

Glossary

How to Use This Glossary

This Glossary provides the definitions of the key terms that are shown in **boldface** type in the textbook (instructional boldfaced words such as “observe,” and “gather,” used in investigations are not included). Other terms that are not critical to your understanding, but that you may wish to know, are also included in the Glossary. The Glossary entries also show the page number where you can find the boldfaced words. The pronunciations of terms that are difficult to say appear in square brackets after the terms. Use the following pronunciation key to read them:

a = mask, back
ae = same, day
air = stare, where
e = met, less
ee = leaf, clean

ih = ice, life
i = simple, this
o = stop, thought
oh = home, loan
oo = food, boot

uh = Sun, caption
uhr = insert, turn
yoo = cute, human

A

abiotic [AE-bih-o-tik] a term applied to non-living things in the environment; for example, air, water, and soil are abiotic (38)

abrasion the wearing down of rocks by wind, ice, waves, and running water (377)

acid rain rain that contains higher than normal levels of acid; caused by waste gases released into the atmosphere by industries and automobiles; damaging to the environment (52)

active of a volcano, the stage when materials such as lava, smoke, and ash are released into the environment

active solar heating a type of heating that uses mechanical devices like fans to distribute stored thermal energy

adapted well-suited (10)

adaptation an inherited characteristic that helps an organism survive in its environment (10)

adhesive a sticky substance, such as glue or epoxy cement, that is used to hold objects or materials together (292)

aesthetics [e-STHE-tiks] a branch of philosophy that studies the principles of beauty; the properties of an object that make it pleasing to the senses (284)

aftershocks smaller ground movements caused by seismic waves moving outward from an earthquake's focus (396)

anther the tip of a stamen (male reproductive organ of a plant) (122)

anticline an upfold of rock layers

area the amount of surface; measured in square units such as cm²

asexual (vegetative) reproduction a type of reproduction that occurs when a “parent” plant grows new plants from its roots, stems, or leaves (118)

ash-and-cinder cone the smallest of the three main types of volcanoes, having steep sides formed by layers of ash and rock

atmosphere the air surrounding the earth

B

balance a device to measure mass; many balances work by using the force of gravity (299)

balance refers to the condition of a stable structure, in which external and internal forces are balanced

bar graph a diagram consisting of horizontal or vertical bars that represent (often numerical) data

baseline data information gathered by scientists to be used as a starting point to compare changes in the environment (74)

bedrock unweathered rock beneath the soil (396)

bending force a combination of push (compression) and pull (tension) forces that results in a temporary curving change in the shape of some structures (308)

bioaccumulation movement of pollutants through levels of a food chain so that greater quantities are retained with movement up the food chain (54, 170)

biological community

see community

biological control a method of controlling insect pests using their natural enemies (61, 173)

biological evidence the type of evidence obtained from living or non-living organisms

biological population

see population

biological weathering the break-up or disintegration of rocks through the physical or chemical effects of living organisms (374)

biomass the total mass of living matter; often expressed in terms of dry weight per unit area (43)

biome a region of land that contains certain kinds of organisms, particularly plants; determined by climate; examples are desert, grassland, and forest

biosphere the thin area around Earth that can sustain life; made up of the atmosphere, the hydrosphere, and the lithosphere

biotic [bih-O-tik] a term applied to living things in the environment, such as humans, plants, birds, animals, and insects (38)

bitumen a heavy, almost solid form of petroleum: some bitumen deposits are found near the surface of Earth and can be mined or heated and pumped to the surface (428)

boiling rapid vaporization occurring at a specific temperature called the boiling point

boiling point the temperature at which a liquid begins to boil and change into a gas or a vapour

brace a device used to add strength to a structure, usually by forming a rigid triangle at the point where pieces come together at a right angle

bromthymol blue [BROM-thih-mol] a chemical indicator that changes colour (from blue to green to yellow) when carbon dioxide is present

buckle of a material, to fold under a compressive force (316)

buttress a slanted brace that supports part of a structure, transferring its thrust line to the ground along an angle

C

cantilever a horizontal board or other span supported at one end only, by a very strong column (e.g., a diving board)

capacity the largest amount that can be held by a container (usually measured in litres or millilitres)

capacity unit unit used to measure the volume of liquids; an example is the litre (L)

carbon cycle the cycle in which carbon is used and reused through the ecosystem (49)

carbonaceous film [car-bon-AE-shuhss] a type of fossil found in sedimentary rock when organic material is compressed, leaving a thin carbon film (418)

carnivore an animal that eats other animals; examples are lynx, wolf, hawk

cast a type of fossil in which sediments or minerals have filled a mould and hardened into rock (420)

Celsius (C) scale the most common scale for measuring temperature; on the Celsius scale, water at sea level boils at 100° and freezes below 0° (194)

cementation a process by which particles are held together by another material (365)

Cenozoic Era [sen-oh-ZOH-ik E-ruh] the fourth and current era on the geologic time scale; the era in which humans evolved (425)

centre of gravity the point at which all of the gravitational force of an object may be considered to act (332)

chemical control the use of herbicides, insecticides, and fungicides to control weeds, insects, and fungi

chemical weathering the break-up or disintegration of rocks through the effects of chemical reactions upon them (374)

chlorophyll a pigment in plants that makes leaves green (110)

circle graph a circle divided into sections (like pieces of a pie) to represent data; also called a pie chart

classification (or biological key) a list of alternatives (e.g., backbone or no backbone) used by scientists as an aid in identifying an unknown plant or animal

clear-cut removing all of the trees from a particular area

cleavage of a mineral, the characteristic of splitting along smooth, flat planes (357)

cogeneration [coh-jen-uh-*AE*-shuhn] a method of energy conservation by which waste heat or energy from one industry is used by another industry (247)

cold-blooded of an organism, having a body temperature that varies with the temperature of its environment

commensalism a symbiotic relationship between two different types of organisms in which one partner benefits and the other neither benefits nor loses (15)

community an association of different populations of organisms in a particular environment or geographic area

compaction the process by which sedimentary rock is formed from sediment, through the weight and pressure of water and other sediment

complex mountains mountains that are formed by the combined processes of folding and faulting (414)

composite of materials, made up of several different materials, with different properties, to fulfil a specific purpose (286)

compost the part of soil composed of dead plant matter (371)

compression force a force that compacts or squeezes a material (307)

compressive strength a measure of the largest compression force that a material can withstand before changing shape or breaking apart (307)

concept map a diagram comprising words or phrases in circles or boxes and connecting lines; used to show various relationships among concepts; can also contain references to events, objects, laws, themes, classroom activities, or other items or patterns related to the concepts

condense change from a gas or vapour into a liquid (220)

condensation the process of changing from a gas or vapour to a liquid; clouds, fog, and dew are examples of condensation (51)

condensation point the temperature at which a gas or vapour begins to change into a liquid; the condensation point of a gas is the same temperature as the boiling point of the material in its liquid state

conifers types of softwood (e.g., hemlock and fir) which have needles and cones

conservation of energy the law stating that the amount of energy within a system always remains the same if the system is left undisturbed

consumers organisms that eat the food made by producers; can be either herbivores, carnivores, or omnivores (40)

continental drift a theory about Earth's structure; according to this theory, the continents have slowly changed their positions over time; the slow movement of continents (384)

contract of substances, to shrink or decrease in volume (210)

control in a scientific experiment, a standard to which the results are compared; often necessary in order to draw a valid conclusion; ensures a fair test

controlled variable in an experiment, a condition that is not allowed to change

convection a process by which a warm fluid moves from place to place carrying thermal energy (230)

convection current a flow resulting from the rising of warm materials and the sinking of cooler denser materials (392)

converging plates two or more plates colliding (390)

convergent boundary an area on Earth's crust where two plates are pushing against each other

co-ordinate graph a grid that has data points named as ordered pairs of numbers; for example (4, 3)

core the innermost part of Earth; made of iron and nickel in solid and liquid form

criteria a set of standards or expectations; specifications for a design

crop rotation a practice whereby crops are rotated annually through various fields, so that each crop is grown in a different field and pests have little opportunity to establish themselves

cross pollination a process whereby the eggs of one plant are fertilized by sperm from another plant of the same species

crust the thin, outermost layer of Earth (354)

crystal the building block of minerals; crystals occur naturally and have straight edges, flat sides, and regular angles (355)

cubic units the units used to report the volume of a substance; for example, cm³

cuttings a process used in plant reproduction whereby small sections of leaf and stem are cut from a parent plant and grow into new plants

cycle concept map an events chain map in which a series of events does not produce a final outcome; this type of concept map has no beginning and no end

D

data facts or information

database an organized or sorted list of facts or information, usually generated by computer

dead load the weight of a structure upon itself (306)

decomposers organisms that break down the cells of dead or waste materials and absorb their nutrients; many bacteria and fungi are decomposers (45)

deformation the change in a structure when a force is acting on it; deformation is an indicator that the materials are stressed (305)

desalination [dee-sal-i-NAE-shuhn] a process for removing the salt from salt water

desertification [de-zuhrt-i-fi-KAE-shuhn] the process in which deserts are formed through the erosion of nutrient-rich topsoil; after desertification the soil is no longer able to support plant life

design the shape and size of a structure and the materials of which it is composed (272)

differentially permeable cells that allow some materials to pass through (e.g., water and nutrients) while keeping others out (107)

diffusion tendency of particles in gas or liquid to become evenly distributed by moving from areas of greater concentration to areas of lesser concentration (107)

dilute to weaken the strength of a solution by increasing the amount of solvent

dilute solution a solution that contains relatively little solute

dispersal the transport of seeds away from the parent plant

dissolving mixing a solute completely with a solvent to form a solution; the distinct properties of each of the materials combine into one set of properties

distillation a process for separating the parts of a liquid solution; the solvent is heated to change it into a gas, then converted back to a liquid state through condensation

divergent boundary an area of Earth's crust where two plates are pulling apart from each other

diverging plates two or more plates moving away from each other (390)

diversity a measure of how many different species live in an ecosystem; an ecosystem with many species has greater diversity than an ecosystem with only a few species

dormant of a volcano, a stage when no eruption is occurring (406)

E

ecological footprint a calculation of the total area of land and water needed to supply all of the materials and energy a human uses, as well as absorb the waste produced (30)

ecologist [ee-KOL-oh-jist] a scientist who studies interactions between the abiotic and biotic parts of the environment (6)

ecology the study of how organisms interact with each other and their environment (6)

ecosystem all the interacting parts of a biological community and its environment (13)

ecosystem (environmental) monitoring a method of checking the condition of an ecosystem by comparing investigation results done at different times (68)

electromagnetic radiation (EMR) energy that is transferred in the form of electromagnetic waves; examples of EMR include radio waves, X-rays, and microwaves (226)

element a type of pure substance (made of one type of particle or atom) that cannot be broken down into simpler parts by chemical means and that has a unique set of properties (354)

embryo a tiny living plant inside a seed (125)

energy the ability to do work and to cause change (chemical or physical)

energy flow the movement of energy, which originally comes from the Sun, from one organism to another (42)

energy source an object or material that can transfer energy to other objects (226)

Environmental Impact Assessment (EIA) a report that outlines how an activity will affect the environment (74)

eon the largest division of time on the geological scale (425)

epicentre [E-pi-sen-tuhr] the area on the surface of Earth that is directly above the focus, or source, of an earthquake

era one of the four longest subdivisions in the history of Earth (425)

erosion movement of rock and mineral grains from one place to another (373)

ethanol a type of liquid fuel made from a process in which microorganisms convert the sugar in plants such as sugar cane, corn, and grain, into fuel that can be burned

evaporation the process by which a liquid, such as water, changes into a gas or a vapour (51, 220)

evaporative cooling a process in which the faster-moving particles on the surface of a liquid evaporate and escape into the air; the slower-moving particles, which are left behind, have lower kinetic energy, decreasing the temperature of the remaining liquid and the surface on which it is resting

events chain map a concept map used to describe a sequence of events, the steps in a procedure, or the stages of a process

expand of substances, to increase in volume (210)

external force stresses that act on a structure from outside (305)

extinct of a species, no longer existing (64)

extrusive rock the type of igneous rock formed when magma (lava) cools and solidifies above Earth's crust (361)

F

fair test an investigation (experiment) carried out under strictly controlled conditions to ensure accuracy and reliability of results. In a fair test, all variables are controlled except the one variable under investigation.

fault a fracture in the bedrock along which rock have moved (403)

fault block mountain mountains formed by the process of thrust faulting (413)

feedback information that is gained from outside a particular system and returned to it for the purposes of modifying a behaviour or a process

fertile of soil, containing the nutrients needed for plant growth (371)

fibres thread-like materials that make up plant and animal tissue, and some manufactured materials

fibre the tissue of plants from the stem, leaves, seeds, or roots

fibre roots a shallow system of similar-sized roots than can quickly soak up moisture

filament the stalk of a stamen (male reproductive organ of a plant) (122)

fixed-continent model a theory about Earth's structure; according to this theory, the continents and the oceans have always occupied the same positions

fluids materials that lack a definite shape and can flow from one place to another (230)

food chain a sequence of feeding relationships among living organisms, as they pass on food energy (42)

food web the network of feeding relationships among organisms (43)

footing a base for a wall in the foundation of a structure; a footing is wider than the wall to spread the weight over a larger area (337)

force a push or pull, or anything that causes a change in the motion of an object (270, 299)

force diagram a drawing that uses arrows to represent the direction and strength of one or more forces (304)

force meter a scientific device used to measure force; also called a spring scale (300)

fossil any trace or remains of once-living organisms

fossil fuels solid, liquid, or gas hydrocarbons formed from the soft parts of plants and animals over millions of years and/or trapped inside the Earth during the planet's formation (426)

foundation the solid base of a structure

fractional distillation a process in which a solution is vaporized and condensed into several different products; for example, petroleum is vaporized and condensed to produce gasoline, diesel fuel, and kerosene

fracture the property of some minerals to break with rough or jagged surfaces (357)

frame structure a type of structure in which a skeleton of materials supports the weight of the other parts (274)

freeze change from a liquid to a solid (220)

freezing point *see* melting point

friction a force that resists, or works against the movement of two surfaces rubbing together (326)

frost wedging a process of mechanical weathering that occurs when water goes through a cycle of freezing and thawing; the water expands and contracts in the cracks of a rock, eventually breaking the rock apart (373)

fruit the growing ovary of a plant that swells and protects the developing seeds until they are ripe

fulcrum the part of a lever that does not move (315)

function of a structure or object, its main purpose (270)

G

gas one of the phases or states of matter; a gas has no particular shape or size and can be compressed; a gas is sometimes known as a vapour

genes the parts of a cell that control the organism's characteristics

genus a group of related species

geothermal energy energy generated in the interior of Earth (240)

germination the development of a seed into a new plant (128)

global warming the gradual increase in the temperature of Earth's atmosphere; some scientists think that global warming results from a surplus of greenhouse gases in the environment and that it may have harmful effects on life on Earth

Gondwanaland the southern part of the supercontinent Pangaea, which split off approximately 200 million years ago (425)

grafting a process used in plant reproduction whereby a branch is taken from one tree and attached to another tree

graphic organizer a visual learning tool that helps clarify the relationship between a central concept and related ideas or terms

gravitational force the force exerted by gravity on an object; measured in newtons (N); the preferred scientific term for the everyday term "weight" (300)

greenhouse gases gases, such as carbon dioxide, that result from the burning of fossil fuels or wood; greenhouse gases prevent heat from leaving the atmosphere, increasing the temperature of the atmosphere (245)

ground water the water contained in the lithosphere or Earth's crust (51)

gyroscope [JIH-roh-skohp] a circular device with a heavy outer rim that spins at a very fast rate, stabilizing the axis so that the axis always points in the same direction (340)

H

habitat the location where an organism lives (8)

half-life the amount of time that a given amount of radioactive substance takes to be reduced by one-half (424)

hardiness a plant's ability to withstand certain environmental conditions

hard water water that contains a high proportion of dissolved materials

heat thermal energy transferred from one object or substance to another because of a temperature difference

heat capacity the thermal energy needed to raise the temperature of 1 kg of a substance, such as water, by 1°C

heat insulators materials that slow the transfer or conduction of thermal energy from one object to another; examples of heat insulators include fibreglass and Styrofoam™ cups (229)

herbivore an animal that eats only plant material; examples are grasshopper, beaver, and moose (40)

heterogeneous [het-uh-oh-JEEN-ee-uhs] of a mixture, made up of parts that retain their own properties, even if these properties are not visible to the unaided eye

histogram a type of bar graph in which each bar represents a range of values and in which the data are continuous

homogeneous [hoh-moh-JEEN-ee-uhs] of materials, having only one set of properties

horizons the layers in a cross section of soil (150)

host the organism that a parasite lives and feeds on (14)

hot spot an area under Earth's crust where the temperature is much hotter than normal, forcing magma toward the surface

humus [HYOO-muhs] the dark-coloured part of soil that is rich in nutrients, such as nitrogen, phosphorus, potassium, and sulphur (150, 371)

hydroponics a technique for growing plants without soil

hydrosphere all water found on the Earth including lakes, oceans, rivers and ground water

I

igneous rock [IG-nee-uhs] the type of rock that is formed by the solidification of hot magma; it is defined as either intrusive or extrusive (361)

incremental change small changes that happen gradually over many thousands of years

index fossil a type of fossil that can be used to determine the age of the material in which it is found (423)

indicator species plant or animal species that help to indicate environmental change (69)

individual a single organism

infrared radiation (or heat radiation) a type of electromagnetic radiation that has a wavelength just greater than the red end of the visible light spectrum

input the materials or forms of energy that are used by a system to do work or to produce new materials (output)

insoluble of a substance, meaning not able to be dissolved in a particular solvent

internal force a force that acts on an object from the inside (305)

introduced species species which are introduced into an environment where they are not naturally found (62)

intrusive rock the type of igneous rock formed when magma cools and solidifies below Earth's crust (361)

irrigate the use of a system of large pipes and sprinklers to water crops

J

joint a fastening that holds parts of structures together. Joints can allow movement (mobile joint) or prevent movement (rigid joint)

joule (J) the standard SI unit for measuring energy

K

Kelvin scale a scale used for measuring temperatures in scientific experiments; on the Kelvin scale, pure water freezes at 273 K and boils at 373 K; the coldest possible temperature (also known as absolute zero) is 0 K (195)

kilogram the primary measurement of mass in SI, equal to 1000 g; 1 kg is the primary standard for mass (298)

kinetic energy [kin-E-tic] energy that is released or transferred by the motion of an object or its particles

kingdom one of five main groupings for classifying living things on Earth; the five kingdoms are: animal, plant, fungus, protist, and monera

L

lamination a process in which a layer of material is pressed or glued onto other layers (286)

landfill site an area where garbage is deposited and eventually buried

Laurasia the northern part of the supercontinent Pangaea, which split off approximately 200 million years ago (425)

lava the term used for magma when it breaks through Earth's crust, as in a volcanic eruption (361)

law in science, a statement of a pattern, action, or condition that has been observed so consistently that scientists are convinced it will always happen

layering a process used in plant reproduction whereby plants reproduce from stems

leaching the process by which materials from soil are dissolved and carried away by water (372)

lever a device used to change the amount of force needed to move an object (315)

line graph a diagram that shows how one value depends on or changes according to another value; produced by drawing a line that connects data points plotted in relation to a *y*-axis (vertical axis) and an *x*-axis (horizontal axis)

liquefaction [lik-we-FAK-shuhn] the process of changing solid material into a liquid-like substance, such as quicksand

liquid one of the states or phases of matter; in the liquid state, a material has a specific size or volume but not a specific shape

lithosphere a hard outer layer of the Earth consisting of the crust and upper level of the mantle

live load the force or forces that act in or on a structure but are not part of the structure; examples of a live load include the wind, the weight of people, and a collision (306)

load the weight carried or supported by a structure (270)

loam a type of soil that is good for plant growth; made up of sand, silt, and clay

lubricants substances that can be made from plants to oil machinery parts to avoid heat buildup from friction

lustre the light-reflecting properties, or "shininess," of minerals (356)

M

magma melted rock, formed under Earth's crust by high temperature and pressure; magma occasionally escapes to Earth's surface as lava (361)

magnetometer [mag-net-O-met-uhr] a device that detects the direction and strength of a magnetic field

manipulated variable in an experiment, a condition that is selected or adjusted to see what effect the change will have on the responding variable

mantle the middle layer of Earth, located between the crust and the core, and made of rock

manufactured structure an object or a structure that is made by humans (271)

margin of safety the need for something built or manufactured to perform as expected for a long time, so that people's safety and health are not at risk. In a structure, a margin of safety would ensure that the structure has extra strength to support more load than normal (285)

mass the amount of matter in a substance; often measured with a balance (298)

mass structure a structure, natural or manufactured, that is made by the piling up of materials; examples of a mass structure include a pyramid and a snow fort (272)

matter anything that takes up space, has mass, and is made up of particles

mechanical energy the energy in a moving object or in moving parts of an object

mechanical mixture a substance made of more than one kind of material, in which the different materials can be easily identified

mechanical weathering of rocks, the break-up or disintegration by the actions of physical forces such as wind, water, and gravity (373)

melt to change from a solid to a liquid (220)

melting point (or freezing point) the temperature at which solid matter begins to change to liquid

Mesozoic Era [mes-oh-ZOH-ik E-ruh] the third era on the geologic time scale; the era in which dinosaurs were the dominant life form on Earth (425)

metal fatigue a weakening of metal due to stress, resulting in an accumulation of small cracks (318)

metallic ores rocks that contain a high proportion of metals and metal oxides

metamorphic rock a type of rock made when high pressure and heat act on another type of rock and change it into a new form (366)

meteorological evidence the type of evidence that is obtained by studying climate change

methanol a type of liquid fuel that is made from wood by a similar process to the one used in producing ethanol

metric system a system of measurement based on multiples of ten and in which the basic unit of length is the metre

micro-organisms organisms that are too small to be seen by the human eye without the aid of a microscope

mineral an inorganic, naturally occurring solid material; minerals can be either elements (pure substances) or compounds (two or more substances combined) (354)

mixture a material made up of several different types of materials; in a mixture, each material retains its own properties

mobile joint a joint that is designed to allow movement; examples of a mobile joint include a door hinge and an elbow (290)

model a verbal, mathematical, or visual representation of a scientific structure or process, which allows scientists to construct and test inferences and theories (e.g., the particle theory of matter)

Mohs hardness scale in geology, a scale that compares the hardness of ten minerals; talc has a hardness value of 1 (the softest) and diamond has a hardness value of 10 (the hardest) (355)

monoculture the limiting of a crop to one particular type in an area in order to use energy and equipment efficiently

mould a type of fossil in which the hard parts of the organism have dissolved, leaving a cavity in the rock (420)

mountain a large, naturally occurring formation of Earth's surface that rises sharply above the surrounding area

mutualism [MYOO-choo-al-is-uhm] a symbiotic relationship between two different types of organisms that is beneficial to both organisms (14)

N

natural resources the materials and products found in nature (18)

natural structure an object or structure not made by people (270)

network tree a concept map in which some terms are circles while other terms are written on connecting lines

newton (N) the standard unit of force in the *Système international d'unités* (SI) (299)

niche [NEESH] the role or characteristic activity that is undertaken by an organism in an ecosystem; one organism may fill several different niches (40)

non-renewable resources resources that take millions of years to form

non-target organisms organisms that are affected negatively by chemical controls

normal fault a type of fault in which rock above the fault moves downward

nuclear energy the energy released when the smallest particles (called atoms) of a substance break apart or fuse together; also known as atomic energy

O

omnivore an animal that eats other animals and plant material; examples are bear, raccoon, people (40)

organic sedimentary rock that is largely made up of once-living matter; limestone is an example (172)

organic food food that is grown without the use of chemical fertilizers and chemical pesticides

organic sedimentary rock sedimentary rock made from remains of plant and animals (365)

organism any type of living creature

original remains a type of fossil in which all or part of the original organism has been preserved (419)

osmosis the diffusion of water through a differentially permeable membrane (107)

output the final materials and energy forms that a system produces by applying energy to raw materials (input)

ovary a tiny chamber containing the plant's ovules (122)

ovule eggs produced by the female species (120)

P

Paleozoic Era [pae-lee-oh-ZOH-ik E-ruh] the second era on the geologic time scale; the era in which the first plants and animals appeared (425)

Pangaea [pan-JEE-uh] the name of the second supercontinent thought to have existed approximately 350 million years ago; Pangaea included all the present continents (425)

parasite an organism that lives on or in another organism (the host) and feeds on it (14)

parasitism a symbiotic relationship between two different types of organisms in which one of the partners is harmed and the other benefits (14)

parent material the mineral (non-organic) matter (rock, soil, clay) from which the soil developed (150)

parent rock the original rock that was acted on by high pressure and heat to form a metamorphic rock (366)

particle size of soil, the average size of the particles of various materials of which the soil is made

particle model of matter a scientific model of the structure of matter; according to the particle theory, all matter is made up of extremely tiny particles, and each pure substance has its own kind of particle, different from the particles of other pure substances (203)

passive solar heating a type of heating that uses materials in a structure to absorb, store, and release solar energy (241)

period on the geologic time scale, a subdivision of an era (425)

permanent plots study areas (74)

permeate of water, to drain through soil

pesticide a substance used to control insects or other organisms that are harmful to plants or animals

petals brightly coloured parts of a flower that help to attract bees to its nectar (122)

petrified a rock-like substance formed when water penetrated dead organic matter, and deposits dissolved mineral matter (418)

petrochemical a product that is produced from petroleum; there are over 500 000 different petrochemicals

petroleum naturally occurring mixture of hydrocarbons such as bitumen, coal, oil and gas (423)

pH a symbol used to express acid or alkaline content (52)

phases of matter the different forms (solid, liquid, or gas) that matter can take; also known as states of matter

photosynthesis [foh-toh-SIN-the-sis] the process by which plants make their own food using sunlight (110)

phytoplankton [fih-toh-PLANK-ton] plankton that use photosynthesis to make their own food

piling a large, cylindrical structure used to carry the weight of a structure to a solid foundation material (337)

pistil female part of a flower (122)

plankton the general name for microscopic plants, algae, and other organisms that float in oceans and other bodies of water

plate one of the large sections into which Earth's crust is divided (390)

plate tectonics a theory about Earth's structure; according to this theory, Earth's crust is made up of very large pieces, called plates, that are always moving very slowly on Earth's mantle (390)

plateau on a graph, a flat, horizontal region where data remain constant

pollen grains the tiny particles of pollen containing sperm

pollination process by which pollen, containing sperm, travels to the female cone (120)

pollutants substances that cause pollution (52)

pollution a collective term for the different types of harmful materials that are released into the environment through human activities (52)

population a group of organisms of the same species found in a particular geographic area

potential energy stored energy

Precambrian Era the first of the four eras on the geologic time scale (425)

precipitation the water (in its liquid or solid state) that falls to Earth; rain, snow, sleet, hail, etc. (51)

predator an organism that catches and eats other organisms of a different species (40)

prey an organism that is caught and eaten by another organism of a different species (40)

primary succession the gradual growth of organisms in an area that was previously bare (57)

primary standard the name given to a small cylinder of metal on which the kilogram (kg) is based; equivalent to 1 kg (298)

primary (P) waves the fastest moving of the three types of seismic waves that are produced by an earthquake, originating from its focus; can pass through solids, liquids, and gases (398)

principle of superposition a geological theory; according to this theory, in undisturbed layers of rock, the oldest layers will be on the bottom and the youngest layers will be on the top (423)

producers plants that use energy from the Sun to make nutrients they need to survive; includes some bacteria that transfer energy from particles (40)

properties the characteristics of materials; every material has its own unique set of properties; examples of properties include colour, odour, and density (286)

protozoa [proh-toh-ZOH-uh] one-celled, animal-like organisms that live in or on other organisms

pure substance a material that is composed of only one type of particle; examples of a pure substance include gold, oxygen, and water

pyramid of numbers the number of individual organisms at each level of a food chain; the number of organisms decreases with each level higher in the food chain (there is a greater number of organisms at the bottom of the food chain than at the top) (43)

Q

quadrat a small square area, marked out for study (76)

qualitative data information gathered by observations in which no measurements take place

qualitative property a characteristic of a substance that can be described but not measured

quantitative data data that consist of numbers and/or units of measurement; obtained through measurement and through mathematical calculations

quantitative property a characteristic of a substance that can be measured

R

radiant energy energy that is transmitted via electromagnetic waves; radiant energy can be absorbed and reflected by objects, and it moves through empty space at 300 000 km/s (226)

radiation the transfer of energy in the form of electromagnetic waves (226)

radiocarbon dating a method used to determine the age of organic remains by measuring the relative amount of radioactive carbon found in the remains (424)

radiometric dating the process of determining the age of a geological specimen by measuring the relative amounts of radioactive particles that are present in the specimen (424)

rate of dissolving the speed at which a solute dissolves in a solvent

recycling the process of using the same item over again; recycling can either use the item as it was originally used or find new uses for it, perhaps by changing its composition

refrigerants liquids that evaporate easily at low temperatures (252)

refining the processing of petroleum to separate it into its parts, such as asphalt or kerosene

relative dating determining the order in which geological events occurred and the relative age of rocks by their positions in rock layers (423)

renewable resources energy resources that can be recycled or replaced by natural processes in less than 100 years (245)

residues chemicals that have washed off plants. These remain in the soil and water (170)

resistant able to withstand certain effects; insects become resistant to pesticides

respiration in the cells of living things, the process in which oxygen is used to get energy from food and is converted into carbon dioxide (111)

responder a pointer, light, or other mechanism that uses the signal in some way (199)

responding variable in an experiment, a condition that is changed as a result of changes to manipulated variable

reverse fault a type of fault in which rock below the fault is forced upward over rock below the fault (403)

Richter scale [RIK-tuhr] a scale on which the magnitude, or strength, of an earthquake is measured (396)

rigid joint a device designed to fix an object into place; a joint that allows no movement; examples of a rigid joint include a nail and a screw (290)

Ring of Fire an area of volcanoes around the Pacific Ocean (410)

rock a natural material composed of one or more minerals (354)

rock cycle the naturally occurring process in which rocks continue to change form over long periods of time (368)

Rodinia the name of the earliest supercontinent thought to have broken apart approximately 750 million years ago; Rodinia included all the large land masses (425)

root hairs tiny hairs that cover the small roots coming out of a tap root. They increase the plant's ability to absorb water and nutrients (105)

run-off water that runs off the ground into lakes, rivers, or streams (51)

S

salinization salt that has collected on the surface of soil (156)

sampling in population studies, a method used to estimate population size in ecosystems by finding out the number of individuals in a portion (that is, the sample) of the population and then calculating the total number for the population as a whole

saturated solution a solution in which no more of a solute is able to be dissolved at a particular temperature

scale a series of equally divided sections that are marked and numbered for use in measurement (e.g., centimetres, litres, or grams) (194)

scavenger an organism that eats dead or decaying plant or animal matter; a carrion beetle is an example of a scavenger (44)

- science** a body of facts or knowledge about the natural world, but also a way of thinking and asking questions about nature and the universe
- science inquiry** the orderly process of asking concise and well-focussed questions and designing experiments that will give clear answers to those questions
- scientific investigation** an investigation that involves the systematic application of concepts and procedures (e.g., experimentation and research, observation and measurement, analysis and sharing of data)
- sea floor spreading** the process in which an ocean floor slowly increases in size over time because of the formation of new igneous rock along a fault (388)
- secondary succession** the gradual growth of organisms in an area that was formerly home to many different species; the regeneration of a burned forest is an example (57)
- secondary (S) waves** the second fastest moving of the three types of seismic waves that are produced by an earthquake, originating from its focus; can pass through solids but not liquids or gases (398)
- sediment** loose material such as bits of rock, minerals, and plant and animal remains (364)
- sedimentary rock** the most common type of rock on Earth's surface; formed by the compacting of sediment (loose materials, such as minerals and organic remains) (364)
- sedimentation** the process in which eroded material is deposited and built up (373)
- seismic waves** [SIHZ-mik] the energy waves (either primary, secondary, or surface) that are released by an earthquake and travel outward from its focus (396)
- seismograph** [SIHZ-moh-graf] a sensitive machine that is attached to bedrock in order to measure the strength of earthquakes (396)
- seismologists** [sihz-MOL-oh-jists] scientists who study earthquakes
- selective breeding** a process that involves choosing specific plants with particular characteristics and encouraging these plants to reproduce (115)
- selective harvest** removing specific trees from a specific area
- sensor** a material that is affected by change in some feature of the environment, such as temperature (199)
- sepals** enclose tightly bound petals of a bud and protect the flower before it opens (122)
- sexual reproduction** a process that involves the production of seeds and fruits from the specialized reproductive cells of two individuals (118)
- shadow zone** an area on Earth's surface that is not reached by primary waves after an earthquake, due to the bending of P waves as they pass through Earth
- shear** of a section of compressed material, to slide over another section along a weak point (315)
- shear force** a force that bends or tears a material by pushing parts of it in opposite directions (307)
- shear strength** measures the largest shear force a material can stand before ripping apart (307)
- shelterbelt** a row of trees planted along the edge of a field to protect crops (159)
- shield volcano** the largest of the three main types of volcanoes; formed above an area, called a hot spot, where the temperature under the crust is much hotter than elsewhere, causing lava to be forced upward through vents
- shell structure** a type of structure that obtains its strength from a thin, carefully shaped outer layer of material and that requires no internal frame; examples of a shell structure include an igloo and an egg (278)
- shrinking apple theory** a nineteenth-century theory about Earth's structure; according to this theory, Earth was once a hot mass, which cooled and shrank over time; the theory compared Earth to an apple that dried up, causing wrinkles (mountains) and valleys between the wrinkles (oceans and lakes)
- SI** (from the French *Le Système international d'unités*) the international system of measurement units, including such terms as kilogram, metre, and second
- signal** information about temperature, such as an electrical current (199)
- society** a group of people united by common goals and interests
- softwood** a type of tree, usually used in construction because it has straight grain, is low in cost, and widely available
- soft water** water that contains few dissolved minerals
- soil** a mixture of weathered rock, organic matter, mineral fragments, water, and air
- soil profile** a description of the characteristics of the different layers that make up a particular soil (372)
- solar energy** energy from the Sun (241)
- solar collectors** mechanical systems and devices, usually containing water, or air, used in active solar heating systems (243)
- soldering** [SO-duhr-ing] a process in which a melted material is applied to a different type of material; the melted material hardens when it cools, forming a rigid joint that holds the other material in place (292)
- solid** one of the states or phases of matter; in the solid phase, materials keep a specific shape and size
- solidification** change from a liquid to a solid
- solubility** the limit to how concentrated a solution can become, before it becomes a saturated solution at a particular temperature; for example, no more than 35 to 37 g of salt will dissolve in 100 g of cold (0°C) water
- soluble** of a substance, able to be dissolved in a particular solvent; something that is soluble is called a solute

- solute** a substance that can be dissolved in a solvent; for example, salt is a solute that dissolves in water
- solution** a homogeneous mixture of two or more substances; the distinct properties of the different substances that make up the solution are combined into one set of properties
- solvent** a substance into which a solute may be dissolved; for example, water is a solvent that dissolves sugar
- sonar (sound navigation and ranging)** a technology that bounces sound waves off an object to determine its distance from the source of the waves (387)
- species** a narrow classification grouping for organisms; e.g., a wolf is the species *Canis lupus*, while a dog is the species *Canis familiaris*
- specific heat capacity** of a material, the energy change that is required to warm or cool a standard amount of the material (1 g or 1 kg) by 1°C
- specifications** a set of standards or expectations; criteria
- spider map** a concept map used to organize a central idea and a jumble of associated ideas that are not necessarily related to each other
- spin stabilization** the tendency of an object that is spinning on its axis to move in a predictable manner; an example of spin stabilization is the motion of a bicycle wheel (340)
- stable** of a structure, tending to maintain its shape and position
- stamen** male part of a flower (122)
- states of matter** the different forms (solid, liquid, or gas) that matter can take; also known as phases of matter
- stigma** sticky tip of a pistil (122)
- strata** layers of sedimentary rock (423)
- stratification** the arrangement of sedimentary rock in visible layers (364)
- streak** the colour of a mineral in powdered form; a property useful in the identification of minerals (357)
- stress** an internal or external force that acts on an object, perhaps causing it to move or change shape
- structure** an object with a definite size and shape, which serves a purpose or function. The parts of a structure have a specific arrangement that remains the same (270)
- STS** an abbreviation for the interrelationships among science, technology, and societal issues
- style** tube connecting the stigma and ovary (122)
- subduction zone** a place on Earth's crust where high pressure pushes one very large piece of rock below another; earthquakes are often formed in subduction zones (393)
- sublimation** a change in state when a gas changes directly to a solid or a solid changes directly to a gas (220)
- succession** the process by which new species gradually replace old species in an ecosystem (56)
- summer fallow** the practice of cultivating land to control weeds but planting no crops
- supersaturated solution** a solution that contains more solute than would normally dissolve at a particular temperature
- surface area** the amount of surface of an object; measured in square units such as cm²
- surface waves** the slowest moving of the three types of seismic waves that are produced by an earthquake, originating from its epicentre; surface waves do the most damage of the three types of waves (398)
- sustainability** resources of nature are being renewed at least as quickly as they are being used, and all wastes are able to be completely absorbed (29)
- sustainability** in the study of plants, being able to grow food and fibre while keeping our natural systems healthy for the long term (132)
- symbiosis** [sim-bih-OH-sis] an interaction between organisms of different species living in close proximity to each other in a relationship that lasts over time (14)
- syncline** a downfold of a rock layer (413)
- system** I. a set of things that are organized and interact with each other to such an extent that they may be described as a single unit II. in biology, a group of organs that work together to perform a major function (e.g., respiratory system, root system)
- T**
- table** an orderly arrangement of facts set out for easy reference; for example, an arrangement of numerical values in rows or columns
- taproot** a single, prominent root with numerous small roots coming out of it (105)
- technology** the design and construction of devices, processes, and materials to solve practical problems and to satisfy human needs and wants
- temperature** a relative measure of how hot or cold something is, measured on a scale; the average kinetic energy of the particles in a substance (204)
- tensile strength** a measure of the largest tension force that a material can withstand before changing shape or breaking apart (307)
- tension force** a force that pulls on a material and stretches it apart (307)
- texture** of soil, how it feels to the touch; texture is affected by the size of the particles in the soil
- theory** an explanation of an event that has been supported by consistent, repeated experimental results and has therefore been accepted by many scientists
- theory of plate tectonics** theory suggesting the lithosphere is divided into plates that interact with each other (390)
- thermal conduction** the direct transfer of thermal energy from one particle or object to another through contact or collision (229)

thermal energy the energy generated by the movement or vibration of particles; the total kinetic energy of all the particles in a substance (205)

thermal pollution a warming of the environment that results from human activities, such as the burning of fossil fuels (247)

thermogenic [THUR-moh-jen-ik] of plants or animals, able to raise their own temperature

thermograph a thermometer that records temperature

thermometer a device used to measure temperature (193)

thrust faulting low angle faulting of rock (413)

thrust line the line that runs downward from an object's centre of gravity, through which force is transferred

tie a device used to add strength to a structure, usually by forming a rigid triangle at the point where the pieces come together in a right angle; a type of rigid joint, such as a piece of rope, that is used to pull objects or materials together and hold them in place

topsoil the topmost layer of soil, which is dark-coloured and rich in humus (150, 372)

torsion force a force that acts on a material by twisting its ends in opposite directions (307)

torsion strength a measure of the largest torsion force that a material can withstand and still be able to return to its original shape (307)

trace fossil a type of fossil in which evidence of animal activities have been preserved (419)

transform boundary an area of Earth's crust where plates are sliding past each other

transformation the changing of a substance or material with a particular set of properties into a new substance (or substances); a change in the characteristics of something

transpiration the process in which water that is taken in by a plant or an animal evaporates from the organism (51)

tubers the swollen, underground stems of potatoes

twist of a material, to change shape through the application of torsion forces

U

unifying theory a single theory that explains many different natural phenomena, events, objects, or processes

unsaturated solution a solution in which more of a solute can be dissolved at a particular temperature

V

variable a condition or factor that can influence the outcome of an experiment

vegetative (asexual) reproduction a type of reproduction that occurs when a "parent" plant grows new plants from its roots, stems, or leaves (118)

Venn diagram a graphic organizer consisting of overlapping circles; used to compare and contrast two concepts or objects

vent an opening in Earth's crust through which magma can escape, forming lava (406)

vertical fault a fault in which rock moves up or down

volcano an opening in Earth's crust that can release materials such as lava, smoke, and ash; volcanoes can be either active (releasing materials) or dormant (not releasing materials)

volume the measurement of the amount of space occupied by a substance; measured in litres or cubic units such as cubic centimetres (cm³)

W

warm-blooded of an organism, maintaining a relatively consistent body temperature regardless of the environment; all mammals are warm-blooded

waste heat energy that is transferred outside the system in which it is generated, without doing any useful work

water cycle the continuous movement of water through the biosphere; the water cycle consists of evaporation, transpiration, condensation, and precipitation (51)

water-holding capacity the ability of a soil to retain water; soils with low water-holding capacity allow a great deal of water to permeate through them

weathering the process in which rocks are broken down and sediment is formed by mechanical, chemical, or biological means (373)

weed a plant that grows where it is not wanted

weight the force of gravity exerted on a mass (300)

welding a process in which pieces of metal or plastic are fused together by the application of heat (292)

WHMIS an acronym that stands for Workplace Hazardous Materials Information System