immense volume. (p. 733)

nekton Free-swimming animals that can move throughout the water column. (p. 467)

neritic zone The region of shallow water in the ocean that extends from the low-tide line out to the edge of the continental shelf. (p. 473)

neutron star A tiny star that remains after a supernova explosion. (p. 734)

nodule A black, potato-shaped lump formed when metals build up around pieces of shell on the ocean floor. (p. 481)

nonpoint source A widely spread source of pollution, such as road runoff, that is difficult to link to a specific point of origin. (p. 413)

nonrenewable resource A natural resource that is not replaced as it is used. (p. 332)

normal fault A type of fault where the hanging wall slides downward; caused by tension in the crust. (p. 146)

nuclear fission The splitting of an atom's nucleus into smaller nuclei. (p. 341)

nuclear fusion The combining of two atomic nuclei into a single larger nucleus, as when two hydrogen atoms join together to form helium, releasing energy. (p. 344, 676)

nucleus The central core of an atom that contains the protons and neutrons. (p. 341)



observation Using all five senses to gather information. (p. 5)

observatory A building that contains one or more telescopes. (p. 717)

oceanographer A scientist who studies Earth's oceans. (p. 11)

occluded Cut off, as the warm air mass at an occluded front is cut off from the ground by cooler air beneath it. (p. 565)

open-ocean zone The area of the ocean beyond the edge of the continental shelf. (p. 473)

operational definition A statement that describes how a particular variable is to be measured or a term is to be defined. (p. 759)

orbit The path of an object as it revolves around another object in space. (p. 637)

ore Rock that contains a metal or economically useful mineral. (p. 63)

organic rock Sedimentary rock that forms where remains of organisms are deposited in thick layers. (p. 85)

outer core A layer of molten iron and nickel that surrounds the inner core of Earth. (p. 111)

oxbow lake The crescent-shaped, cutoff body of water that remains after a river carves a new channel. (p. 256)

ozone A form of oxygen that has three oxygen atoms in each molecule instead of the usual two. (p. 500)



P wave A type of seismic wave that compresses and expands the ground. (p. 155)

pahoehoe A hot, fast-moving type of lava that hardens to form smooth, ropelike coils. (p. 187)

paleontologist A scientist who studies fossils to learn about organisms that lived long ago. (p. 286)

Pangaea The name of the single landmass that broke apart 225 million years ago and gave rise to today's continents. (p. 119)

parallax The apparent change in position of an object when seen from different places. (p. 724)

passive solar system A method of converting solar energy into heat without pumps or fans. (p. 335)

penumbra The part of a shadow surrounding the darkest part. (p. 650)

period One of the units of geologic time into which geologists divide eras. (p. 305)

permafrost Permanently frozen soil found in the tundra climate region. (p. 614)

permeable Characteristic of materials such as sand and gravel which allow water to pass easily through them. (pp. 217, 379)

pesticide A chemical intended to kill insects and other organisms that damage crops. (p. 416)

petrified fossil A fossil in which minerals replace all or part of an organism. (p. 287)

petrochemical Compound made from oil. (p. 331)

petroleum Liquid fossil fuel; oil. (p. 330)

pH How acidic or basic a substance is, measured on a scale of 1 (very acidic) to 14 (very basic). (p. 397)

phase One of the different shapes of the moon as seen from Earth. (p. 647)

photochemical smog A brownish haze that is a mixture of ozone and other chemicals, formed when nitrogen oxides, hydrocarbons, and other pollutants react with one another in the presence of sunlight. (p. 506)

photosphere The inner layer of the sun's atmosphere. (p. 677)

photosynthesis The process by which plants use water, plus carbon dioxide and energy from the sun, to make food. (p. 366)

pipe A long tube through which magma moves from the magma chamber to Earth's surface. (p. 184)

pixels The tiny dots in a satellite image. (p. 33)

plain A landform made up of flat or gently rolling land with low relief. (p. 20)

plankton Tiny algae and animals that float in water and are carried by waves and currents. (p. 467)

plate A section of the lithosphere that slowly moves over the asthenosphere, carrying pieces of continental and oceanic crust. (p. 132)

plate tectonics The theory that pieces of Earth's lithosphere are in constant motion, driven by convection currents in the mantle. (p. 133)

plateau A landform that has a more or less level surface and is elevated high above sea level. (pp. 21, 151)

plucking The process by which a glacier picks up rocks as it flows over the land. (p. 270)

point source A specific source of pollution that can be identified, such as a pipe. (p. 413)

polar (air mass) A cold air mass that forms north of 50° north latitude or south of 50° south latitude and has high air pressure. (p. 560)

polar zones The areas near both poles, from about 66.5° to 90° north and 66.5° to 90° south latitudes. (p. 597)

pollutants Harmful substances in the air, water, or soil. (p. 504)

pores Tiny openings in and between particles of rock and soil which may contain air or water. (p. 379)

porphyritic texture An igneous rock texture in which large crystals are scattered on a background of much smaller crystals. (p. 79)

potential energy Energy that is stored and available to be used later. (pp. 265, 420)

precipitation Forms of water such as rain, snow, sleet, or hail that fall from clouds and reach Earth's surface. (pp. 551, 362)

pressure The amount of force pushing on a surface or area. (pp. 109, 509)

prime meridian The line that makes a half circle from the North Pole to the South Pole, passing through Greenwich, England. (p. 28)

prominence A loop of gas that protrudes from the sun's surface, linking parts of sunspot regions. (p. 680)

protostar A contracting cloud of gas and dust; the earliest stage of a star's life. (p. 733)

psychrometer An instrument used to measure relative humidity, consisting of a wet-bulb thermometer and a dry-bulb thermometer. (p. 546)

pulsar A neutron star that produces radio waves. (p. 732)

pyroclastic flow The expulsion of ash, cinders, bombs, and gases during an explosive volcanic eruption. (p. 188)

Q

quasar A distant galaxy with a black hole at its center. (p. 736)

R

radiation The direct transfer of energy through empty space by electromagnetic waves. (pp. 115, 526)

radioactive decay The breakdown of a radioactive element, releasing particles and energy. (p. 300)

radio telescope A device used to detect radio waves from objects in space. (p. 716)

rain forest A forest in the tropical wet climate zone that gets plenty of rain all year. (p. 607)

rain gauge An instrument used to measure the amount of precipitation, consisting of an open-ended can topped by a collecting funnel and having a collecting tube and measuring scale inside. (p. 553)

reactor vessel The part of a nuclear reactor where nuclear fission occurs. (p. 342)

recharge New water that enters an aquifer from the surface. (p. 381)

recycling The process of reclaiming and reusing raw materials. (p. 237)

refinery A factory where crude oil is separated into fuels and other products. (p. 331)

reflecting telescope A telescope that uses one or more mirrors to gather light. (p. 716)

refracting telescope A telescope that uses convex lenses to gather and focus light. (p. 716)

relative age The age of a rock compared to the ages of rock layers. (p. 293)

relative humidity The percentage of water vapor in the air compared to the maximum amount the air can hold at that temperature. (p. 546)

relief The difference in elevation between the highest and lowest parts of an area. (p. 19)

renewable resource A resource that is naturally replaced in a relatively short time. (p. 333)

reptile A vertebrate with scaly skin that lays eggs with tough, leathery shells. (p. 311)

reserve A known deposit of fuels. (p. 329)

reservoir A natural or artificial lake that stores water for human use. (p. 374)

responding variable The factor that changes as a result of changes to the manipulated variable in an experiment; also called the dependent variable. (pp. 7, 759)

retrograde rotation The spinning motion of a planet from east to west, opposite to the direction of rotation of most planets and moons. (p. 685)

reverse fault A type of fault where the hanging wall slides upward; caused by compression in the crust. (p. 147)

revolution The movement of an object around another object. (p. 637)

Richter scale A scale that rates seismic waves as measured by a mechanical seismograph. (p. 157)

rift valley A deep valley that forms where two plates move apart. (p. 135)

rill A tiny groove in soil made by flowing water. (p. 253)

Ring of Fire A major belt of volcanoes that rims the Pacific Ocean. (p. 179)

rip current A rush of water that flows rapidly back to sea through a narrow opening. (p. 432)

river A large stream. (pp. 254, 432)

rock The material that forms Earth's hard surface. (p. 23)

rock cycle A series of processes on the surface and inside Earth that slowly changes rocks from one kind to another. (p. 94)

rotation The spinning motion of a planet about its axis. (p. 637)

runoff Water that flows over the ground surface rather than soaking into the ground. (p. 253)



S wave A type of seismic wave that moves the ground up and down or side to side. (p. 155)

salinity The total amount of dissolved salts in a water sample. (p. 439)

sand dune A deposit of wind-blown sand. (p. 278)

sandbar A ridge of sand deposited by waves as they slow down near shore. (p. 432)

sanitary landfill A landfill that holds nonhazardous waste such as municipal solid waste and construction debris. (p. 236)

satellite Any object that revolves around another object in space. (p. 656)

satellite images Pictures of the land surface based on computer data collected from satellites. (p. 32)

saturated zone A layer of permeable rock or soil in which the cracks and pores are completely filled with water. (p. 379)

savanna A tropical grassland with scattered clumps of trees; found in the tropical wet-and-dry climate zone close to the equator. (p. 610)

scale Used to compare distance on a map or globe to distance on Earth's surface. (p. 25)

scattering Reflection of light in all directions. (p. 528)

science A way of learning about the natural world and the knowledge gained through that process. (p. 4)

scientific inquiry The diverse ways in which scientists explore problems and seek to answer questions about the natural world. (p. 4)

scientific theory A well-tested concept that explains a wide range of observations. (pp. 8, 133)

sea breeze The flow of air from an ocean or lake to the land. (p. 540)

sea-floor spreading The process by which molten material adds new oceanic crust to the ocean floor. (pp. 125)

seamount A mountain on the ocean floor that is completely underwater. (p. 463)

sediment Small, solid particles of material from rocks or organisms which are moved by water or wind, resulting in erosion and deposition. (pp. 82, 247)

sedimentary rock A type of rock that forms when particles from other rocks or the remains of plants and animals are pressed and cemented together. (pp. 77, 287)

seismic wave A vibration that travels through Earth carrying the energy released during an earthquake. (pp. 108, 154)

seismograph A device that records ground movements caused by seismic waves as they move through Earth. (p. 156)

septic tank An underground tank containing bacteria that treats wastewater as it passes through. (p. 403)

sewage Water containing human wastes. (p. 401)

shearing Stress that pushes a mass of rock in opposite directions. (p. 145)

shield volcano A wide, gently sloping mountain made of layers of lava and formed by quiet eruptions. (p. 194)

silica A material that is formed from the elements oxygen and silicon; silica is found in magma. (pp. 80, 186)

sill A slab of volcanic rock formed when magma squeezes between layers of rock. (p. 196)

sludge Deposits of fine solids that settle out from wastewater during the treatment process. (p. 402)

smelting The process by which ore is melted to separate the useful metal from other elements. (p. 66)

sod A thick mass of grass roots and soil. (p. 232)

soil The loose, weathered material on Earth's surface in which plants can grow. (p. 221)

soil conservation The management of soil to prevent its destruction. (p. 233)

soil horizon A layer of soil that differs in color and texture from the layers above or below it. (p. 223)

solar eclipse The blocking of sunlight to Earth that occurs when the moon is between the sun and Earth. (p. 650)

solar flare An explosion of hydrogen gas from the sun's surface that occurs when loops in sunspot regions suddenly connect. (p. 680)

solar wind A stream of electrically charged particles produced by the sun's corona. (p. 678)

solstice The two days of the year on which the noon sun is directly overhead at either 23.5° South or 23.5° North. (p. 642)

solution A mixture in which one substance is dissolved in another. (p. 58)

sonar A system that determines the distance of an object under water by recording echoes of sound waves; gets its name from sound navigation and ranging. (pp. 124, 461)

spectrograph An instrument that separates light into colors and photographs the resulting spectrum. (p. 719)

spectrum The range of wavelengths of electromagnetic waves. (p. 715)

spiral galaxy A galaxy whose arms curve outward in a pinwheel pattern. (p. 740)

spit A beach formed by longshore drift that projects like a finger out into the water. (p. 277)

spring A place where groundwater bubbles or flows out of cracks in the rocks. (p. 380)

spring tide A tide with the greatest difference between high and low tide that occurs when the sun and the moon are aligned in a line with Earth. (p. 436)

stalactite A calcite deposit that hangs from the roof of a cave. (p. 261)

stalagmite A cone-shaped calcite deposit that builds up from the floor of a cave. (p. 261)

steppe A prairie or grassland found in the semiarid climate region. (p. 611)

storm A violent disturbance in the atmosphere. (p. 567)

storm surge A dome of water that sweeps across the coast where a hurricane lands. (p. 574)

stratosphere The second-lowest layer of Earth's atmosphere; the ozone layer is located in the upper stratosphere. (p. 516)

stratus Clouds that form in flat layers. (p. 548)

streak The color of a mineral's powder. (p. 50)

stream A channel through which water is continually flowing downhill. (p. 254)

stress A force that acts on rock to change its shape or volume. (p. 144)

strike-slip fault A type of fault where rocks on either side move past each other sideways with little up-or-down motion. (p. 146)

subarctic A climate zone that lies north of the humid continental climate zone, with short, cool summers and long, bitterly cold winters. (p. 613)

subduction The process by which oceanic crust sinks beneath a deep-ocean trench and back into the mantle at a convergent plate boundary. (p. 128)

submersible An underwater vehicle built of strong materials to resist pressure at depth. (p. 443)

subsoil The layer of soil beneath the topsoil that contains mostly clay and other minerals. (p. 223)

sunspots Dark, cooler regions on the surface of the sun. (pp. 621, 678)

supernova The explosion of a dying giant or supergiant star. (p. 734)

surface wave A type of seismic wave that forms when P waves and S waves reach Earth's surface. (p. 156)

symbols On a map, pictures used by mapmakers to stand for features on Earth's surface. (p. 26)

syncline A downward fold in rock formed by compression in Earth's crust. (p. 150)



telescope A device built to study distant objects by making them appear closer. (p. 661)

temperate zones The area between the tropical and polar zones, from about 23.5° to 66.5° north and 23.5° to 66.5° south latitudes. (p. 597)

temperature The average amount of energy of motion in the molecules of a substance. (p. 533)

tension Stress that stretches rock so that it becomes thinner in the middle. (p. 145)

terrestrial planets The name given to the four inner planets: Mercury, Venus, Earth, and Mars. (p. 682)

texture The size, shape, and pattern of a rock's grains. (p. 75)

thermal energy The energy of motion in the molecules of a substance. (p. 533)

thermometer An instrument used to measure temperature, consisting of a thin, glass tube with a bulb on one end that contains a liquid (usually mercury or alcohol). (p. 533)

thermosphere The outermost layer of Earth's atmosphere. (p. 519)

tides The daily rise and fall of Earth's waters on shores. (pp. 435, 654)

till The sediments deposited directly by a glacier. (p. 271)

topographic map A map that shows the surface features of an area. (p. 35)

topography The shape of the land determined by elevation, relief, and landforms. (p. 18)

topsoil Mixture of humus, clay, and other minerals that forms the crumbly, topmost layer of soil. (p. 223)

tornado A rapidly whirling, funnel-shaped cloud that reaches down from a storm cloud to touch Earth's surface, usually leaving a destructive path. (p. 569)

trace fossils A type of fossil that provides evidence of the activities of ancient organisms. (p. 289)

transform boundary A plate boundary where two plates move past each other in opposite directions. (p. 134)

transpiration The process by which plants release water vapor through their leaves. (p. 362)

trench A deep canyon in the ocean floor. (p. 464)

tributary A stream that flows into a larger stream. (pp. 254, 368)

tropical (air mass) A warm air mass that forms in the tropics and has low air pressure. (p. 560)

tropical zone The area near the equator, between about 23.5° north latitude and 23.5° south latitude. (p. 597)

troposphere The lowest layer of Earth's atmosphere, where weather occurs. (p. 515)

trough The lowest point of a wave. (p. 431)

tsunami A giant wave caused by an earthquake on the ocean floor. (p. 164)

tundra A polar climate region, found across northern Alaska, Canada, and Russia, with short, cool summers and bitterly cold winters. (p. 614)

turbulence A type of movement of water in which, rather than moving downstream, the water moves every which way. (p. 268)



ultraviolet radiation A form of energy with wavelengths that are shorter than visible light. (p. 527)

umbra The darkest part of a shadow. (p. 650)

unconformity A place where an old, eroded rock surface is in contact with a newer rock layer. (p. 296)

universe All of space and everything in it. (p. 723)

unsaturated zone A layer of rocks and soil above the water table in which the pores contain air as well as water. (p. 379)

upwelling An upward flow of cold water from the ocean depths. (p. 449)



valley glacier A long, narrow glacier that forms when snow and ice build up in a mountain valley. (p. 269)

variable Any factor that can change in an experiment. (pp. 7, 759)

vein A narrow slab of a mineral that is sharply different from the surrounding rock. (p. 58)

vent The opening through which molten rock and gas leave a volcano. (p. 184)

vernal equinox The day of the year that marks the beginning of spring in the Northern Hemisphere. (p. 643)

vertebrate An animal with a backbone. (p. 310)

visible light Electromagnetic radiation that can be seen with the unaided eye. (p. 715)

volcanic neck A deposit of hardened magma in a volcano's pipe. (p. 196)

volcano A weak spot in the crust where magma has come to the surface. (p. 178)



water cycle The continuous process by which water moves from Earth's surface to the atmosphere and back, passing through the living and nonliving parts of the environment. (p. 362)

water pollution The addition of any substance that has a negative effect on water or the living things that depend on the water. (p. 411)

water quality The degree of purity of water, determined by measuring the substances in water, besides water molecules. (p. 396)

water table The top of the saturated zone, or depth to the groundwater in an aquifer. (p. 379)

water vapor The invisible, gaseous form of water. (pp. 360, 501)

watershed The land area that supplies water to a river system. (p. 369)

wave The movement of energy through a body of water. (p. 429)

wave height The vertical distance from the crest of a wave to the trough. (p. 431)

wavelength The horizontal distance between two wave crests. (pp. 430, 715)

weather The condition of Earth's atmosphere at a particular time and place. (p. 498)

weathering The chemical and physical processes that break down rock at Earth's surface. (p. 212)

wetland An area of land that is covered with a shallow layer of water during some or all of the year. (p. 384)

white dwarf The remaining hot core of a star after its outer layers have expanded and drifted out into space. (p. 734)

wind The horizontal movement of air from an area of high pressure to an area of lower pressure. (p. 536)

wind-chill factor Increased cooling caused by the wind. (p. 537)

windward The side of mountains that faces the oncoming wind. (p. 601)