

# Glossary

## How to Use This Glossary

This Glossary provides the definitions of the key terms that are shown in **boldface** type in the text (instructional boldfaced words such as “observe” and “gather,” used throughout the 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. A pronunciation key, in square brackets, will help you pronounce difficult words.

a = mask, back  
ae = same, day  
ah = car, farther  
aw = dawn, hot  
e = met, less

ee = leaf, clean  
ih = idea, life  
i = simple, this  
oh = home, loan  
oo = food, boot

u = wonder, Sun  
uh = taken, focus  
uhr = insert, turn

### A

**absorption** in biology, the process by which dissolved food particles pass from the small intestine to the capillaries

**abyssal plains** on the deep ocean floor, wide, open, flat plains between the high mountain ranges at the centre and the deep trenches at the edges of the sea floor (415)

**accommodation** in vision, the process of changing the shape of the lens (in the eye) to adjust for different distances from an object being viewed (215)

**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

**additive primary colours** red, green, and blue; described as additive because adding all three colours together in the proper amounts makes white light (233)

**agitation** stirring or shaking (19)

**algae** type of aquatic micro-organism, capable of photosynthesis (444)

**algal bloom** a problematic population explosion of algae; usually caused by excessive nutrients (e.g., from fertilizers) (444)

**alveolus** [ahl-vee-OH-luhs] in the lungs, a tiny air sac at the end of a bronchiole (plural alveoli) (148)

**amplitude** in a wave, the height of the crest or the depth of the trough (239)

**aneroid barometer** a type of barometer that contains no liquid

**angle of incidence (*i*)** in optics, the angle between the incident ray and the normal (189)

**angle of reflection (*r*)** in optics, the angle between the normal and the reflected ray (189)

**angle of refraction (*R*)** in optics, the angle between the normal and the refracted ray (204)

**annual precipitation** the total amount of precipitation in a year

**aperture** [AP-uhr-chuhr] the opening in the diaphragm of a camera; can let more light reach the film by opening wider (216)

**aquifer** [AK-wi-fuhr] an area of porous rock with a water system flowing through it (403)

**Archimedes' principle** a scientific principle stating that the buoyant force acting on a submerged object equals the weight (force of gravity) of the fluid displaced by the object (65)

**area** the amount of surface; measured in square units such as cm<sup>2</sup> (304)

**arete** a mountain ridge carved by two or more glaciers from several directions (381)

**artery** a blood vessel that carries oxygen-rich blood from the heart

**artificial light source** a human-made source of light (176)

**attitude** in optics, the position (upright or upside down) of an image in relation to the object it reflects

**average density** the total mass of an object divided by the total volume (62)

### B

**baleen filters** plates or blades of cartilage found in the mouths of baleen whales, used to trap plankton

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

**barometer** [buh-RAWM-uh-tuhr] the most common device for measuring air pressure (76)

**bioindicator species** sensitive or important species whose numbers can show the health of an ecosystem (456)

**bioluminescence** [BIH-oh-LOO-min-E-sens] the emission of light produced by chemical reactions inside the bodies of living creatures (183)

**bioluminescent source** [BIH-oh-LOO-min-E-sent] an organism that relies on chemical reactions inside its body to produce light (e.g., a firefly) (183)

**biomagnification** concentration of a toxin as it moves up through the food chain (446)

**blind spot** the point where the optic nerve enters the retina; has no light-sensing cells (217)

**block and tackle** a combination of fixed and movable pulleys; may be used to lift very heavy or awkward loads (293)

**blood** the fluid that transports substances to and from all parts of the body; consists of plasma, red blood cells, and white blood cells

**breaker** in a body of water, a wave that breaks or collapses into foam when it reaches shallow water or a beach (418)

**bronchiole** [BRAWN-kee-ohl] in the lungs, a small, narrow tube branching off from the bronchus

**bronchus** [BRAWN-kuhs] a tube connecting the trachea with the lungs

**buoyancy** the tendency to rise or float in a fluid (59)

**buoyant force** the upward force exerted on objects submerged in or floating on a fluid (59)

## C

**calve** when large chunks of ice break off from the edge of a glacier and become icebergs (379)

**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, e.g., the litre (L)

**capillary** [ca-PIL-uh-ree] the smallest type of blood vessel; connects arteries and veins (148)

**carpal tunnel syndrome** a common workplace disorder causing numbness and pain in the thumb and first three fingers; often results from repetitive finger movements such as those involved in working at a computer keyboard (283)

**cell** the smallest unit that can perform the functions of life (100)

**cell membrane** the selectively permeable structure enclosing the contents of a cell or organelle; regulates the passage of substances into and out of a cell or organelle

**cell theory** a major theory of living things, formulated by scientists Matthias Schleiden, Theodore Schwann, and Rudolf Virchow in the nineteenth century; the theory states that all living things are composed of one or more cells, that the cell is the basic unit of life, and that all cells come from already existing cells

**cell wall** a rigid structure surrounding the cell membrane of plants, fungi, and some unicellular organisms; protects and supports the cell

**cellular respiration** in cells, the process that releases food energy

**cellulose** the tough, carbohydrate material that in large part makes up the cell walls of many plants and fungi

**change of state** the transformation of a substance's physical state (whether solid, liquid, or gas) into another state

**chemiluminescence** [KE-mee-LOO-min-E-sens] the emission of light resulting from chemical action and not involving heat (183)

**chemiluminescent source** [KE-mee-LOO-min-E-sent] chemical reaction that produces particles that give off visible light energy (183)

**chemosynthesis** [KEE-mo-sinth-isis] the process of making food using energy from chemical reactions; carried out by bacteria around sea-floor vents (447)

**chloroplast** an organelle (cell part) that contains chlorophyll and enables plants to make carbohydrates through the process of photosynthesis; found only in plants and in some unicellular organisms

**chromosome** [KROH-muh-sohm] in a cell nucleus, a threadlike structure that carries genetic material (instructions for producing new cells with the same characteristics as the parent cell)

**cilia** small hair-like projections on the inside of respiratory passages that trap and remove particles

**ciliary muscle** [SIL-yuh-ree] the muscle in the eye that controls the eye's accommodation for viewing objects at varying distances

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

**circulatory system** the system that transports food and oxygen throughout the body; includes the heart, blood, and blood vessels (146)

**cirques** bowl-shaped basins eroded by valley glaciers (381)

**clarity** a measure of how clear something is, including water; determined by the amount of matter suspended in it (390)

**Class 1 lever** a lever in which the fulcrum is between the effort and the load (e.g., a teeter-totter) (271)

**Class 2 lever** a lever in which the load is between the fulcrum and the effort (e.g., a bottle-opener) (271)

**Class 3 lever** a lever in which the effort is applied between the fulcrum and the load (e.g., tweezers) (271)

**classify** to group ideas, information, or objects based on their similarities

**climate** patterns of weather in a particular place over a period of years; e.g., condition of temperature or precipitation

**closed system** a system having a boundary that separates it from its surroundings (307)

**coherent** referring to light, having only one wavelength, with all waves lined up in a similar pattern (e.g., laser light) (246)

**colloid** a heterogeneous mixture in which particles do not settle (15)

**colour blindness** a condition in which people have difficulty distinguishing between some colours (235)

**complementary colours** pairs of colours that, together, form white light (e.g., magenta and green)

**compound pulley** a combination of several pulleys working together (293)

**compressibility** the ability to be squeezed into a smaller volume; a property of gases

**compressible** capable of being squeezed into a smaller volume

**compressor** an electrical device that compresses air (82)

**computer spreadsheet** software that uses rows and columns to help organize information

**concave** curving inwards (195)

**concave lens** a lens that is thinner and flatter in the middle than around the edges; causes refracting light rays to diverge (spread out) (208)

**concept map** a diagram comprised of 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

**conclusion** an explanation of the results of an experiment as it applies to the hypothesis being tested

**condensation** the process of changing from gas to liquid

**cone** in the retina of the eye, a cone-shaped cell that detects colour (234)

**consumer product survey** a sampling of information about products, gained by asking consumers questions and recording and analyzing the responses

**contamination** pollution of groundwater caused by human activities (406)

**Continental Divide** in North America, the continuous ridge of mountain summits dividing the continent into two main drainage areas. On one side, rivers and streams flow west to the Pacific Ocean; on the other side, rivers and streams flow northeast to Hudson Bay or southeast to the Gulf of Mexico. (392)

**continental glacier** a glacier, or ice sheet, covering all or a significant part of a continent (377)

**continental shelf** the gradually sloping area between a seacoast and the edge of an ocean basin (415)

**continental slope** a steep slope dividing a continental shelf from an ocean basin (415)

**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

**convex** curving outwards (195)

**convex lens** a lens that is thicker in the middle than around the edges; causes refracting light rays to converge (come together) (208)

**co-ordinate graph** a grid that has data points named as ordered pairs of numbers, (e.g., (4, 3))

**crankshaft** a shaft that turns or is turned by a crank. A crankshaft turns the wheels of an automobile. (338)

**crest** the high part of a wave (238)

**crevasse** a deep fissure, or crack in ice (377)

**cubic units** the units used to report the volume of a substance (e.g.,  $\text{cm}^3$ )

**current** a broad, continuous movement of water in an ocean or other body of water

**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

**cylinder** in an engine, a hollow, tube-shaped chamber in which a gas or a liquid causes a piston to move

**cytoplasm** the gel-like substance within the cell membrane that contains and supports the structures of the cell

## D

**decomposed** decayed or broken down (444)

**decompress** to release from pressure

**dehydration** the process of removing water from the solution

**density** the amount of mass in a certain unit volume of a substance (density equals mass divided by volume) (50)

**density current** a mass of cold water flowing beneath the ocean surface; the water is often more saline (salty) than surrounding water and often contains a significant amount of sediment

**deposition** the process in which eroded material is dropped or left (397)

**desalination** removal of dissolved salts from a solution

**desalination plant** [dee-salin-AE-shun] the buildings and machinery used in producing fresh water by removing salts from seawater

**detritus** organic matter produced by decomposition, such as decaying bodies of plants and animals (441)

**diaphragm** [DIH-uh-fram] in a camera or microscope, a device that controls the amount of light that enters (216)

**diffuse reflection** the type of reflection that occurs off a rough surface, resulting in no clear image

**diffusion** the movement of particles in liquids and gases from an area of higher concentration to an area of lower concentration (129)

**digestive system** a group of organs that work together to break down food and eliminate wastes; includes the stomach and intestines

**displace** to move something out of the way (e.g., a solid object can displace water out of a container)

**dissolved solids** salts, such as sodium, calcium, and magnesium found dissolved in water (449)

**dissolving** breaking up; forming a solution by mixing two or more materials together (17)

**distillation** a method of separating the parts of a liquid mixture

**diversity** the differences or variety of adaptations of living things (432)

**downstream** the direction in which a river flows

**drainage basin** the total area from which precipitation drains into a single river or system of rivers

**drainage divide** the boundary between two drainage basins; usually the crest of a hill or mountain

**driven gear** a gear whose movement is caused by a driving gear; also called follower (287)

**driver** *see* driving gear (287)

**driving gear** a main gear that causes other gears to move; also called driver (287)

## E

**efficiency** the ratio of the useful work or energy provided by a machine or system with the actual work or energy supplied to the machine or system (298)

**effluent** wastewater from a septic tank; liquid industrial waste (465)

**effort arm** in a lever, the distance between the fulcrum and the effort force (270)

**effort force** the force supplied to any machine to produce an action (270)

**electromagnetic spectrum** the arrangement by wavelength of the different forms of electromagnetic radiation, including visible light energy (249)

**emulsion** a mixture in which droplets of fat are prevented from joining together by an emulsifying agent (15)

**endocrine system** [END-oh-krin] a set of glands that produce chemical messengers, called hormones, which are released into the bloodstream; includes the pituitary and thyroid glands, and many more

**epidermal tissue** the outermost layer of cells, which protects the outer surface of the plant or animal; also known as skin

**epithelial tissue** [epi-THEEL-ee-ul] in animals, the tissue that covers the body and internal structures such as the intestine

**ergonomics** the science of designing home or work environments that best suit the human body in its various dimensions (283)

**erosion** the movement of sediments from one place to another (396)

**esker** a winding ridge made of sand and gravel formed by streams that flow beneath a glacier (382)

**evaporation** vaporization that occurs slowly over a wide range of temperatures

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

**excretory system** the system that regulates blood composition and gets rid of waste fluids; includes the kidneys (151)

**exhaust valve** in an engine, a movable part that controls the amount of steam escaping from a cylinder (335)

**experiment** an activity or procedure designed to test a hypothesis

**exponent** in science or mathematics, a number, or power, that tells you how many times the number is multiplied by itself; e.g.  $10^3$  means  $10 \times 10 \times 10$  or 1000

**eyepiece lens** in a telescope or microscope, the lens that works as a magnifying glass to enlarge the image (221)

## 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.

**far point** (of the eye) the greatest distance at which an object is in focus (215)

**far-sighted** unable to see close objects clearly (210)

**fat** any of several yellow or white oily substances formed in the bodies of animals and also in some plant seeds; stores energy

**feedback** the return of information from the output of a system to the input

**field of view** the area seen through the eyepiece of a microscope or other optical instrument

**filament** in a light bulb, the metal strip that glows to produce light

**film** a sheet or strip of thin, flexible material coated with a light-sensitive material and used to make photographs

**filtrate** the solution which passes through a filter paper or through a filtration device

**fixed pulley** a pulley supported by attachment to something that does not move, such as a ceiling, wall, or tree (292)

**floating** remaining suspended in a fluid; for example, not falling in air or sinking in water (59)

**flood plain** bordering a river or stream, a generally flat area of land that is naturally subject to flooding; made up largely of soil deposited by floods (408)

**flow pressure** pressure that is caused by a moving fluid

**flow rate** the volume of fluid that passes a point in a pipe or tube in a certain amount of time (40)

**fluid** any substance that flows; includes liquids and gases (2)

**fluidity** the ability to flow (2)

**fluid friction** the friction a fluid experiences when it flows past an object such as the solid wall of a pipe or tube

**fluorescence** [fluhr-E-sens] the process in which high-energy, invisible ultraviolet light is absorbed by the particles of an object, which then emits some of this energy as visible light, causing the object to glow (181)

**fluorescent source** [fluhr-E-sent] a source that produces light when exposed to light of a particular wavelength (181)

**focus** to bring (rays of light) to a point; for example, a concave mirror or a convex lens focusses light rays (210)

**follower** *see* driven gear (287)

**force** a push or a pull, or anything that causes a change in the motion of an object (53, 304)

**fractional distillation** a process that yields different petroleum products by separating parts of a solution

**freezing** the process of changing from liquid to solid

**freezing point** the temperature at which a liquid freezes

**frequency** the number of entire cycles completed by a vibrating object in a unit of time; usually given in cycles per second, or hertz (Hz) (239)

**fresh water** water from sources such as lakes, rivers, ponds, and wells that contain a low amount of dissolved salts (364)

**fulcrum** the point of a lever that does not move (270)

## G

**gamma rays** the rays having the shortest frequency and highest energy of all radiant waves in the electromagnetic spectrum; gamma rays come from nuclear reactions

**gas** the state of matter in which a substance has neither a definite shape nor a definite volume (e.g., water vapour) (7)

**gear** a rotating wheel-like device with teeth around its rim (287)

**gear train** a group of two or more gears that are meshed together (287)

**genus** a group of species that are related

**gills** organs enabling some aquatic animals to get oxygen from the water

**glacier** a large moving mass of compressed ice and snow (375)

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

**gravity** the attractive force between masses; causes objects to be attracted to Earth (53)

**groundwater** the water that has seeped down under Earth's surface to a depth of about 100 m (390)

**guard cells** in a plant leaf, cells that surround openings called stomata; can expand to close off the stomata

## H

**hard water** water that contains large amounts of dissolved salts (449)

**headland** an area of land that sticks out into a body of water

**headwaters** the source of a watershed (393)

**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 (429)

**heat engine** a device that continuously converts thermal energy to mechanical energy

**hemoglobin** [HEE-moh-gloh-bin] in red blood cells, an iron-rich chemical that binds oxygen, allowing the blood to carry more oxygen than it could otherwise

**hertz (Hz)** a unit of frequency equal to one cycle per second (239)

**heterogeneous** made up of parts, or mixed (15)

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

**holdfast** a structure at the bottom of sea weeds that attaches them to the ocean bottom

**homogeneous** the same in structure, quality, or kind (14)

**hormones** substances released from specific glands to control particular body activities. The hormone insulin, for example, regulates the body's burning and storage of sugar.

**horn** a sharp mountain peak carved by glaciers (381)

**humour** any of a number of fluids in the body, including those in the eye

**hydraulic lift** a mechanical system that uses a liquid under pressure in a closed system to raise heavy objects (307)

**hydraulic power** power that comes from the pressure of a liquid in a hydraulic system

**hydraulic system** a device that transmits an applied force through a liquid to move something else by means of pressure (80, 313)

**hydraulics** the study of pressure in liquids (80)

**hydrogen fuel cell** a cell that fuels a chemical reaction that uses hydrogen and oxygen from the atmosphere to make electricity (345)

**hydrometer** an instrument designed to measure the density of a liquid (67)

**hypothalamus** [hah-poh-THAL-ah-muhs] the part of the brain that regulates many body functions, such as temperature, hunger, thirst, sleep, and growth

**hypothesis** a testable proposal used to explain an observation or to predict the outcome of an experiment; often expressed in the form of an "If ..., then ..." statement.

## I

**ice age** any of the major periods when glaciers covered much of Earth. The most recent ice age ended about 11 000 years ago (385)

**ice cap** a large dome-shaped glacier that flows outwards from its centre and covers a large area, especially of land (375)

**icebergs** large chunks of floating ice that break loose or calve from continental glaciers as the glaciers flow downslope in the ocean (379)

**icefall** a frozen waterfall made when a glacier flows over a steep cliff (377)

**icefield** an area that feeds two or more glaciers (375)

**image** the likeness of an object

**impermeable** allowing no materials to pass through (128, 403)

**incandescence** [in-cand-E-sens] the emission of visible light by a hot object (180)

**incandescent source** [in-cand-E-sent] an object that can be heated to such a high temperature that it emits visible light (180)

**incident ray** the light that strikes a reflecting or refracting material (188)

**inclined plane** a ramp or slope for reducing the force needed to lift something (276)

**incoherent** referring to light, having many different wavelengths or one wavelength but the waves are not lined up (e.g., incandescent light) (246)

**incompressible** incapable of being squeezed into a smaller volume (73)

**infer** to conclude or decide by reasoning

**inference** a conclusion or opinion formed by inferring

**infrared radiation** heat radiation; anything that is warmer than its surroundings emits infrared rays (250)

**input work** work done on a machine (278)

**insoluble** not able to be dissolved in a particular solvent (24)

**intensity** brightness (of light); describes how much energy a surface will receive (178)

**internal combustion engine** a type of engine in which fuel is burned internally, that is, inside the engine (338)

**internal friction** the motion-resisting force between the surfaces of the particles making up a substance

**iris** in the eye, the coloured ring; works like the diaphragm of a camera (216)

**iris reflex** the natural adjustment in the eye's pupil size in response to varying light levels (217)

**issue** a problem with two or more possible resolutions of interest to members of society

## J

**joule (J)** a unit used to measure energy or work; 1 J = a force of 1 N moving through 1 m

## K

**kilopascal (kPa)** a unit of pressure equal to 1000 pascals (71)

**kinetic energy** the energy of motion (296)

**kilowatt hour (kW·h)** a unit of electrical energy; the amount of energy transmitted by one thousand watts of power over a period of one hour; 1 kW·h = 1000 W of power used for 1 h (184)

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

## L

**lake** a large area of water surrounded by land (390)

**land bridge** a narrow strip of land connecting larger land masses

**laser** a device for amplifying light to produce an intense, narrow beam; used in computer printers, surgical procedures, and other applications. The term stands for light amplification by the stimulated emission of radiation (246)

**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

**laws of reflection** the two main predictable behaviours of reflected light: 1. The angle of reflection ( $r$ ) is equal to the angle of incidence ( $i$ ). 2. The incident ray, the normal, and the reflected ray are always in the same plane. (194)

**lens** a curved piece of transparent material, usually glass or plastic. Light rays bend as they pass through a lens. (208)

**levels of organization** in organisms, the arrangement of structures from the simplest (i.e., cells) to more complex (i.e., tissues, organs, and organ systems) (140)

**lever** a machine consisting of a bar that is free to rotate around a fixed point, changing the amount of force that must be exerted to move an object (270)

**light** the form of energy we can see (176)

**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)

**liquid** the state of matter in which a substance has a definite volume, but no definite shape (e.g., water) (7)

**load** the weight of an object that is moved or lifted by a machine, or the resistance to movement that a machine must overcome (270)

**load arm** in a lever, the distance from the load to the fulcrum (270)

**longshore currents** ocean currents that run parallel to the shore (419)

**luminous** giving off its own light (188)

## M

**magnification** the apparent amount of enlargement produced by a microscope or similar magnifying instrument

**magnify** to make an object appear larger by using a microscope or another magnifying instrument (103)

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

**mass** the amount of matter in a substance; often measured with a balance (53)

**mass production** the manufacturing of large quantities of a standardized item by standardized mechanical processes (343)

**mean discharge** the volume of water flowing from a river into an ocean; measured in cubic metres per second ( $\text{m}^3/\text{s}$ )

**mechanical advantage** the ratio of the force produced by a machine or system (the load) to the force applied to the machine or system (the effort force) (278)

**mechanical mixture** mixtures that are obviously heterogeneous (15)

**melting** the process of changing from solid to liquid

**melting point** the temperature at which a solid changes to a liquid

**meltwater** the run-off from melting snow (384)

**meniscus** the slight curve at the top of a liquid where the liquid meets the sides of a container

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

**micrometre** a unit often used for measuring the size of cells; equal to one millionth of a metre; expressed by the symbol  $\mu\text{m}$

**microscope** an instrument that makes objects appear larger by bending light through a lens (104)

**microwave** a radio wave having a short wavelength and high frequency; used in microwave ovens, telecommunications satellites, and other applications (251)

**micro-organism** organisms so small, they can only be seen with a microscope

**millwell** a rounded hole in the ice formed by a stream as it melts its way downward through the ice (384)

**mixed layer** near the ocean surface, a layer of water in which winds and waves evenly mix heat from the Sun and other sources

**mixture** a combination of two or more pure substances such as that each one's properties are not lost, but may be hidden (13)

**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)

**moraine** a landform made of a glacial till (382)

**movable pulley** a pulley attached to something movable, such as a construction crane or oil derrick (292)

**multicellular** having many cells (115)

## N

**nanometre** one billionth of a metre; a unit used to measure radiation wavelength; abbreviated nm

**natural light source** a non-human-made source of light, such as the Sun (176)

**neap tides** the smallest tidal movements; occur when lines pointing from Earth to the Sun and the Moon are perpendicular to each other (423)

**near point** (of the eye) the shortest distance at which an object is in focus (215)

**near-sighted** unable to see distant objects clearly (210)

**nervous system** the body system that senses internal and external changes, and controls and co-ordinates body activities; includes the brain and nerves (151)

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

**neutral buoyancy** the condition in which the amount of force pulling down on an object immersed in a fluid (i.e., gravity) equals the amount of force pushing up (buoyancy) (65)

**non-luminous** a substance that does not give off its own light (183)

**non-point sources** sources of pollution that come from a wide area (406)

**normal** a reference line drawn perpendicular to a reflecting surface at the point where an incident ray strikes the surface (189)

**nuclear membrane** [NOO-klee-uhr] the thin, outer membrane that surrounds the cell nucleus; separates the contents of the nucleus from the cytoplasm

**nucleus** in a cell, an organelle that controls all the cell's activities

**nutrients** the substances in foods that provide energy and materials for cell development, growth, and repair

## O

**objective lens** the convex lens in a refracting telescope or microscope (221)

**objective mirror** the mirror in a reflecting telescope; also called the primary mirror (221)

**observation** the use of the senses to gather information; in science, often aided by instruments such as telescopes, thermometers, and balances

**ocean** the large body of salt water that covers almost three quarters of Earth's surface; any of its five main sections (the Pacific, Atlantic, Indian, Southern, and Arctic Oceans)

**ocean basins** deep, wide depressions in Earth's surface that contain the oceans

**ocean ridges** long undersea mountain ridges (414)

**opaque** [oh-PAEK] not allowing any light to pass through (185)

**optic nerve** the nerve that connects the eye to the brain (217)

**ore** a mineral, or group of minerals that contain a valuable substance

**organ** a group of different tissues that work together to perform a specific function (e.g., the heart) (140)

**organelle** a structure within a cell that has a specific function (e.g., mitochondrion) (122)

**osmosis** [oz-MOH-sis] the diffusion of a solvent, usually water, through a selectively permeable membrane (130)

**outflow** the water that flows out of a watershed (393)

**output work** the work a machine does on a load (278)

**outwash** material deposited by the meltwater from a glacier (382)

**ozone layer** a “blanket” of ozone (a form of oxygen) surrounding Earth about 20–25 km above the ground; acts like a filter, absorbing much of the Sun’s ultraviolet light (254)

## P

**pack ice** a floating sheet of ice rarely more than 5 m thick that breaks easily (379)

**palisade cells** in a plant leaf, a layer of cells that are filled with chloroplasts

**particle model of matter** a scientific model of the structure of matter; one part of this theory states that all matter is made up of extremely small particles

**pascal (Pa)** a unit for pressure; newtons per square metre (N/m<sup>2</sup>) (71)

**Pascal’s law** a law stating that when pressure is exerted on one part of a fluid, the same pressure is transmitted unchanged to all parts of the fluid, no matter what the shape of the container holding the fluid (307)

**permeable** allowing materials to pass through (128, 403)

**petrochemicals** products made from petroleum

**petroleum** a naturally occurring mixture of hydrocarbons

**phases** separate parts of a mechanical mixture (15)

**phloem tissue** [FLOH-EM] in plants, the tissue that transports sugars manufactured in the leaves to the rest of the plant (134)

**phosphorescence** [faws-fohr-E-sens] the persistent emission of light following exposure to and removal of a source of radiation (182)

**phosphorescent source** [faws-fohr-E-sent] a substance that gives off visible light released after the light energy has been absorbed by certain particles that have stored this energy for a while. The light continues for some time even after the substance is no longer exposed to the light. (182)

**photosynthesis** the process by which plants make their own food using sunlight

**phytoplankton** [fih-toh-PLANK-tuhn] the plant organisms in plankton

**pigments** natural food colouring matter of a cell

**piston** in an engine, a disc-shaped part that fits tightly inside a cylinder in which some force, such as steam pressure, moves it back and forth or up and down (334)

**plain** a generally flat or gently sloping area of land

**plane** a flat or level surface (194)

**plane mirror** a mirror having a flat surface (189)

**plankton** tiny, drifting organisms in the surface waters of the ocean

**plasma** the liquid portion of blood

**pneumatic system** [noo-MAT-ik] a system in which a gas, such as air, transmits a force exerted on the gas in an enclosed space (82, 313)

**pneumatics** [noo-MAT-iks] the study of pressure in gases

**point sources** sources of pollution that are small and defined (406)

**pond** a body of standing water, smaller than a lake, and surrounded by land (390)

**porous** having pores or tiny holes; allowing fluid to pass through

**potential energy** stored energy (296)

**potable** safe to drink (463)

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

**pressure** the force acting perpendicular to a certain surface area (304)

**prisms** in binoculars, glass blocks serving as plane mirrors; allow binoculars to be made shorter than telescopes (223)

**properties** characteristics that describe matter (13)

**protein** a nutrient essential for growth and repair of body tissues

**pulley** a wheel with a grooved rim to guide a rope or chain that runs along the groove; used to transmit or change the direction of force (292)

**pump** a machine used for raising or moving liquids (324)

**pupil** the opening in the eye; appears as the dark centre of the eye (216)

**pure substance** a material that contains only one kind of particle

## Q

**qualitative data** information gathered by observations in which no measurement takes 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

**radar** a device that uses the reflection of radio waves to determine the distance and location of unseen objects; the term stands for **radio detecting and ranging**



- radiant energy** energy transferred or emitted as waves or rays in all directions (176)
- radiate** to send out energy in the form of waves or rays (176)
- radiation** the transfer of radiant energy, such as light (176)
- radiation therapy** the use of gamma rays to destroy cancer cells (256)
- radio wave** any electromagnetic wave that is useful for carrying sounds or pictures through the air from a transmitter to a receiver (251)
- radius** the distance in a straight line from the centre of a circle to the circle's circumference (outer boundary) (285)
- rate of dissolving** how fast a solute dissolves in a solvent
- ray** a single line or narrow beam of light that originates from a light source and that may bounce off a surface that it strikes (184)
- ray diagram** a representation of the path of light by using a straight line with an arrow (184)
- ray model** a model of light based on the observation that light travels in a straight line
- recycling** the extraction and reprocessing of useful materials from waste for re-use
- reflected ray** the light that is cast back (reflected) from a reflecting surface (188)
- reflecting telescope** a telescope having a concave mirror to collect rays of light from a distant object (221)
- reflection** the casting back of light from a surface (188)
- refracting telescope** a telescope having a convex lens to collect and focus light from a distant object, and an eyepiece lens to magnify the image (221)
- refraction** the bending of light when it travels from one medium (material) to another (200)
- refrigerant** the cooling liquid in refrigerators
- residue** what remains after a part is taken; the material which is trapped on the filter paper or filtering device and does not pass through the system
- resistance to flow** the condition in which particles in a substance can move around but cannot easily pass each other
- respiratory system** the system that moves air in and out of the body; includes the lungs, bronchi, trachea, and nasal passages (146)
- responding variable** in an experiment, the factor that changes in response to a change in the manipulated variable
- retina** a light-sensitive area at the back of the eye (210)
- reverse osmosis** a process which may be used to desalinate water by pumping water through filters
- rivers** large, fast flowing bodies of water (391)
- rod** in the retina of the eye, a cylinder-like cell that detects the presence of light (234)
- root hair** on a plant root, an extension of a single epidermal cell. Water enters a root hair by osmosis (134)
- run-off** rainwater that flows off a land surface (392)
- S**
- salinity** the measure of the amount of salts dissolved in a liquid (411)
- salt water** water such as sea water with a high salt content (364)
- saturated solution** a solution in which no more solute will dissolve in a specific amount of solvent at a specific temperature (20)
- scale drawing** a drawing in which the objects appear in the same proportions as they are in reality
- 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-focused 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)
- scientific notation** a short form for writing very large or very small numbers (e.g.,  $3 \times 10^{11}$  means  $3 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$ )
- sea-floor vent** a crack in the ocean floor that releases heat and minerals (447)
- secondary colours** colours produced by the light of two additive primary colours. The three secondary colours are cyan, magenta, and yellow; also called subtractive colours. (233)
- sediment load** the total amount of sediment transported over a certain time
- selectively permeable** allowing only certain materials to pass through (128)
- septic tank** large underground container that stores sewage (465)
- sewage** waste materials that pass through sewers (465)
- shutter** in a camera, a device that opens the aperture to allow light to reach the film; can let more light reach the film by staying open longer (216)
- SI** (from the French *Le Système international d'unités*) the international system of measurement units, including such terms as kilogram, metre, and second
- society** a group of people united by common goals and interests
- soft water** water that contains less salts than hard water (449)
- solar spectrum** the pattern of colours in sunlight: red, orange, yellow, green, blue, indigo, and violet (230)

- solid** the state of matter in which a substance has a definite shape and a definite volume (e.g., ice) (7)
- soluble** able to be dissolved in a particular solvent (18)
- solubility** the mass of a solute that can dissolve in a given amount of solvent to form a saturated solution at a given temperature (200)
- solute** a substance that dissolves in a solvent (e.g., salt is a solute that dissolves in water) (18)
- solution** a homogeneous mixture of two or more pure substances (14)
- solvent** a substance that dissolves a solute to form a solution (e.g., water is a solvent that dissolves salt) (18)
- specialized** in living things, cells having different structures and appearances and performing different functions (138)
- species** a narrow classification grouping for organisms; e.g., a wolf is the species *Canis lupus*, while a dog is the species *Canis familiaris*
- spectrum** the series of coloured bands produced when white light is separated into its component wavelengths (230)
- speed** the rate of motion, or the rate at which an object changes its position (282)
- speed ratio** the relationship between the speed of rotations of a smaller gear and a larger gear (289)
- sphygmomanometer** [sfig-moh-ma-NAHM-e-tuhr] a device used to measure blood pressure
- 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
- spring** a small stream consisting of groundwater flowing naturally out onto the surface of Earth
- spring tides** the largest tidal movements; occur when Earth, Moon, and Sun are lined up (423)
- sprocket** a gear with teeth that fit into the links of a chain (289)
- static pressure** the force on an object exerted by a fluid when the fluid is not moving
- steam** the invisible gas into which water is changed by boiling
- steam engine** a steam-powered engine; often burns fuel such as coal or wood to change water into steam in a boiler outside the engine (332)
- stethoscope** [STETH-uh-skohp] a device for listening to sounds in the heart, lungs, and other body parts
- STS** an abbreviation for the interrelationships among science, technology, and societal issues
- stomata** the tiny openings on the underside of a plant leaf that let air into the leaf (singular stoma)
- streamflow** the speed and amount of water discharged by a watershed (400)
- streamlined** having a shape that moves easily through a fluid
- streams** small, fast flowing bodies of water (391)
- striations** scratches made in rocks by rock fragments carried by glaciers (380)
- sublimation** the process of changing from solid to gas without going through the liquid state
- subsystem** a secondary or subordinate system that is part of a larger system (326)
- subtractive primary colours** cyan, magenta, and yellow; described as subtractive because some portion of white light has been removed in order to get each colour; also called secondary colours
- supersaturated solution** a solution that contains more solute than would normally dissolve at a certain temperature (21)
- surface water** fresh water system above ground, including streams, rivers, ponds, wetlands, and lakes (390)
- suspension** a heterogeneous mixture in which particles settle slowly after mixing (15)
- sustainable resource** a resource which can be managed to provide a reliable supply to meet present and future needs
- swell** in the ocean, a long, smooth wave near the shore; caused by winds and storms far out at sea (417)
- system** a collection of parts that work together in such a way that a change in one part can result in a change in another part (140)
- T**
- table** an orderly arrangement of facts or numerical data set out for easy reference; for example, an arrangement of numerical values in vertical or horizontal columns
- technology** the application of scientific knowledge and everyday experience in solving practical problems by designing and developing devices, materials, systems and processes
- temperature** a measure of the thermal energy of the particles in a substance
- theory** an explanation of an event that has been supported by consistent, repeated experimental results and has therefore been accepted by a majority of scientists
- thermal energy** the total energy of the random motion of particles making up a substance
- thermocline** 200–1000 m below the ocean surface, a region in which temperatures decrease rapidly with increasing water depth
- tidal range** the difference in the water level between high tide and low tide; varies with the shape of the shoreline (423)
- tide** the slow rise and fall of the ocean surface, caused by the gravitational pull of the Sun and the Moon (423)
- till** unsorted material deposited by a glacier (382)
- tissue** a group of cells having the same structure and function (e.g., muscle, nerve, skin) (140)
- toxic substances** poisonous substances (451)
- trachea** [TRAE-kee-uh] the wind-pipe; part of the respiratory system

**trade winds** near the equator, winds that blow from the east to drive ocean currents westward (427)

**translucent** allowing some light to pass through. The light, however, is scattered from its straight path (185)

**transmission** energy is transferred from one place to another, and no energy is changed or converted (298)

**transmitted** passed along

**transparent** allowing light to pass through (185)

**transpiration** the loss of water from a plant through evaporation (135)

**trenches** narrow, steep-sided canyons running along some ocean-floor margins (414)

**trough** the low part of a wave, between crests (238)

**turbine** a device used to convert the motion of a fluid into mechanical energy; consists of fan blades attached to a central hub

## U

**ultraviolet (UV) radiation** wavelengths of 200 nm beyond violet light in the electromagnetic spectrum (nm = nanometre); causes tanning (254)

**unicellular** having a single cell (115)

**unsaturated solution** a solution in which more of the solute could dissolve in a specific amount of solvent at the same temperature (20)

**upstream** the direction from which a river flows

**upwelling** a type of vertical current flowing upward from the ocean floor to the surface

**user-friendly** easy to assemble and use

## V

**vacuole** [VA-kyoo-ohl] in a cell, a fluid-filled organelle that stores water, food, wastes, and other materials

**valley** a low stretch of land between higher areas of land. A river may flow through it.

**valley glacier** a glacier that forms between mountain ranges (376)

**valve** a device used to regulate the flow of a liquid in a hydraulic system (324)

**vaporization** the process of changing from liquid to gas

**variable** a factor that can influence the outcome of an experiment

**vascular tissues** in plants, tissues that connect the root system and the shoot system (134)

**vein** a blood vessel that carries blood back to the heart

**velocity** the speed of an object in a specified direction

**velocity ratio** in a set of gears, a comparison of how much farther (and faster) a smaller gear turns than a larger gear

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

**vent** an ocean-floor opening that releases hot water and gases from deep within Earth

**villus** a tiny, fingerlike projection on the inner lining of the small intestine (plural villi)

**virtual image** an image located where reflected rays only seem to originate (196)

**viscosity** the measure of how fast a fluid will flow; the “thickness” or “thinness” of a fluid (40)

**volume** the measurement of the amount of space occupied by a substance; measured in litres or cubic units such as cubic centimetres (cm<sup>3</sup>) (53)

## W

**water cycle** the process in which nearly all water on Earth moves continuously between the oceans, land, and atmosphere (368)

**water management** the process of maintaining a safe water supply (460)

**water monitoring** the regular observation and testing of a water supply

**water quality** the characteristics of a water resource that make it suitable or unsuitable for various uses (373)

**water quantity** the amount of water (373)

**water sampling** a technique for taking samples of water for testing

**water table** in the ground, the level beneath which porous rocks are saturated with water (403)

**water treatment** the purification of a supply of water (463)

**watershed** area of land that drains into a body of water (392)

**watt (W)** a unit of power equivalent to one joule per second; 1 W = 1 J/s (184)

**wave** in a body of water, a large ripple set in motion by steady winds; also, the way in which light travels (417)

**wetlands** areas such as swamps, marshes and bogs occurring in low areas; important habitats for many species of plants and animals (390)

**wave model of light** a way of explaining the behaviour of light; involves picturing it travelling as a wave (239)

**wavelength** the distance from crest to crest, or from trough to trough, of a wave of light as it travels through space; also used to describe the distance from crest to crest, or from trough to trough, of a water wave (238)

**weather** atmospheric conditions at a particular time and place, including temperature, moisture, cloudiness, and windiness

**weight** the force of gravity exerted on a mass (53)

**westerly winds** in temperate zones (e.g., near the Canada–United States border), winds blowing from the west that drive ocean currents eastward (427)

**wet mount** a type of sample preparation using a microscope slide, a cover slip, and water

**wheel and axle** a machine consisting of two turning objects attached to each other at their centres. One object causes the other to turn (e.g., a winch) (286)

**WHMIS** an acronym that stands for Workplace Hazardous Materials Information System

**winch** a machine consisting of a small cylinder, a crank or handle, and a cable; used for lifting and pulling (285)

**work** the transfer of energy through motion

## X

**X-ray** electromagnetic radiation having a very short wavelength; can penetrate substances such as skin and muscle (255)

**xylem tissue** [ZIH-lem] in plants, the tissue that conducts water and minerals absorbed by the root cells to every cell in the plant (134)

## Z

**zone of saturation** a layer of porous rock in which all pores are full of water

**zooplankton** [zoh-PLANK-tuhn] the animal organisms in plankton