

## How to Use This Glossary

This Glossary provides the definitions of the key terms that are shown in boldface type in the text. Definitions for other important terms are included as well. The Glossary entries also show the numbers of the topics where you can find the boldface words.

1.1 = Unit 1, Topic 1

U2P = Unit 2 Project

U3R = Unit 3 Review

SST1 = Science Skills Toolkit 1

NST1 = Numeracy Skills Toolkit 1

LST1 = Literacy Skills Toolkit 1

A pronunciation guide, using the key below, appears in square brackets after selected words.

a = mask, back

ae = same, day

ah = car, farther

aw = dawn, hot

e = met, less

ee = leaf, clean

i = simple, this

ih = idea, life

oh = home, loan

oo = food, boot

u = wonder, Sun

uh = taken, travel

uhr = insert, turn

s = sit

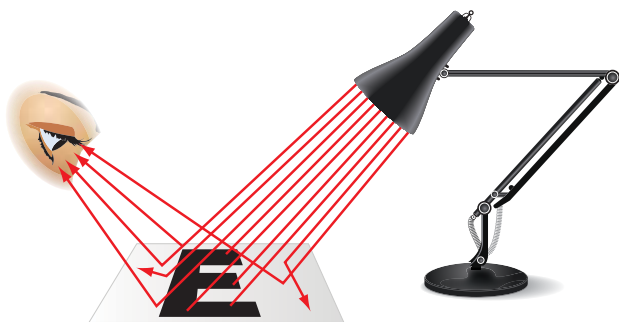
z = zoo

zh = equation

Emphasis is placed on the syllable(s) in CAPITAL letters.

## A

**absorption** *In Biology*: the process by which nutrients diffuse or are moved from the digestive system to the blood; *In Optics*: the process in which light energy remains in the object that it hits, and the light energy is converted into heat; as shown here, black text on a white page appears black because all light is absorbed (1.4, 4.2) ▼



**acid deposition** more commonly known as acid rain; precipitation that has a pH less than 5.6 (2.4)

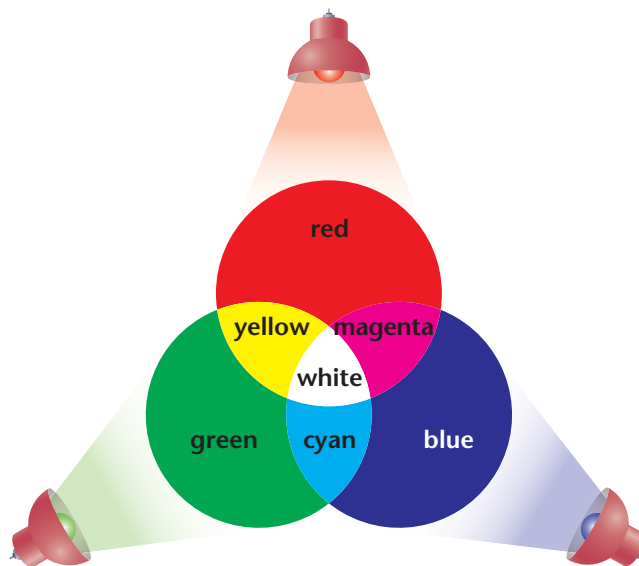
**acid reflux** pain around the chest and throat area, experienced when your stomach produces too much acid; also known as heartburn (2.4)

**acid** a compound that tastes sour, corrodes metals and tissue, and turns blue litmus paper red (2.4)

**acid-base indicator** a substance that changes colour when added to an acid or a base (2.4)

**actual load** carbon dioxide emissions per person for a vehicle based on how many seats are filled in an average trip (3.5)

**additive primary colours** red, green, and blue; when these colours of light are combined, they produce the additive secondary colours; if all three additive primary colours are overlapped, they “add up” to form white, as shown (4.3) ▼



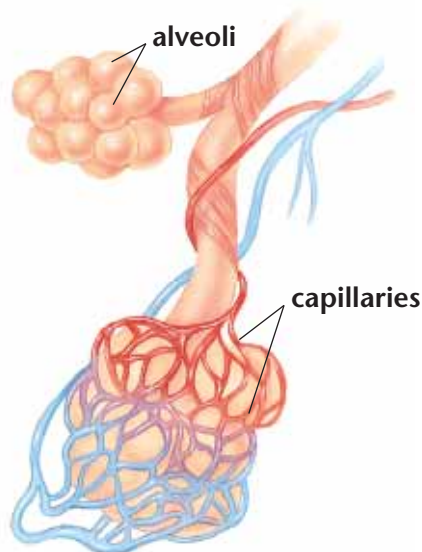
**additive secondary colours** cyan, magenta, and yellow; produced by combining the additive primary colours, as shown above (4.3) ▲

**after image** an image produced by staring at one image and then looking at a piece of white paper (4.3)

**air pressure** the amount of air pressing down on any land or water below it; as air warms, its molecules move farther apart and air pressure decreases (3.2)

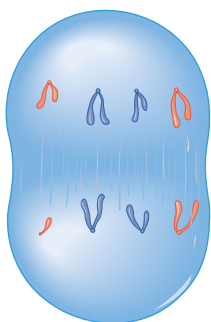
**alkali metals** [AL-kuh-lih MET-uhls] the Group 1 metals; have only one electron in their outer electron shell; the most reactive metals (2.2)

**alveoli** [AL-vee-OH-lih] air sacs in the lungs where gas exchange occurs (singular is alveolus) (1.4) ▼



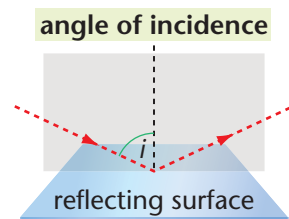
**analogy** a comparison that helps us understand something better (1.2, SST6)

**anaphase** [AN-uh-faez] the third phase of mitosis, when the chromosomes separate and move to opposite ends of the cell (1.2) ▼

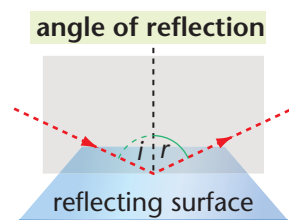


**anemia** [a-NEE-mee-uh] a condition resulting from too few red blood cells; people who are anemic are often tired (1.4)

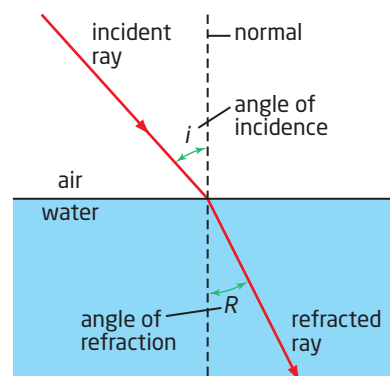
**angle of incidence ( $i$ )** the angle between the incident ray and the normal (4.4) ▼



**angle of reflection ( $r$ )** the angle between the reflected ray and the normal (4.4) ▼



**angle of refraction ( $R$ )** the angle between the refracted ray and the normal (4.5) ▼



**antacid** non-toxic base that is used to neutralize stomach acid; relieves the pain of excess stomach acid (acid reflux or heartburn) (2.4)

**anthropogenic** [AN-thruh-puh-JEN-ik] caused by humans (3.4)

**anthropogenic greenhouse effect** a process in which human-produced greenhouse gases in Earth's atmosphere absorb heat energy from the Sun and Earth's surface (3.4)

**anus** [AE-nus] part of the digestive system through which feces are eliminated (1.4)

**Aqua** an EOS (Earth Observing System) satellite that monitors water cycle interactions (3.5)

**arteries** thick-walled, elastic blood vessels that carry blood away from the heart (1.4)

**asthma** [AZ-muh] respiratory condition in which airways are inflamed and constricted (1.4)

**atherosclerosis** [A-thuhr-oh-skluhr-OH-sis] condition in which the arteries are increasingly blocked by a build-up of fatty deposits, slowing blood flow; can result in heart attack (1.5)

**atmosphere** the layer of gases above Earth's surface; helps to moderate (even out) temperatures so they are not too extreme; transfers heat around the globe (3.1, 3.3)

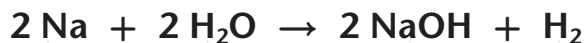
**atomic structure** the numbers of electrons, protons, and neutrons that an atom of an element has (2.2)

**Aura** an EOS (Earth Observing System) satellite that monitors ozone and air quality (3.5)

**average global temperature** an average calculated from air temperatures measured in numerous places worldwide (3.1)

## B

**balanced chemical equation** represents a chemical reaction using coefficients (numbers in front of the reactants and products) that tell you how much of the reactants are used and how much of the products are made (2.3) ▼



The 2 in front of Na means two atoms of Na or Na Na

The 2 in front of H<sub>2</sub>O means 2 sets of H<sub>2</sub>O  
2 × H<sub>2</sub> = H H H H  
2 × O = O O

The 2 in front of NaOH means 2 sets of NaOH  
2 × Na = Na Na  
2 × O = O O  
2 × H = H H

If there is no coefficient, it means a 1, so 1 set of H<sub>2</sub> = H H

**base** a compound that tastes bitter, has a slippery texture, corrodes tissue, and turns red litmus paper blue (2.4)

**benign** [buh-NIHN] non-cancerous (1.2)

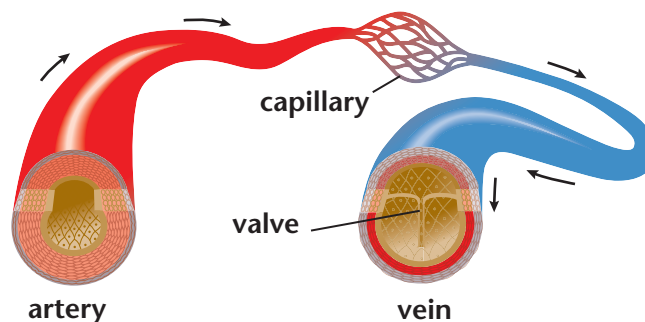
**bias** [BIH-us] a point of view that influences a decision and prevents a fair and balanced judgement (SST1)

**bioclimate profile** a method for communicating climate-projection information; a graph of temperature and moisture conditions of a particular site over a period of time (3.5)

**biofuel** any fuel that is derived from living (or very recently living) plant material; a renewable source of fuel (3.4)

**bioluminescence** [BIH-oh-LOOM-in-E-sens] light that is released through biochemical processes in living organisms (4.1)

**blood vessels** elements of the circulatory system that transport blood; include arteries, veins, and capillaries (1.4) ▼



**brain** a major organ in the nervous system; controls all body activities (1.3)

**breathing rate** the number of times a person inhales and exhales in one minute (1.4)

**bromothymol blue** [BROH-moh-THIH-mawl BLOO] an acid-base indicator that is blue in a base, yellow in an acid, and green when neutral (2.3, 2.4)

**bronchitis** [bron-KIH-tus] a respiratory condition in which airways (the branches leading to alveoli) are inflamed due to infection or irritation (1.4)

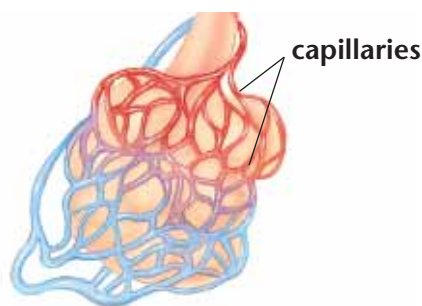
## C

**calcium carbonate** commonly known as lime; a chemical that is added to lakes affected by acid rain to neutralize the water (2.4)

**cancer** cells with abnormal genetic material that are dividing uncontrollably and can spread to other parts of the body (1.2)

**cap-and-trade system** a method of regulating carbon dioxide emissions; a limit (cap) is placed on carbon emissions, and corporations that produce *less* carbon than their limit may sell or trade their credits to corporations that produce *more* carbon than their limit; over time, the caps are gradually lowered. (U3R)

**capillary** [kuh-PIL-uh-ree] tiny blood vessels that play an important role in gas exchange (1.4) ▼



**carbon dioxide** second-most-abundant greenhouse gas; produced in and by the cells of most living organisms through cellular respiration (3.3)

**carbon footprint** the total amount of greenhouse gas emissions caused by an individual, company, or organization (3.5)

**carbon sink** a process that absorbs and stores carbon dioxide from the atmosphere (3.3)

**carbonate** a negative ion that consists of one carbon and three oxygen atoms, and has two negative charges; the four atoms remain attached and act as a unit in many chemical reactions; has the chemical formula  $\text{CO}_3^{2-}$  (2.3)

**carbonic acid** acid produced when carbon dioxide reacts with water to make a carbonated beverage; has the chemical formula  $\text{H}_2\text{CO}_3$  (2.4, U2P)

**carbon-tax system** a method of regulating carbon dioxide emissions; the government places a tax on either the source of carbon compounds or the emission of greenhouse gases; causes the price of anything that depends on carbon fuels to go up; results in consumers having an incentive to spend their money on alternatives that do not produce carbon emissions (U3R)

**cell cycle** the continuous series of events in the life of a cell in which it is born, grows, reproduces, and dies (1.2)

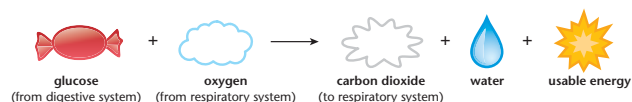
**cell differentiation** the series of events through which stem cells develop into specialized cells (1.3)

**cell membrane** semi-permeable membrane that separates the inside of the cell from the external environment; controls the flow of materials into and out of the cell (1.1)

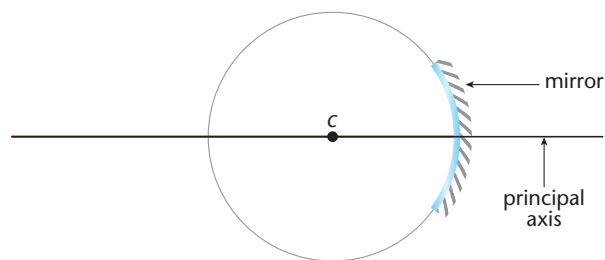
**cell specialization** refers to the fact that different types of cells have different structures and abilities that enable them to perform their functions efficiently (1.3)

**cell wall** a tough, rigid structure lying just outside a plant cell's membrane; provides support for the cell (1.1)

**cellular respiration** a process in the cells of most living things that converts the energy stored in chemical compounds into usable energy; the word equation for the process is shown here (1.4) ▼



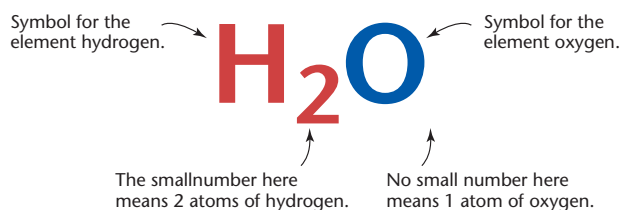
**centre of curvature (C)** the centre of the imaginary sphere that a curved mirror fits on (4.4) ▼



**chemical change** a change in which a new substance or substances are produced (2.1)

**chemical equation** an equation that uses chemical symbols to represent reactants and products in a chemical reaction (2.3)

**chemical formula** a group of letters and subscript numbers that represent the make-up of a chemical compound (2.2) ▼



**chemical reaction** a change in matter that produces new substances with new properties (2.1)

**chemiluminescence** [KEM-ee-loo-min-ES-uhns] light that is released during chemical reactions; the process that allows glow sticks to give off light (4.1)

**chlorofluorocarbons (CFCs)** [KLOR-oh-FLUHR-oh-kar-buns] damaging greenhouse gases; used in the past as solvents and as coolants in refrigerators, but banned due to the damage they cause to the atmosphere's ozone layer (3.4)

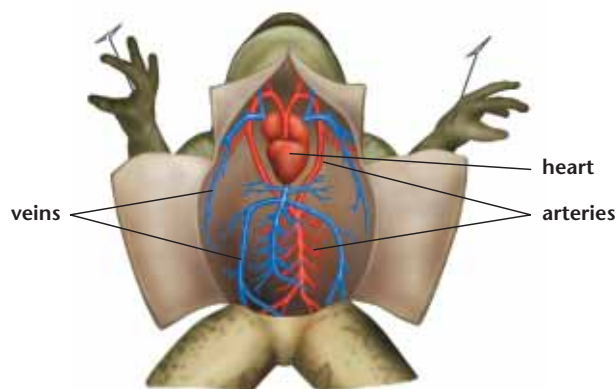
**chloroplasts** found only in plant cells; trap energy from the Sun to make glucose, which is broken down in the mitochondria to power cell activities (animals must get glucose from the food they eat) (1.1)

**cholera** [KAW-luhr-uh] a water-borne disease caused by bacteria; more common in warm, wet conditions; on the rise in some African countries due to climate change (3.2)

**chromatin** [KROH-muh-tin] coiled threads of DNA that are condensed so they can fit inside the nucleus (1.2)

**chromosomes** a super-condensed form of chromatin formed during cell division; because they are compact, they are a convenient way to pass on hereditary information when a cell divides. (1.2)

**circulatory system** transports blood, nutrients, gases, and wastes within the body; helps to control temperature, fluid balance, and acidity (1.3) ▼



**climate change** a change in the weather conditions that a region experiences over a long period of time; refers not only to changes in temperature patterns, but also to changes to long-term patterns in other parts of weather such as precipitation (rain and snow), wind, and storms (3.1)

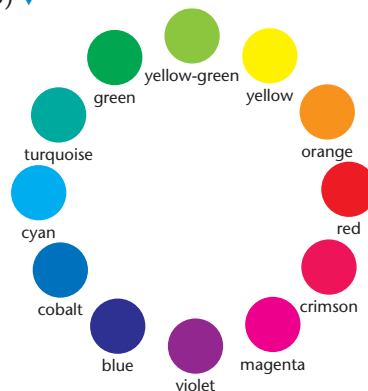
**climate projection** a prediction of how climate may change in the future, usually based on a global climate model (3.5)

**climate** the pattern of weather conditions within a region over a long period of time (3.1)

**coefficient** [KOH-ee-FI-shunt] the number in front of a product or reactant in a balanced chemical equation; tells you how much of the reactant or product is used (2.3)

**colon** [KOH-lun] a part of the large intestine in the digestive system (3.5)

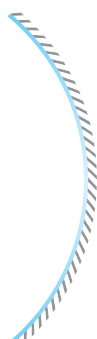
**colour wheel** a graphic organizer that summarizes the additive and subtractive primary colours, the secondary colours, the complementary colours, and the tertiary colours (4.3) ▼



**complementary colours** red/cyan, green/magenta, and blue/yellow; pairs of colours that can be combined to form white, or subtracted to form black; a primary colour and the secondary colour created by mixing the other two primary colours; colours that are directly across from each other on a colour wheel (4.3)

**concave lens** a lens that makes light rays move apart; curved inward on at least one side; also known as a diverging lens (4.6)

**concave mirror** a reflecting surface that curves inward or “caves in” in the centre (4.4) ▼



**conclusion** a statement that indicates whether your results support or do not support your hypothesis (SST2)

**concentrated** non-dilute; containing a large number of molecules of a substance in a given volume (2.1)

**concentration** the number of molecules of a substance in a given volume (1.1)

**conductivity** ability to conduct (transfer) electricity; can also refer to ability to transfer heat (2.2)

**cone cells** cells in the retina of the eye that receive and respond to colours of light (4.3)

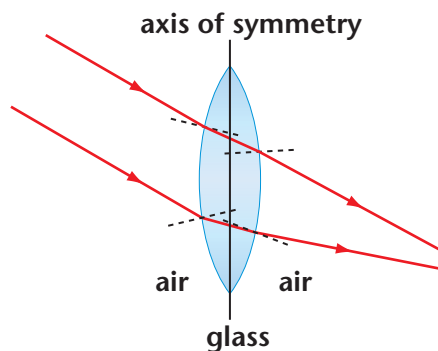
**conifers** [KAW-ni-fuhrs] cone-bearing trees, such as pine, spruce or fir; have needles instead of leaves (2.4)

**connective tissue** strengthens, supports, or connects cells and tissues (1.3)

**control** a test that an experimenter carries out with no variable; this test can be compared to a test in which an independent variable is manipulated by the experimenter, to see whether the independent variable does indeed cause a change in the dependent variable (SST2)

**converge** come together (4.6)

**converging lens** lens that makes light rays come together; curved outward on at least one side; also known as a convex lens (4.6) ▼



**convex lens** a lens that makes light rays come together; curved outward on at least one side; also known as a converging lens (4.6)

**convex mirror** a mirror that bulges out in the centre; shaped like the outside of a piece of a sphere (4.4) ▼



**coral** animal that lives in the ocean, in a close association with algae (3.2)

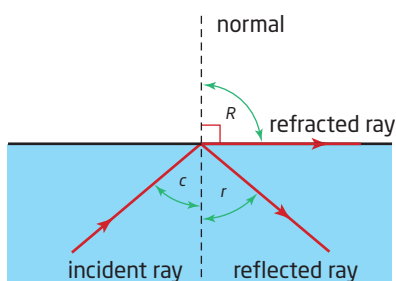
**coral bleaching** a process in which corals rid themselves of the algae that provides them with food; as a result, the coral turns white and dies; caused by increasing ocean temperature (3.2) ▼



**corrosion** a chemical reaction in which one substance, such as an acid, “eats away at” or “breaks down” the surface of another substance; many metals are easily corroded by acids (2.4)

**corrosive** used to describe a product that can burn your skin or eyes; if swallowed, it will damage your throat and stomach. (2.1)

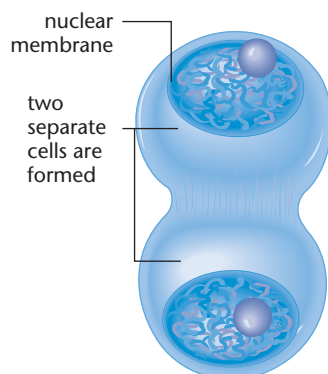
**critical angle** the angle of incidence for which the angle of refraction is  $90^\circ$ ; the angle of incidence gets so large that the angle of refraction is  $90^\circ$  (the angle of refraction cannot get any larger, because the refracted ray skims the boundary between the two media) (4.5) ▼



**Crohn’s disease** a condition that causes inflammation of the digestive system (1.5)

**CT (computerized axial tomography) scan** imaging technique that produces a 3-D image that looks like slices of the body; used to view hard tissue, such as bone, and to diagnose bone injuries and malformations (1.5)

**cytokinesis** [SIH-toh-kuh-NEE-sus] the stage in the cell cycle when the cytoplasm and organelles divide into two identical, separate cells (1.2) ▼

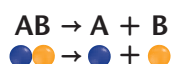


**cytoplasm** [SIH-toh-PLAZ-um] includes the organelles, and other life-supporting materials, such as sugar and water, all contained by the cell membrane (1.1)

**cytoskeleton** [SIH-toh-SKEL-uh-tuhn] filaments and tubules that provide a framework for the cell, helping it maintain its structure and providing “tracks” along which vesicles and organelles can move (1.1)

## D

**decomposition reaction** a type of reaction in which one compound breaks down into two or more simpler compounds or elements (2.3) ▼



**deep lake water cooling** a process that uses cold water pumped from the bottom of a lake as a heat sink for climate control systems; can reduce the electrical demands of large cooling systems (U3R)

**deforestation** a practice in which large areas of forest are cleared of their trees; results in less carbon dioxide being removed from the atmosphere through photosynthesis (3.4)

**dependent variable** the factor that is observed in a scientific test; also known as the responding variable (SST2)

**desertification** [duh-zuhr-tuh-fuh-KAE-shun] the spread of deserts; affects all organisms living in an area, including humans, due to lack of water for crops and drinking water (3.2)

**diaphragm** [DIH-uh-fram] a large muscle located directly beneath the lungs; it makes the lungs expand and contract (1.4) ▼







**electromagnetic waves** waves that carry electrical energy and magnetic energy (4.1)

**elephant seals** deep-diving marine mammals that are used to conduct deep ocean research on the impact of climate change on water temperature, salt level, and other factors (3.2) ▼



**elimination** process in which solid waste passes from the digestive system out of the body (1.4)

**emphysema** [EM-fiz-EE-muh] respiratory condition in which alveoli burst and fuse into enlarged air spaces (1.4)

**endocrine system** [EN-doh-krin SIS-tum] organ system that produces and releases hormones (chemical messengers); helps to coordinate the organ systems; responds to stress; helps to regulate fluid balance, acidity, and metabolism (1.3)

**endoplasmic reticulum** a network of membrane-covered channels that transport materials made in the cell; is connected to the nucleus (1.1)

**endoscopy** [en-DAWS-kuh-pee] an imaging process that is used to view internal body parts without cutting open the body; to diagnose diseases, take tissue samples, and perform surgeries (1.5)

**epithelial tissue** [e-pi-THÉE-lee-uhl TI-shyoo] body tissue that covers the external and internal body surfaces (1.3)

**esophagus** [e-SAW-fuh-gus] tube-like organ that pushes the food into the stomach using wave-like muscular contractions (1.4)

**ethanol** an example of biofuel, a renewable energy source that is derived from plant tissue (3.4)

**excretory system** [EX-kruh-TOH-ree or ex-KREE-tuh-ree SIS-tum] organ system that eliminates liquid waste from the body; helps to control fluid balance and acidity (1.3)

**explosive** used to describe a container that can explode if heated or punctured; flying pieces of metal or plastic from the container can cause serious injury, especially to eyes (2.1)

## F

**fair test** a scientific test with only one independent (manipulated) variable; a test that is valid and unbiased (SST2)

**family** a vertical column or group in the periodic table; all elements in a group have the same number of electrons in their outer electron shell, and share similar chemical and physical properties (2.2) ▼

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| H  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | He |
| Li | Be |    |    |    |    |    |    |    |    |    |    |    | B  | C  | N  | O  | F  | Ne |    |
| Na | Mg |    |    |    |    |    |    |    |    |    |    |    | Al | Si | P  | S  | Cl | Ar |    |
| K  | Ca | Sc | Ti | V  | Cr | Mn | Fe | Co | Ni | Cu | Zn | Ga | Ge | As | Se | Br | Kr |    |    |
| Rb | Sr | Y  | Zr | Nb | Mo | Tc | Ru | Rh | Pd | Ag | Cd | In | Sn | Sb | Te | I  | Xe |    |    |
| Cs | Ba | La | Hf | Ta | W  | Re | Os | Ir | Pt | Au | Hg | Tl | Pb | Bi | Po | At | Rn |    |    |

**feces** [FEE-sees] any undigested materials that remain in the digestive system after they have passed through the large intestine; stored in the rectum and eliminated through the anus (1.4)

**fibre optic** a cable containing many optical fibres—tiny glass fibres that transmit light (4.5)

**field of view** the circle that you see through the eyepiece of a microscope (SST5)

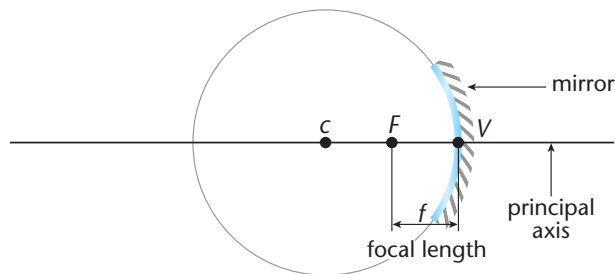
**filter** a material that allows only certain wavelengths (colours) of light to pass through it (4.3)

**flammable** used to indicate that a product or its fumes will catch fire easily if it is near heat, flames, or sparks; rags used with this product may begin to burn on their own (2.1)

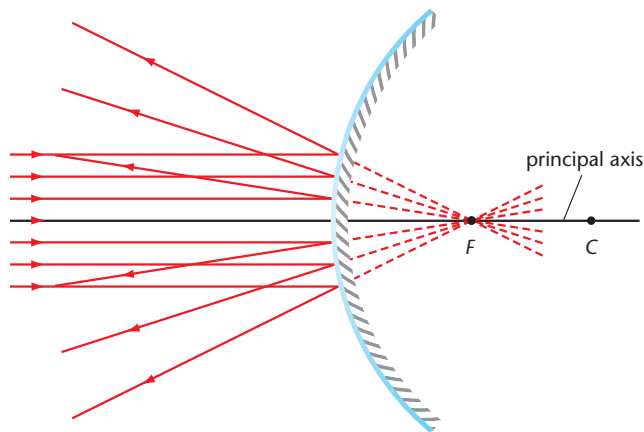
**fluorescence** [flohr-E-sens] a form of electric discharge in which the gases emit ultraviolet light, which transfers energy to a phosphor coating on the inside of a fluorescent bulb; the phosphor releases the energy as light (4.1)

**fluorocarbons** chemicals that are closely related to the non-stick coating on frying pans; carry and release large amounts of oxygen (1.5)

**focal length ( $f$ )** the distance from the vertex of a mirror or the centre of a lens to the focal point of the mirror or lens (4.4) ▼



**focal point ( $F$ )** the point where reflected rays meet when incident rays are parallel to and near to the principal axis; for a concave mirror, the focal point is in front of the mirror; for a convex mirror, extended rays meet at a focal point behind the mirror (4.4) ▼



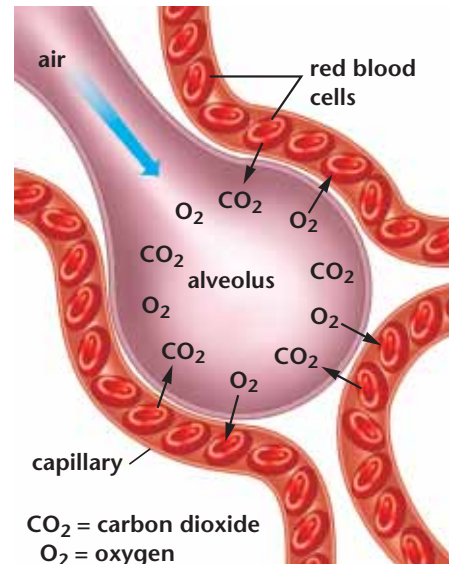
**fossil fuels** materials that are burned to carry out industrial processes, generate electricity, heat homes, and power vehicles; derived from once-living tissues; include coal, oil, and natural gas (3.4)

**fossils** remains of ancient organisms that are preserved in rock or other substances; the type of fossil in a certain place tells scientists what the climate must have been like there during that period (3.1, 3.5) ▼



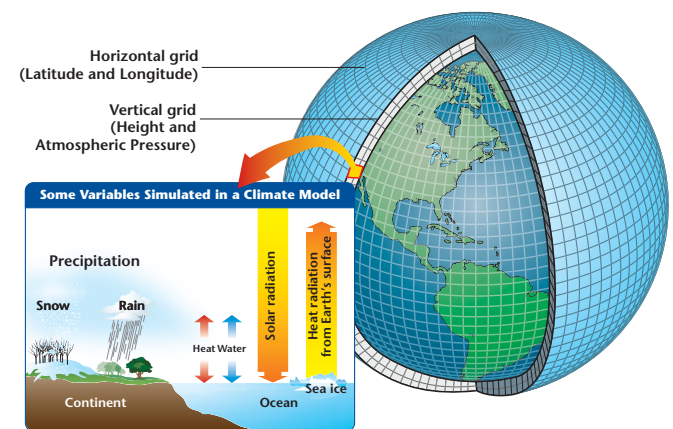
## G

**gas exchange** the process of taking in oxygen and releasing carbon dioxide (1.4) ▼



**gingivitis** [JIN-ji-VIH-tus] a swelling of the gums that surround the teeth (1.5)

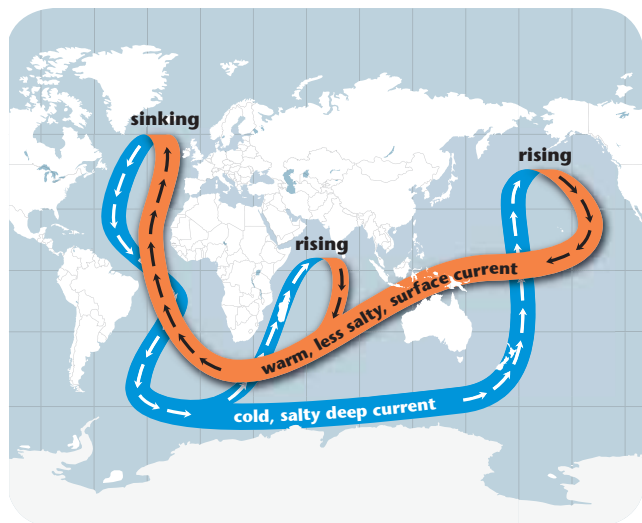
**global climate model** a computer program that uses mathematical equations to help scientists understand and estimate changes in Earth's climate (3.5) ▼



**global warming** an increase in average global (world-wide) temperatures; refers to an average increase in one part of weather—air temperature—as it affects the whole planet (3.1)

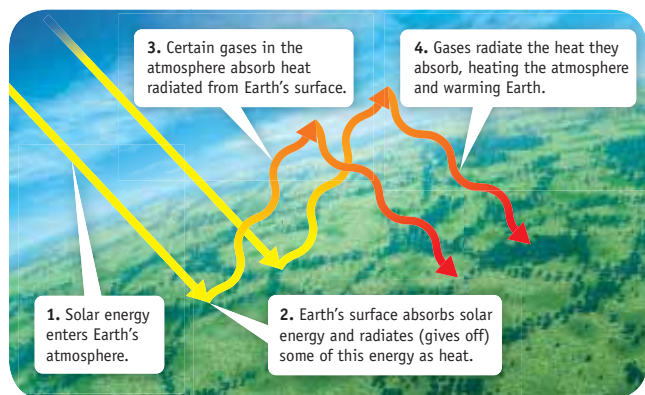
**Golgi body** [GOHL-jee BAW-dee] organelle that sorts and packages proteins and other molecules for transport out of the cell (1.1)

**great ocean conveyor belt** massive system of deep-water currents in the oceans that moves water and heat around the whole Earth; driven by differences in density arising from temperature and salt level (cold, salty water sinks; warm, less-salty water stays on the surface) (3.3) ▼



**Green Wall of China** the largest forestation project in the world; intended to preserve grassland in China from the rapidly expanding Mongolian Gobi Desert (3.2)

**greenhouse effect** a natural process in which certain gases in Earth's atmosphere absorb heat from the Sun as well as heat radiated from Earth's surface (3.3) ▼



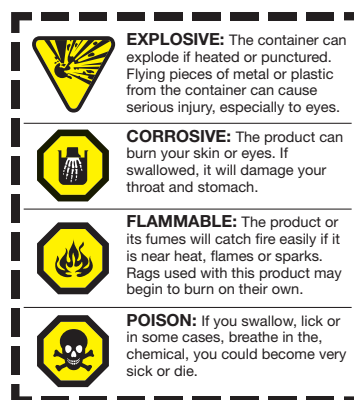
**greenhouse gases** gases in Earth's atmosphere that act like the air in a greenhouse, absorbing energy from the Sun and trapping heat in the atmosphere; major greenhouse gases are water vapour, carbon dioxide, methane, and nitrous oxide (3.3)

## H

**halocarbons** [HAE-loh-KAR-buns] the only greenhouse gases produced solely by human beings; industrial chemical compounds such as chlorofluorocarbons (CFCs) (3.4)

**halogens** Group 17 non-metals; their outermost electron shell is one electron short of being full; the most reactive non-metals (2.2)

**Hazardous Household Product Symbols (HHPS)** icons that appear on household product labels to warn of possible danger; display some basic safety information about a product (2.1) ▼



**heart rate** the number of times the heart beats in one minute (1.4)

**heart** the major organ of the circulatory system; pumps blood through the body (1.3)

**heat sink** something that can absorb heat and store heat (3.3)

**hydrogen electrolyser** [HIH-droh-jen e-LEC-truh-LIH-zuhr] a device that splits water into hydrogen and oxygen, and creates energy (2.3)

**hydrogen** an element that has only one electron; unique because it can behave like a metal or a non-metal; has only one electron in its outer shell, but needs only one electron to complete its outer shell (2.2)

**hydrogen peroxide** active ingredient in oxygen bleach; has the chemical formula  $H_2O_2$  (2.2)

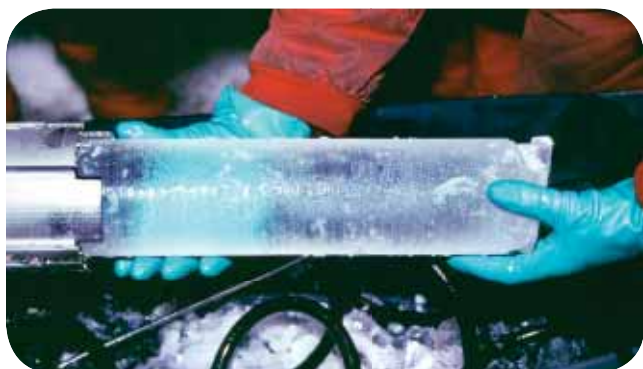
**hydrosphere** [HIH-drus-feer] water in all its different forms on Earth (3.3)

**hydroxide ion** a negative ion that consists of one oxygen atom and one hydrogen atom, and has one negative charge; the two atoms remain attached and act as a unit in many chemical reactions; has the chemical formula  $\text{OH}^-$  (2.3)

**hypothesis** a statement about an idea that you can test, based on your observations (SST2)

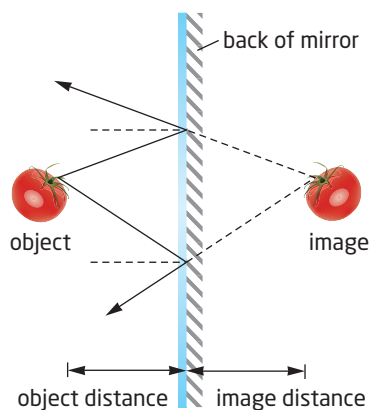
**ice age** a time period in Earth's history when glaciers covered a large part of Earth's surface; the last ice age began 26 000 years ago (3.1)

**ice core** a drilled sample of ice from Earth's polar regions; since a new layer of ice is deposited each year, a core reveals a record of the past (3.5) ▼



**ICESat** an EOS (Earth Observing System) satellite that monitors ice-atmosphere interactions (3.5)

**image distance** the distance from a mirror or lens to the image (4.4) ▼



**image** the reflection of an object in the mirror (4.4)

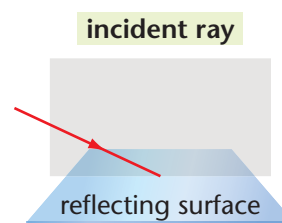
**immune system** an organ system that defends the body against infections (1.3)

**incandescence** [IN-kan-DES-uhns] light given off by an object because it is very hot (4.1) ▼



**incandescent light bulb** a bulb in which electrical current runs through a tiny metal filament, making the filament so hot that it glows (4.1) ▲

**incident ray** a light ray travelling toward a mirror or other surface (4.4) ▼



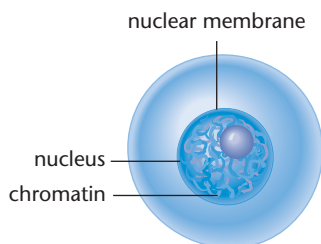
**independent variable** the factor that the experimenter manipulates in a scientific test; also known as the manipulated variable (SST2)

**industrial revolution** a period in history that started about 300 years ago, when people who lived in the countryside began moving to cities to work in factories; factories used steam engines fueled by the burning of coal (3.4)

**ingestion** [in-JES-chun] the process in which food is taken into the body (1.4)

**integumentary system** [in-TEG-yoo-MEN-tuh-ree SIS-tum] an organ system that includes the skin, hair, and nails; provides a protective barrier around the body; receives sensory information; helps to control body temperature (1.3)

**interphase** the stage in the cell cycle when a cell grows and carries out its usual functions, as well as making a copy of its DNA and organelles to prepare for cell division (1.2) ▼



**inverted** an image that is oriented opposite to the image; (the image is upside down compared with the object) (4.4)

**ion** [IH-uhn] an atom or a group of atoms that has an electrical charge, either positive or negative (2.2)

**ionic compound** a compound composed of oppositely charged ions; forms because the positively charged metal ions attract the negatively charged non-metal ions; is solid at room temperature, has a very high melting point, and conducts electricity when melted or dissolved in water (2.2)

**i-pill** “intelligent pill;” can deliver medication directly to where it is needed, and then electronically release a pre-measured amount at that location; contains a microprocessor, battery, pH sensor, temperature sensor, wireless transceiver, fluid pump, and reservoir for the medication (1.5)

**issue** a topic that can be seen from more than one point of view (SST1)

**IUPAC** (International Union of Pure and Applied Chemistry) a group of chemists from around the world; the group agrees on a set of chemical symbols that are used in the periodic table and in chemical formulas all over the world (2.2)

## K

**kidneys** organs that produce urine by filtering wastes and excess water from the blood (1.3)

**kinetic energy** energy of motion (4.1)

**krill** tiny animals at the bottom of the aquatic food chain that feed on microscopic plants called plankton; declining numbers of krill have an impact on the many organisms that feed on them (3.2)

**Kyoto Protocol** [KYOH-toh PROH-toh-kawl] a commitment to reduce greenhouse gas emissions by six percent below 1990 levels by 2012; signed on April 29, 1998 (U3R)

## L

**Landsat** an EOS (Earth Observing System) satellite that monitors remote sensing and land mapping (3.5)

**large intestine** a tube-like organ in the digestive system; reabsorbs water and some nutrients from undigested food (1.4)

**larynx** the organ that produces the sound of your voice; air flows into the throat and passes through the larynx (1.4)

**law of conservation of mass** during a chemical reaction, the total mass and number of atoms of the reactants equal the total mass and number of atoms of the products (2.3)

**law of reflection** the angle of reflection is equal to the angle of incidence; the reflected ray and the incident ray are on opposite sides of the normal; the incident ray, the normal, and the reflected ray lie on the same plane (4.4)

**LCD** liquid crystal display (4.3)

**left atrium** the upper-left chamber of the heart; receives oxygen-rich blood from the lungs (1.4)

**left ventricle** the lower-left chamber of the heart; pumps oxygen-rich blood to the body cells (1.4)

**lens** a thin piece of glass or plastic that has at least one curved side (4.6)

**line of best fit** a smooth curve or straight line that has the general shape outlined by the points on a graph; drawn so that it comes as close to most of the points as possible (NST2)

**litmus paper** an acid-base indicator that often comes in two colours—red and blue; acids turn blue litmus paper red, while bases turn red litmus paper blue (2.4) ▼



**Little Ice Age** a period beginning in 1500 that had lower-than-normal average global temperatures (3.1)

**liver** an organ that cleans the blood and stores substances such as certain vitamins and minerals (1.3)

**location** the position of an image relative to a mirror or lens (4.4)

**luminescence** [LOO-min-E-sens] light given off by an object that has not been heated; may be in the form of fluorescence, electric discharge, or chemiluminescence (shown here) (4.1) ▼



**luminol** [LOO-min-awl] a compound that reacts with hydrogen peroxide in the presence of blood to give off light (2.3)

**lungs** respiratory organs that draw oxygen-rich air into the body and remove carbon-dioxide rich air from the body (1.3)

## M

**magnification** whether an image is smaller than, larger than, or the same size as the object (4.4)

**malignant** cancerous (1.2)

**mass** the amount of matter in a substance or object (SST3)

**Material Safety Data Sheet (MSDS)** information about the composition and properties of a chemical substance, as well as steps for handling and storing it safely (2.1)

**medical imaging technologies** technologies that are used to make images of cells, tissues, and organs (1.5)

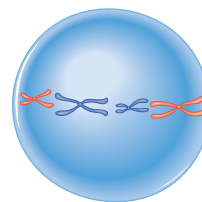
**medium** the substance or material that light is travelling through (the plural of medium is *media*) (4.5)

**meniscus** the slight curve where a liquid touches the sides of its container (SST3)

**metals** elements left of the metalloid “staircase” on the periodic table; all metals except mercury are malleable, shiny, conduct heat and electric current, and are solids at room temperature (2.2)

**metamaterials** human-made materials that cause light to bend in ways that it normally wouldn’t, including backwards and around objects; allow light waves to reconnect after bending around an object, making the object appear invisible (4.4)

**metaphase** the second phase of mitosis, when the chromosomes align in the centre of the cell (1.2) ▼



**methane** a foul-smelling gas released by bacteria in the digestive system as they break down food; also released by microorganisms that live in wetlands or melting permafrost; released by openings in Earth’s crust; a major greenhouse gas (1.4, 3.3)

**microscopy** [mih-KRAWS-kuh-pee] a group of techniques that are conducted using a variety of microscopes, including light microscopes and electron microscopes; used to view small objects, such as cells, and to diagnose various diseases (1.5)

**misconception** an idea about something that is false, misleading, or based on incomplete or false assumptions (3.1)

**mitochondria** [MIH-toh-KAWN-dree-uh] organelles responsible for releasing energy from glucose to fuel cellular activities (singular: mitochondrion) (1.1)

**mitosis** the stage in the cell cycle when the contents of the nucleus separate into two identical copies (1.2)

**mnemonic** [ne-MAW-nik] a memory aid that reminds you of one or more important terms, facts, etc.; for example, the word **LOST** could be used to remember the characteristics of an image: **L**ocation, **O**rientation, **S**ize, and **T**ype (1.2)

**model** anything that helps you understand a concept or process; can be a mental picture, a diagram, a structure, a working device, a chemical equation, or even a mathematical expression; can also be used to simplify a situation to allow you to test an hypothesis under conditions in which only one independent variable is changing (SST2, SST6)

**molecular compounds** compounds that form when non-metal atoms share electrons with each other; may be solids, liquids, or gases at room temperature; have lower melting points than ionic compounds; do not conduct electric current when they are melted or dissolved in water, except in the case of certain acids (2.2)

**MRI (magnetic resonance imaging) scan** a medical imaging technique that creates images of the body using radio waves and a magnetic field; used to contrast soft tissue (such as organs) and hard tissue (such as bones) and to diagnose disease in soft tissues and organs (1.5)

**muscle tissue** tissue that allows body parts to move, exert force, or change shape (1.3)

**muscular system** organ system that moves body parts, such as arms, and organs, such as the stomach; maintains posture (1.3)

**mutation** a change in the hereditary information carried in a cell's DNA (1.2)

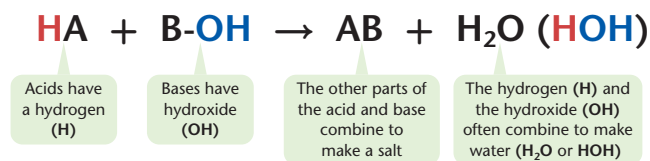
## N

**natural greenhouse effect** a natural process in which certain gases in Earth's atmosphere absorb heat from the Sun as well as heat radiated from Earth's surface (3.4)

**nervous system** an organ system that gathers and interprets sensory information from outside and inside the body; coordinates all the functions of other organ systems (1.3)

**nervous tissue** senses, conducts, and transmits information (1.3)

**neutralization reaction** [NOO-truh-lih-ZAE-shun ree-AK-shun] a chemical reaction between an acid and a base that "neutralizes" their acidic and basic properties (2.4) ▼



**ninhydrin** [nin-HIH-drin] a compound that reacts with chemicals in human skin; reveals fingerprints on surfaces (2.3)

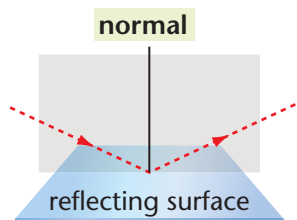
**nitrate** a negative ion that consists of one nitrogen and three oxygen atoms, and has one negative charge; the four atoms remain attached and act as a unit in many chemical reactions; has the chemical formula NO<sub>3</sub><sup>-</sup> (2.3)

**nitrous oxide** greenhouse gas produced when certain species of bacteria break down nitrogen-rich compounds for food; absorbs 300 times more heat than carbon dioxide does (3.3, 3.4)

**noble gases** the Group 18 elements; have a full outer electron shell (eight electrons), which makes them unreactive (2.2)

**non-metals** the elements on the right of the periodic table; are not malleable, do not conduct heat or electric current, and can be solids, liquids, or gases at room temperature (2.2)

**normal** a line perpendicular to a surface, such as a mirror, or a boundary between two substances, such as air and water (4.4) ▼



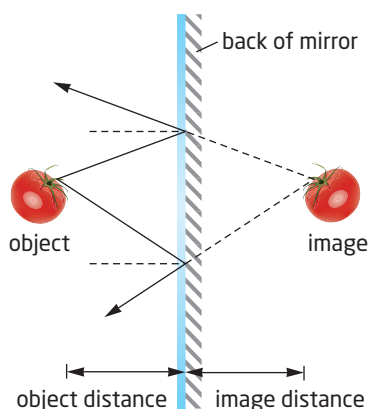
**nuclear membrane** a semi-permeable membrane that separates the nucleus from the rest of the cell and regulates the passage of substances into and out of the nucleus (1.2)

**nucleus** organelle that controls all cell activities (1.1)

**numerical prefix** a syllable that can be added to the beginning of a word to indicate the number of units present (2.2)

## O

**object distance** the distance from a mirror or lens to the object (4.4) ▼

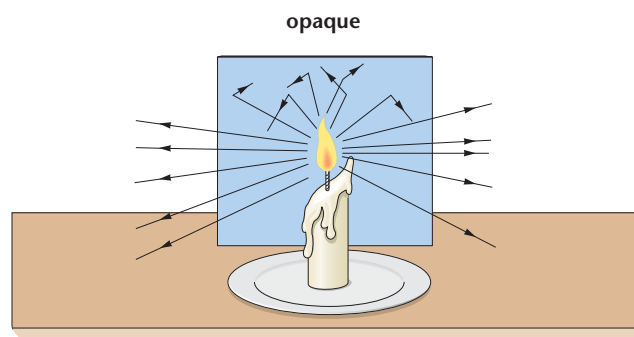


**object** the item in front of the mirror or lens (4.4)

**ocean-spray ships** a proposed method of reducing global warming; ships that would spray tonnes of cloud-forming saltwater particles into the air, creating clouds that would reflect solar energy and reduce the amount of heat trapped by greenhouse gases (3.5) ▼



**opaque** [oh-PAEK] a property of an object that will not allow any light to penetrate it (4.2) ▼



**optical fibre** made of a tiny glass fibre, called the core, which is about the size of a human hair, and a cladding (protective coating) made of a different type of glass, that covers the core; sends light in pulses, carrying information long distances at nearly the speed of light (4.5)

**organ** different tissues working together to perform a specific task; connective, nervous, and epithelial tissues make up the brain, shown below (1.3) ▼





**organelle** a structure within a cell that carries out specific functions to support the life of the cell; functions include bringing in nutrients, removing wastes, generating and releasing energy for the cell to use, making substances that the cell needs, and reproducing (1.1)

**organic** containing or grown using only substances found in nature; for example, fruit or vegetables grown without the use of pesticides (1.5)

**organic compounds** compounds containing mostly carbon and hydrogen; some also contain oxygen, sulfur, and a few other elements (2.2)

**organ system** a group of organs that interact with each other to perform a common task; the circulatory system (shown) includes the heart, arteries, and veins (1.3) ▼



**orientation** how an image is oriented vertically relative to an object; whether an image is oriented in the same direction as the object (right side up or upright) or in the opposite direction as the object (upside down or inverted) (4.4)

**osmosis** the movement of water molecules across a membrane in response to concentration differences (1.1)

## P

**period** a horizontal row in the periodic table; the period number represents the number of electron shells in the atoms of an element (2.2)

**peristalsis** [pae-ri-STAWL-sis] wave-like muscle contractions that move food through your digestive system (1.4)

**permafrost** the permanently frozen layer of soil found in Canada's far north (3.2)

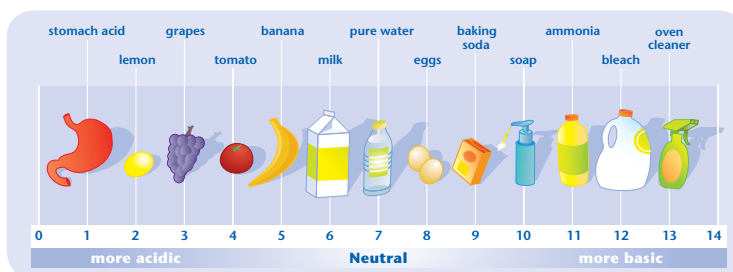
**perpendicular** at an angle of  $90^\circ$  (4.4)

**pesticides** chemicals that are used to control and kill weeds and insects (1.5)

**PET (positron emission tomography) scan** an imaging technique that involves scanning small amounts of radioactive materials that have been taken into the body; reveals details of soft tissues and organs; used to diagnose cancer or track cancer treatments (1.5)

**pH paper** an acid-base indicator that has a different colour for each pH (2.4)

**pH scale** a scale from 0 to 14 that describes how acidic or basic a substance is (2.4) ▼



**photosynthesis** a process in the cells of plants, algae, and some bacteria that converts light energy from the Sun into stored chemical energy that can be used by organisms (2.1)

**physical change** a change in which no new substances are produced; a substance simply changes its appearance (2.1)

**pigments** compounds that absorb different colours (wavelengths) of light (4.3)

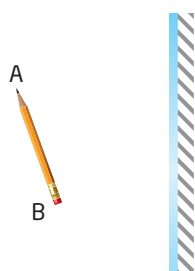
**pixel** a tiny spot on a TV screen or monitor that is produced by a combination of red, green, and blue light; a magnified view of a TV screen reveals the pixels that make up the image (4.3) ▼



**plagiarism** [PLAE-juh-ri-zum] copying information word-for-word and then presenting it as though it is your own work (SST7)

**plane** flat surface (4.4)

**plane mirror** any smooth, flat reflecting surface; often represented in diagrams as a straight line with hatch marks (short diagonal lines) on the non-reflecting side, as shown here (4.4) ▼



**plankton** microscopic plants that are a vital part of aquatic ecosystems; krill and larger organisms feed on plankton (3.2)

**pneumonia** [noo-MOHN-yah] respiratory condition in which the alveoli fill with thick fluid (1.4)

**poison** term used on product labels to indicate that you could become very sick or die if you swallow, lick, or, in some cases, breathe in the chemical (2.1)

**potential capacity** refers to the amount of carbon dioxide emitted per person when all the seats are filled in a vehicle (3.5)

**precipitate** the solid substance that appears in some chemical reactions when two clear solutions are mixed (2.3) ▼

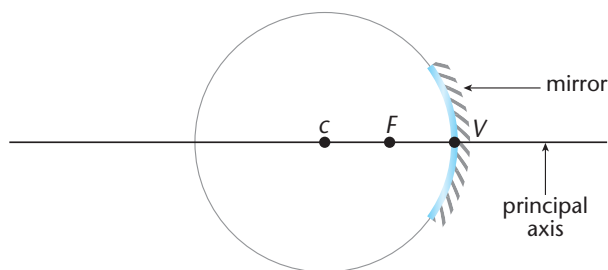


**prediction** a forecast about what you expect to observe (SST2)

**prefix** a syllable that can be added to the beginning of a word to change its meaning (2.2)

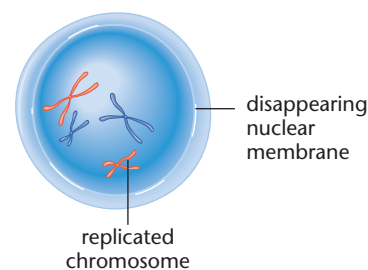
**primary colours** three colours which, when combined in different amounts, can generate any other colour (4.3)

**principal axis** a line drawn normal to the centre of a spherical mirror or a lens; always goes through the centre of curvature, C (4.4) ▼



**products** new substances produced in a chemical reaction (2.1)

**prophase** the first phase of mitosis, when the nucleus and nuclear membrane disappear and chromosomes form (1.2) ▼



**protractor** device used to measure angles (4.4, SST3)

## Q

**qualitative observation** an observation in which numbers are not used (SST2)

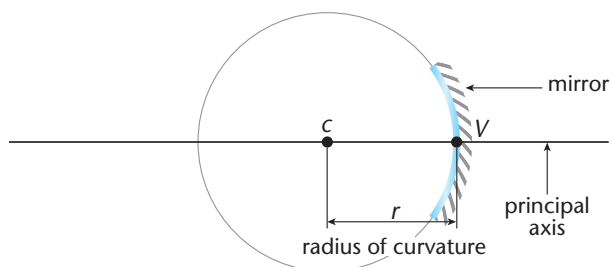
**quantitative observation** an observation that uses numbers (SST2)

**QuickSCAT** an EOS (Earth Observing System) satellite that monitors wind speed and direction (3.5)

## R

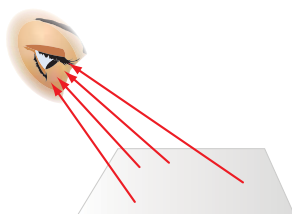
**radar** [RAE-dahr] technology used to track storms by detecting precipitation that is forming inside clouds; works by emitting short pulses of microwaves, which strike water droplets and ice crystals in the atmosphere and then bounce back to a receiver; used to create an image of cloud cover and precipitation (3.5)

**radius of curvature** the distance between  $C$  and  $V$ , or the radius of the sphere that the mirror fits on (4.4) ▼



**ray diagrams** diagrams that demonstrate light rays, and allow you to make predictions about the way light behaves (4.2)

**ray** an arrow that shows the direction in which light is travelling (4.2) ▼



**reactants** substances that react together in a chemical reaction (2.1)

**reactive** describes the likelihood of an atom taking part in a chemical reaction and forming a compound (2.2)

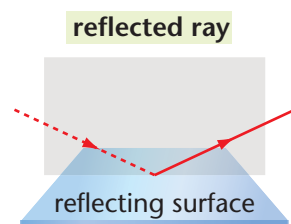
**reading stone** a converging lens that is placed directly on a page of print to magnify the text; used by monks and scholars around 1000 C.E. (4.6)

**real** an image that is formed when light rays meet and do not have to be extended backwards; (if a screen is placed at the location of an image, the image will appear on the screen) (4.4)

**rectum** part of the digestive system where feces are stored; located between the large intestine and the anus (1.4)

**red blood cells** blood cells that carry oxygen and carbon dioxide in the blood (1.4)

**reflected ray** a light ray that has “bounced” off a reflecting surface (4.4) ▼

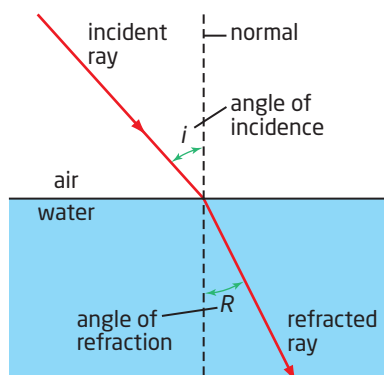


**reflection** the process in which light “bounces off” the surface of an object and travels in another direction; can also refer to the image produced when this process occurs (4.2) ▼



**refracted ray** a light ray after it has crossed a boundary between two media (4.5)

**refraction** the change in the direction in which light is travelling when it crosses a boundary between two media (4.5) ▼



**regeneration** the ability to grow new cells to replace damaged or lost body components (1.2)

**regenerative medicine** [re-JEN-ruh-tiv MED-uh-sin] process of producing new cells, tissues, and organs to replace damaged body parts (1.5)

**reproductive system** organ system that produces eggs (in females) and sperm (in males); produces estrogen, testosterone, and the other sex hormones; in females, allows for the growth and delivery of offspring (1.3)

**respiratory system** organ system that controls breathing; delivers oxygen to the blood and removes carbon dioxide from the blood (1.3) ▼



**ribosomes** organelles that help to produce proteins, which make up much of a cell's structure and are required for activities necessary for the cell's survival; some ribosomes float in the cytoplasm, and others are attached to the endoplasmic reticulum (1.1)

**right atrium** the upper-right chamber of the heart; receives carbon dioxide-rich blood from the body (1.4)

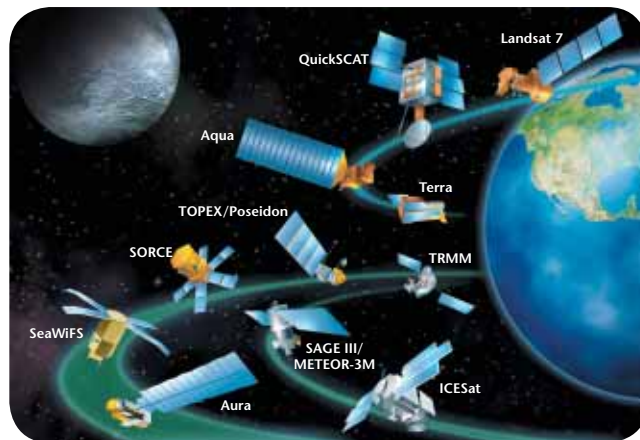
**right ventricle** the lower-right chamber of the heart; pumps carbon-dioxide-rich blood into the lungs (1.4)

**ruminants** [ROO-muh-nunts] cud-chewing animals, such as cows and sheep; release large quantities of methane during the process of digesting their food (U3R)

## S

**SAGE III/METEOR-3M** an EOS (Earth Observing System) satellite that monitors atmospheric particles and gases (3.5)

**satellite** human-made object or vehicle that orbits Earth, the Moon, or other bodies in space; EOS (Earth Observing System) satellites can make detailed observations of the whole planet in a single day (3.5) ▼



**scale drawing** a drawing that is proportional to the size of an object (SST5)

**sea turtles** turtles that spend most of their lives at sea, returning to land to lay eggs; threatened by rising sea levels (3.2)

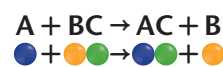
**SeaWiFS** an EOS (Earth Observing System) satellite that monitors ocean-atmosphere interactions (3.5)

**secondary colours** the colours generated by combining two primary colours; additive secondary colours are cyan, magenta, and yellow (4.3)

**semi-permeable membrane** a barrier that lets water and some molecules diffuse across it, but keeps molecules of other substances from penetrating it (1.1)

**significant digits** all the certain digits in a measurement, plus the first uncertain digit; represent the amount of uncertainty in a measurement (NST 1)

**single displacement reaction** a type of chemical reaction in which one element takes the place of another element in a compound (2.3) ▼



**size** whether an image is larger or smaller than an object; sometimes called the magnification of the image (4.4)

**skeletal system** organ system that provides a framework for muscles to attach to, protects the soft organs, makes blood cells, and stores minerals (1.3)

**small intestine** organ in the digestive system; nutrients from food are absorbed into the bloodstream here (1.4)

**smelter** a factory where metal is extracted from ore (2.4)

**sodium fluoride** a compound that reacts with the calcium in your teeth to resist the effects of tooth decay (2.4)

**sodium hydrogen carbonate** baking soda (2.1)

**sodium hypochlorite** active ingredient in chlorine bleach (2.2)

**sodium rhodizonate** a compound that is used to detect the presence of lead from gunshot residue (2.3)

**solar desalination** [SOH-luhr dee-sal-i-NAE-shun] a process that uses solar energy to remove salt from ocean water (3.5)

**solar energy** light and other forms of energy that the Sun gives off; can be converted into electrical energy (3.3)

**solubility** ability to dissolve in a liquid; solubility usually refers to ability to dissolve in water (2.2)

**SORCE** an EOS (Earth Observing System) satellite that monitors incoming solar energy (3.5)

**specialized cells** cells that have differentiated, or developed special characteristics that make them well suited to their function; red blood cells take on a flattened circular shape with a depression in the middle (1.3) ▼

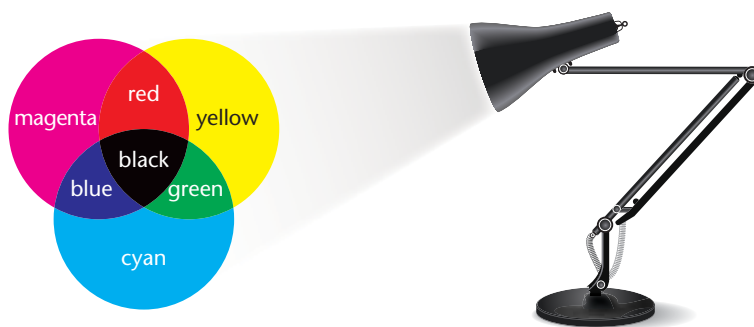


**stomach** digestive organ that churns and digests food (1.3)

**storm surge** a change in sea level caused by a hurricane or other storm (3.2)

**subscript numbers** small numbers at the base of larger letters; tell you how many atoms of these elements are in a compound; for example, in O<sub>2</sub>, the subscript 2 indicates there are two atoms of oxygen (2.2)

**subtractive primary colours** cyan, magenta, and yellow; a variety of combinations of these three colours can subtract light from white light to produce nearly any colour (4.3) ▼

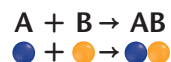


**subtractive secondary colours** red, green, and blue; the colours produced by subtracting equal amounts of two of the three subtractive primary colours; same as the additive primary colours (4.3)

**summer tanagers** Canadian birds that are threatened by climate change because they are not making their annual trip south for the winter (3.2) ▼

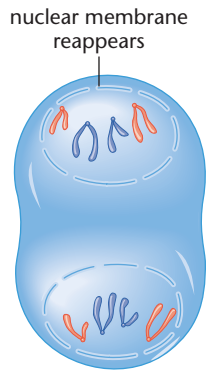


**synthesis reaction** a chemical reaction in which two or more reactants combine to produce a new product (2.3) ▼



## T

**telophase:** the fourth phase of mitosis, when the membrane surrounding the nucleus re-forms, creating two new nuclei (1.2) ▼



**temperature** a measure of the thermal (heat) energy of the particles of a substance; a measure of how hot or how cold something is (SST3)

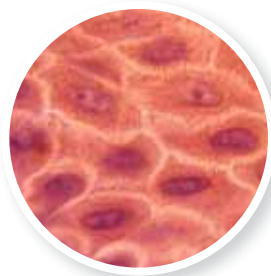
**Terra** an EOS (Earth Observing System) satellite that monitors solar energy-atmosphere-land interactions) (3.5)

**tertiary colour** [TUHR-shee-ae-ree KUH-luhr] the colour that you get by mixing the secondary colours (4.3)

**the haze effect** global cooling caused by eruption-generated particles in the upper atmosphere (U3R)

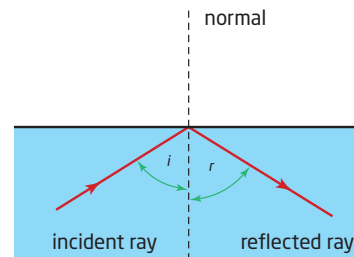
**theory** a statement that explains why or how something happens; eventually, when an hypothesis has been thoroughly tested and nearly all scientists agree that the results support the hypothesis, it becomes a theory (SST2)

**tissue** specialized cells working together to perform a function; the four major types of human tissue are muscle tissue, connective tissue, nervous tissue, and epithelial tissue (shown here) (1.3) ▼

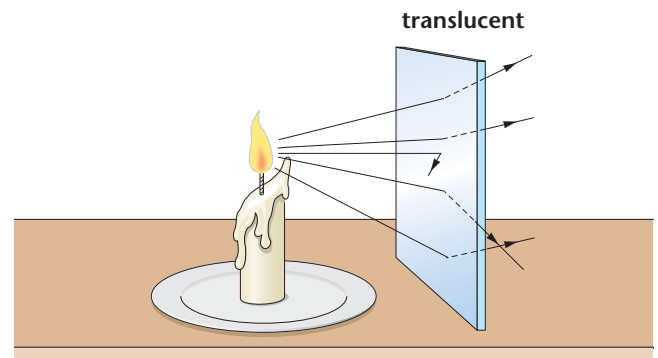


**TOPEX/Poseidon** an EOS (Earth Observing System) satellite that monitors ocean-surface mapping (3.5)

**total internal reflection** the condition in which no light can escape the medium because the angle of incidence is larger than the critical angle; all light is reflected within the medium (4.5) ▼

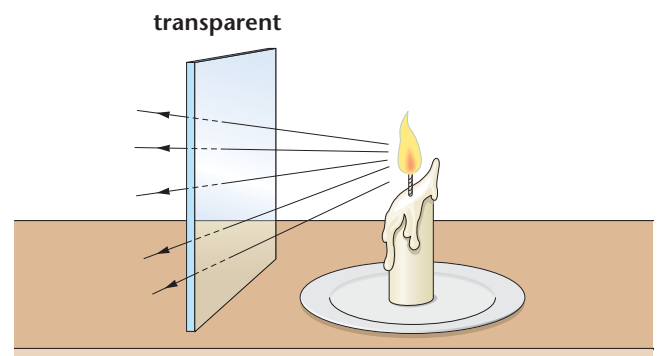


**translucent** [trans-LOO-sent] property of an object that allows light to pass through but scatters it in different directions (4.2) ▼



**transmission** the process in which light travels through an object and continues travelling; transparent and translucent objects transmit light, while opaque objects do not (4.2)

**transparent** property of an object that allows light to penetrate the object, making it possible to see objects from the other side (4.2) ▼



**TRMM** an EOS (Earth Observing System) satellite that monitors tropical rainfall (3.5)

**tufted puffins** birds that live on the coast of British Columbia; threatened by climate change because the small fish that they feed on are moving to cooler waters, causing the puffins to follow and abandon their young (3.2)

**tumour** an abnormal group or clump of cells (1.2)

**type** whether an image is real or virtual; if reflected rays do not meet, the image is virtual; if reflected rays do meet, the image is real; a real image can be viewed on a screen while a virtual image cannot (4.4)

## U

**ultrasound** an imaging technique that involves directing sound waves at a body part and measuring reflected sound waves to make an image; used to view soft tissue, monitor fetal development, observe organ function, and detect cancer (1.5)

**upright** an image that has the same orientation as the object (4.4)

**urbanization** the spread of cities into rural areas; involves clearing land, building roads, and increased transportation; produces greenhouse gases (3.4)

## V

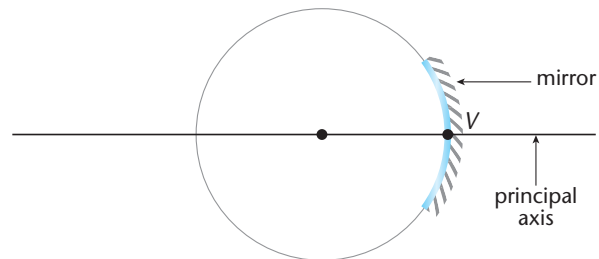
**vacuoles** [VAK-yoo-uhls] organelles that contain water and other materials and are used to store or transport small molecules; plant cells tend to have one large vacuole; animal cells may have several smaller vacuoles (1.1)

**Vatnajökull** [VAHT-nah-yuh-kutl] Europe's largest glacier; in Iceland; retreating at one meter per year due to global warming (3.2)

**variable** any factor that could affect a scientific test (SST2)

**veins** thin-walled, inelastic blood vessels that have valves to keep blood from backing up as it is carried toward the heart (1.4)

**vertex (V)** the point where the principal axis meets the mirror (4.4) ▼



**vesicles** [VEE-zi-kuhls] membrane-covered sacs that transport and/or store materials inside the cell and sometimes help these materials cross the cell membrane to enter or exit the cell (1.1)

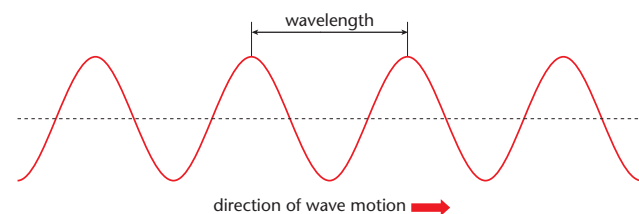
**volume** the amount of space that a substance or object occupies (SST3)

**virtual image** an image that is located where no light rays ever meet; occurs when reflected rays are separating and must be extended backwards to find out where they meet (4.4)

**visible light** a very small part of the electromagnetic spectrum; the longest wavelengths of visible light are red ( $7.0 \times 10^{-7}$  m) and the shortest wavelengths are blue ( $4.0 \times 10^{-7}$  m) (4.1)

**water vapour** evaporation from water; given off by cellular respiration and certain plant processes; most abundant greenhouse gas (3.3)

**wavelength** the distance between peaks on a wave (4.1) ▼



**weather balloon** device that carries a mini weather station to measure the temperature, pressure, and humidity at different heights up to about 30 000 m; a small radio transmits the collected data back to the ground (3.5) ▼



**weather** the conditions of the atmosphere for a specific place at a specific time (3.1)

**West Nile Virus** a virus carried and transmitted by mosquitoes; causes a disease that can be fatal (1.5, 3.2)

**WHMIS (Workplace Hazardous Materials Information System)** provides detailed information about how to store, handle, and dispose of chemical substances that are used in the workplace; also provides first aid information (2.1)

**word equation** uses words instead of chemical formulas to describe what happens to reactants and products during a chemical reaction (2.3) ▼



**X ray** a form of electromagnetic radiation; can be sent through the body to make an image; used to view hard tissue, such as bone; used to diagnose bone injuries and malformations (abnormal structures) (1.5, 4.1)