

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 = mask, back
ee = leaf, clean
u = wonder, Sun
ae = same, day
ih = idea, life

uh = taken, focus
ah = car, farther
i = simple, this
uhr = insert, turn
aw = dawn, hot

oh = home, loan
e = met, less
oo = food, boot

A

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

acid a chemical that produces an acidic substance, having a pH value of less than 7

acid precipitation rain or snow containing acid compounds from the air

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

acid-base neutralization the combining of an acid and a base to produce salt and water

acidic having a pH value of less than 7

acute toxicity the ability of a chemical to cause harm to an organism with only one exposure

adaptive optics is the technology that adjusts the mirror of a telescope, or adjusts the image of a telescope, to cancel the effects of the constant changes in Earth's atmosphere

algae type of aquatic micro-organism, capable of photosynthesis

algal bloom large increase in population of algae due to increased levels of nutrients in a water system; may occur seasonally or due to pollution

alternating current (AC) electricity produced in a generator where the current flowing from the generator changes direction regularly

altitude is the angle measured above the horizon in degrees when measuring altitude-azimuth co-ordinates

altitude-azimuth (alt-azimuth) co-ordinates locate a celestial body relative to a fixed Earth (as though the celestial bodies are circling Earth)

ammeter an instrument used to measure larger currents

amperes the unit used to measure electric current (A). Milliamperes (mA) is also commonly used

aquaculture fish farming

aquifer an underwater reserve of water

artificial satellite a satellite made by humans, such as a spacecraft or telescope

artificial selection technique in which individual plants or animals with desirable traits are bred together to develop plants or animals with specific traits; also called selective breeding

asexual reproduction the formation of a new individual from a single organism

astrolabe is a device used to measure the altitude of an object.

astronomical unit (AU) is the distance from Earth to the Sun (150 million km)

atomic mass the average mass of an atom of an element

atomic nucleus the centre of the atom; contains the protons and neutrons

atomic number the number of protons in the nucleus of an atom

azimuth is the angle measured clockwise from north when measuring altitude-azimuth co-ordinates

B

bacterial conjugation the direct transfer of genetic material (DNA) from one bacterial cell to another

ballistic missile a rocket with a bomb as a payload, launched in a trajectory that sends it up into space and down onto its target

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

base a chemical that produces a basic substance, having a pH value of more than 7

basic having a pH value of more than 7

battery a combination of cells, either wet or dry

behavioural adaptation an inherited characteristic behaviour that helps an organism survive in its environment

binary code two states (on or off) that represent numbers and letters

binary compounds compounds made of two elements

binary fission the splitting of a single-celled organism into two new organisms approximately equal in size; amoebae and many bacteria reproduce asexually through this process

bioaccumulate to collect in progressively higher concentrations toward the top of the food chain

biodegradable able to be broken down by bacteria, fungi, and other simple organisms into carbon dioxide and water

bioindicator species species that help indicate environmental change

biological diversity the number and variety of organisms in an area

biological indicator a living organism whose state is indicative of conditions in a particular environment

biomagnification the process whereby chemicals accumulate in the tissues of organisms along the food chain

bioreactor a tank containing bacteria in appropriate conditions for bioremediation to occur

bioremediation a method of using living organisms to break down complex, toxic substances into simpler, non-toxic ones

biotechnology using or modifying living organisms to make marketable products; sometimes involves genetic engineering

branch each current path in a parallel circuit; a parallel circuit has a series of branches connected side by side

broad niche the roles or characteristic activities filled by a generalist organism

budding an asexual reproduction process in which a bud forms on an organism, grows, and eventually breaks away to become a new organism independent of the parent

C

carbohydrate an organic nutrient made of carbon, hydrogen, and oxygen

catalytic converter a device that encourages complete oxidation during combustion

catalyst a substance that speeds up a chemical reaction without being used up in a reaction

caustic an agent that burns or destroys living tissue

celestial bodies all objects seen in the sky (the Sun, Moon, stars, and planets)

cell the smallest unit that can perform the functions of life

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

charge coupled devices (CCDs) devices that convert light signals into electric signals in digital format

chemical change a change in which one or more new chemical substances are formed

chemical family a group of related elements that have similar properties

chemical formula a formula that shows the number and types of atoms in a molecule

chemical property a characteristic of matter that describes how it reacts when undergoing a chemical change (e.g., reaction of a substance with electricity)

chemical reaction a process in which a substance is changed into one or more new substances

chemistry the study of the properties of matter and the changes it undergoes

chromosome in a cell, tightly packed strands of DNA visible under a light microscope during cell division

chronic toxicity the ability of a chemical to cause harm to an organism only after the chemical accumulates to a specific level after many exposures over time

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

circuit breaker acts as a switch and safety device that can cut all power coming into the home

clone an identical copy of a molecule, gene, cell, or entire organism

cogenerator systems electricity generating stations that produce electricity and also supply thermal energy

colloids heterogeneous mixtures composed of fine particles evenly distributed throughout a second substance

combustion the highly exothermic combination of a substance with oxygen; requires heat, oxygen, and fuel

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

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

commutator a part of the dynamo generator that serves to reverse the induced current as it changes direction, making the current flow in only one direction

compass a device used to measure an object's azimuth.

competition the struggle among individual organisms for access to a limited resource, such as a food or territory

compounds pure substances that are made up of two or more elements chemically combined together; can be broken down into elements again by chemical means

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

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

conductivity the ability of a substance to carry an electrical current

conductors materials that allow charges to move freely; most metals are conductors

constellations groupings of stars that form patterns, which appear like objects and are given names (such as Orion, the hunter)

continuous variation in genetics, traits that show a range of possibilities

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

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

corrosion a process whereby metals or stone are chemically degraded or broken down

cosmonaut the Russian term for astronaut

cotyledon a seed leaf; a structure in a seed that nourishes the plant embryo

cross-pollination pollination of an ovule in a flower with pollen from a different individual plant

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

D

Dalton's atomic theory states that: All matter is made up of small particles called atoms; Atoms cannot be created, destroyed, or divided into smaller particles; All atoms of the same element are identical in mass and size. Atoms of one element are different in mass and size from the atoms of other elements; Compounds are created when atoms of different elements link together in definite proportions.

density amount of matter that occupies a certain space; the mass per unit volume of a substance

diatomic molecules molecules made of two atoms of the same element

dicot a flowering plant whose seeds contain two cotyledons that store food for the embryo

diffraction grating a device made of thousands of closely spaced slits through which light is passed in order to produce a spectrum

digital electronic technology machines that process numerically coded information

direct current (DC) current that flows in one direction only

discrete variation in genetics, inherited traits that have a limited number of variations, such as the ability or inability to roll one's tongue

dissolving breaking up; forming a solution by mixing two or more materials together

diversity the differences or variety of adaptations of living things

diversity index a measure of the biological diversity in an area, calculated by dividing the number of runs in a walk-through of an area by the total number of specimens

DNA (deoxyribonucleic acid) a molecule that stores genetic information for heritable traits and directs the structure and functions of cells

domestic animal an animal that is no longer wild, but has been bred or tamed by humans to perform various functions

dominant trait an inherited trait that shows up in the offspring

Doppler effect the phenomenon that the observed frequency of a wave changes if the source of the wave and the observer are moving toward or away from one another

dynamo a generator that produces direct current

E

Earth-centred (or **geocentric**) a model of the universe that places Earth at the centre with the Sun, Moon, and planets revolving around it

ecological footprint a calculation of the total area of land and water needed to supply all of the materials and energy a human uses, as well as absorb the waste produced, expressed in square metres or hectares.

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

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

egg female gamete; also, a developing embryo enclosed in a shell or membrane and produced by animals that do not give birth to live young

electric discharge the rebalancing of an unbalanced charge; felt as a shock or seen as a spark

electric generator a device that converts mechanical energy into electric energy

electrical code the set of standards for electrical work

electrodes the two metals in a voltaic or electrochemical cell

electrolysis the process of decomposing a chemical compound by passing an electric current through it

electrolyte a substance that conducts an electric current, and in which the electrodes are placed

electromagnet a strong temporary magnet, created by inserting a soft iron core into a coil of wire and then passing a current through the wire

electromagnetic radiation varying types of energy waves emitted by stars (radio waves, infrared waves, visible light, ultraviolet waves, X rays, and gamma rays)

electrons negatively charged particles

element a pure substance made up of one type of particle, cannot be broken down into simpler substances by means of a chemical change

element symbols one or more letters used to represent the name of a substance (e.g., O is the symbol for oxygen)

ellipse a figure that looks like a squashed circle; planets in the solar system move in elliptical orbits around the Sun

embryo a multi-cellular organism during early development

emulsions types of colloids in which liquids are dispersed in liquids

endangered of a species, facing risk of extinction

endothermic reaction a chemical reaction in which heat energy is taken in from the surroundings

environment the area or conditions in which an organism lives; sometimes used to refer exclusively to natural areas on Earth

enzyme a special protein molecule that regulates chemical reactions in living organisms

exhaust velocity the speed at which exhaust leaves a rocket

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

exothermic a chemical reaction in which heat energy is released to the surroundings

extinct of a species, no longer existing

extirpation the extinction of a species from specific geographic areas

eyepiece (or **ocular lens**) the lens through which you view a magnified object using a telescope.

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

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

flare gas waste gas from natural gas production facilities that is burned to generate electricity

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

frame of reference a set of axes of any kind that is used to describe the positions or motions of things

fungicide a chemical used to control moulds and fungi

fuse a device containing a metallic conductor that melts when heated by excessive current

G

galvanization the process of protecting metals by coating them with a thin layer of zinc

galvanometer an instrument used to measure very weak current

gamete a reproductive cell (egg or sperm) containing half the number of chromosomes of a somatic cell

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

gauge description of the cross-sectional thickness of wire

gene a section of DNA on a chromosome that codes for a specific protein and function

generalist an organism with generalized requirements and adaptations that allow it to survive in variable conditions and depend on a variety of food sources; generalists tend to have broad niches

genetic engineering the artificial introduction of genes from one organism into the genetic material of another organism

genetically modified organism an organism that has been altered by the artificial introduction of genetic information from a different organism

genetics the study of genes or heritable traits

genus a group of species that are related

geocentric (or Earth-centred) a model of the universe that places Earth at the centre with the Sun, moons, and planets revolving around it

geosynchronous orbit orbit of satellites placed about 36 000 km above the ground, directly above the equator, orbiting Earth once every 24 h

geothermal energy thermal energy contained in the inner portions of Earth

global positioning system (GPS) using a fleet of GPS satellites above Earth and small hand-held GPS units on Earth, you can calculate your position on Earth to within 30 m (military units can be accurate to within a few centimetres)

global treaties international agreements between many nations worldwide

gravitational assist a method of acceleration which enables spacecraft to change speed by using the gravity of a planet

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

greenhouse gas gases that help regulate the temperature on Earth by holding in the heat from the Sun in our atmosphere

grounding connecting an object to Earth with conducting wire to safely rebalance a charge

ground water water that filters down through soil and fills spaces in the ground

ground wire a device to safely channel any energy that has “leaked” out; the ground wire is either bare copper or covered with green insulation

H

habitat the place where an organism lives

hazardous containing substances that are poisonous, corrosive, flammable, or explosive

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

heavy metal a metal with a high density (usually over 4.0 g/mL)

heliocentric (or **Sun-centred**) a model of the universe that places the Sun at the centre with Earth, the planets, and moons revolving around it

herbicide a chemical used to control weeds

heritable a genetic characteristic; that is, one that can be passed on from parent to offspring

heterogeneous mixture a mixture in which the particles are not uniformly scattered; does not have a uniform composition

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

homogeneous mixture a mixture in which particles are uniformly scattered; has a uniform composition

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.

hot wire one of the “live” wires in electric cables, which carries high energy electricity; the hot wire is black and insulated

human genome all of the genes or genetic information of the human species

hydro-electric plants plants that use water pressure to generate electric energy

hypothesis a statement of a proposed relationship, based on background information or an observed pattern of events, and stated in a way that makes it testable.

I

indicator a chemical that changes colour to indicate whether a substance is an acid or a base

infer to conclude or decide by reasoning

inference a conclusion or opinion formed by inferring

inhibitor substances that slow down or prevent chemical reactions

inner planets the four planets closest to the Sun—Mercury, Venus, Earth, and Mars—sometimes called terrestrial planets because of their terrestrial, or rocky, composition

input work work done on a machine

insecticide a chemical used to control insects

insulators any material in which the charge stays on the spot where the object is rubbed; most non-metals are insulators

interferometry a technology that electronically connects two (or more) separate telescopes to combine their images

introduced species a non-native species introduced to one environment from another

ionic compound formed when atoms transfer electrons to or from other atoms

J

joule (J) a unit used to measure energy or work; $1 \text{ J} = \text{a force of } 1 \text{ N moving through } 1 \text{ m}$

K

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

kinetic energy the energy of motion

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; $1 \text{ kW} \cdot \text{h} = 1000 \text{ W of power used for } 1 \text{ h}$

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

L

law an action or condition that has been observed so consistently that scientists are convinced it will always happen

Law of Charges Laws that describe the behaviour between charged and uncharged objects:

1. Unlike charges attract
2. Like charges repel
3. Charged objects attract uncharged (neutral) objects

law of conservation of mass in a chemical change, the total mass of the new substances is always the same as the total mass of the original substances

law of definite composition compounds are pure substances that contain two or more elements combined together in fixed (or definite) proportions

LD50 the dose of a chemical that will kill 50% of the population to which it is applied

leach dissolves in water and the water seeps downward

leachate the liquid that results as wastes decompose and rainwater filters down through the landfill

lens a curved piece of transparent material, usually glass or plastic; light rays bend as they pass through a lens

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)

light-year the distance that light travels in one year (approximately 63 240 AU or about 9.5 trillion km)

liming the process of adding calcium carbonate to the environment

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)

lipid an organic nutrient that does not dissolve in water

litmus a mixture of plant compounds used as a chemical indicator

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

loads items along a circuit that convert electricity into other forms of energy

low Earth orbit satellites are placed from 200—800 km above the ground complete one orbit of Earth in about 1.5 h

M

macroinvertebrate an organism visible to the unaided eye and lacking a backbone

macromineral a mineral that the body requires in the amount of 100 mg/day or more in order to maintain health

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

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

mass number the total number of protons and neutrons in the nucleus

meiosis in the formation of the gametes, the process by which genetic material is duplicated and divided so that each gamete has half the number of chromosomes of a somatic cell

melting the process of changing from solid to liquid

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

metalloids elements with properties in between metals and nonmetals

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

meristem an area of cell division of unspecialized cells in the tips of roots and shoots that produces new growth in plants

microgravity there is almost as much gravity in orbit as there is on Earth; however, gravity is effectively eliminated inside a spacecraft due to the free-falling effect of orbiting Earth, which causes the microgravity environment

micro-organism a single-celled organism

microscope an instrument that makes objects appear larger by bending light through a lens

mitosis the process by which genetic material is duplicated and divided so that the two new cells have identical sets of chromosomes

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

model a mental image, used as a building block that helps to explain an event; often, for clarity, scientists diagram, make physical representations, or treat mathematically the features of a model

molecular compound formed when atoms share electrons

molecule smallest independent unit of a pure substance, generally a cluster of atoms joined together

monocot a flowering plant whose seeds contain a single cotyledon that transfers food from the endosperm to the embryo

mutagen an agent that can cause changes in the genetic information of an organism

mutation a change in the genetic information, or DNA, of an organism

mutualism a symbiotic relationship between two different types of organisms that is beneficial to both organisms

mycorrhizal fungi fungi that live in or on the roots of plants and help them draw nutrients from the soil

N

narrow niche a highly specialized role or characteristic activity undertaken by an organism in an ecosystem

natural selection a naturally occurring process in which only those organisms with the best traits for survival in an environment survive to reproduce; over time this process results in changes in the genetic characteristics of a species

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

neutrons uncharged particles in the atomic nucleus

niche the role or characteristic activity that is undertaken by an organism in an ecosystem; one organism may fill several different niches

nitrogen base in genetics, a chemical subunit of DNA

non-persistent wastes wastes that can be broken down into simple non-polluting compounds by naturally occurring chemical reactions or bacterial action

non-point source a source of pollution in which pollutants are diffuse and originate from no specific location

non-renewable resources fuels that are consumed faster than they can be replaced by nature

neutral wire one of the "live" wires in electric cables, which returns low energy electricity back to the breaker panel; the neutral wire is white and insulated

nuclear fission the process whereby uranium is split into smaller atoms, releasing energy

nuclear fusion the process whereby two smaller atoms join into a larger atom, producing tremendous energy; how the Sun generates energy

nutrient a chemical in food, used for energy, growth, body building, or cell repair

O

objective lens the large lens at the front of a telescope.

objective mirror the mirror in a reflecting telescope; also called the primary mirror

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

ocular lens (or eyepiece) the lens through which you view a magnified object using a telescope

ohm the standard unit for resistance Ω

Ohm's law $R = \frac{V}{I}$ resistance
= $\frac{\text{voltage (potential difference)}}{\text{current}}$

ohmmeter an instrument to directly measure resistance

open pit mining mining in which the fuel, such as coal, is uncovered and dug directly from the ground

outer planets the four planets furthest from the Sun—Jupiter, Saturn, Uranus, and Neptune—all have gaseous composition

output work the work a machine does on a load

ovule the plant part that develops into a seed

oxidation a chemical reaction in which oxygen combines with other elements to form new substances

P

parallel circuits circuits with several current paths

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

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

payload the device or material that a rocket carries

piezoelectric effect sound produced when an electric current causes vibrations in a tiny crystal

persistent wastes wastes that accumulate in the environment and break down very slowly, if at all

pesticide a chemical used to control "pests"

pH paper paper saturated with a chemical to show whether a substance is acidic or basic

pH scale a scale that measures the acidity or alkalinity of a substance

photovoltaic cell (PV) a device used to produce electricity from light

physical change change in form but not in chemical composition; no new substances are formed

pistil the seed-producing, or female, part of a flower

planets celestial bodies in our solar system, including Earth, that orbit the Sun

point source a specific location where pollution originates

pollen tube in a plant, a tube that grows from a pollen grain toward the ovule

pollutant any material, or form of energy, that will cause harm to a living organism

pollution an alteration of the environment producing a condition harmful to living things

potential difference the difference in potential energy per unit of charge between one point in the circuit and another point in the circuit

potential energy stored energy

power energy per unit time.
 $\text{Power} = \text{Energy}/\text{Time}$

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

products the substances produced by a chemical reaction

properties characteristics that describe matter

protected areas natural areas protected by law from certain kinds of human activities; includes preserves, refuges, and provincial and national parks

protein an organic nutrient composed of a chain of amino acids

proton positively charged particle found inside the atomic nucleus

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 physical property a characteristic of a substance that can be described but not measured numerically (i.e., a quality)

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 physical property a characteristic of a substance that can be measured numerically (a quantity)

quantitative property a characteristic of a substance that can be measured

R

radio astronomy using radio waves to learn about the composition of stars

radio object objects in space that give off large amounts of radio waves

reactants the substances that go into a chemical reaction

reaction rate a measure of how fast a reaction occurs

recessive trait an inherited trait that shows up in the offspring only if both parents passed on the genes for the trait; when mixed with genes for a dominant trait, a recessive trait does not show up in the offspring

red shift when spectral lines move toward the longer-wavelength part (red end) of the spectrum

reflecting telescope a telescope that has a mirror for its objective

refracting telescope a telescope that has a lens for the objective

remote sensing taking measurements of Earth (and other planets) from space

reproductive strategy a method an organism uses to reproduce

resistance the property of a substance that hinders motion of electric charge and converts electric energy into other forms of energy

resistor symbol used to represent one of many different loads in a circuit diagram

resolving power determines the fineness of detail a telescope can produce of an object in view

responding variable in an experiment, the factor that changes in response to a change in the manipulated variable

rhizobia a group of bacteria that are able to live in direct association with the roots of legume plants; the bacteria convert atmospheric nitrogen into compounds the plant can use

rocket a tube that contains combustible material in one end and a payload in the other end and moves by the action, reaction principle

rotor the rotating core of an AC motor

rust iron oxide, a product of the chemical reaction of iron, oxygen, and moisture

S

sanitary landfill a landfill incorporating a waterproof liner filled with compacted garbage covered with earth

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-focussed questions and designing experiments that will give clear answers to those questions

scientific investigation an investigation that involves the systematic application of concepts and procedures (e.g., experimentation and research, observation and measurement, analysis and sharing of data)

scientific notation a short form for writing very large or very small numbers (e.g., 3×10^{11} means $3 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$)

scrubber a device that uses a sorbent to reduce oxide emissions

scrubbers antipollution systems that remove sulfur dioxide and contaminating gasses resulting from the burning of fossil fuels

secure landfill a specialized landfill that safely disposes of hazardous and toxic wastes

seed bank a collection of genetically diverse seeds

selective breeding technique in which individual plants or animals with desirable traits are bred together to develop plants or animals with specific traits; also called artificial selection

self-pollination pollination of an ovule in a flower with pollen from the same flower

series circuits circuits with only one current path

sexual reproduction reproductive process involving two sexes or mating types, and resulting in offspring with a combination of genes from both parents

short circuit occurs when the wires in an electric cord accidentally connect, usually because of frayed insulation

SI (from the French *Le Système international d'unités*) the international system of measurement units, including such terms as kilogram, metre, and second

solar wind high-energy subatomic particles that stream off the Sun and define the boundaries of the solar system

solid the state of matter in which a substance has a definite shape and a definite volume (e.g., ice)

soluble able to be dissolved in a particular solvent

solution a homogeneous mixture of two or more pure substances

solvent a substance that can be used to dissolve another substance

somatic cells body cells, not the egg or sperm (reproductive cells)

sorbent a substance that absorbs oxides

specialist a type of organism that is adapted to very specific environments and having a narrow niche

specialization adaptations for surviving in very specific environments

speciation the evolution of different species from a single ancestor

species a group of organisms that share similar genetic and physical characteristics; generally these organisms can interbreed and produce fertile offspring

spectral analysis the study of spectra

spectral lines dark lines or bright lines observed in the spectra of stars

spectroscope a device that produces a focussed spectrum

spectroscopy the study of spectra spectrum produced when a beam of light is passed through a prism

sperm the male gamete

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

spore a single-celled reproductive structure from which an individual offspring develops; plants, algae, fungi, and some protozoa produce spores

static electricity a charge produced by rubbing or touching objects together

staged rocket a rocket with more than one stage; a stage is a section of a rocket that drops off once its fuel is used up

stamen the part of a flower that contains pollen

stator a stationary part of a motor surrounding the rotor. The simplest form of stator is a two-pole electromagnet

structural adaptation an inherited physical characteristic that helps an organism survive in its environment

STS an abbreviation for the interrelationships among science, technology, and societal issues

suborbital a trajectory in which a spacecraft is boosted above the atmosphere and then falls back to Earth without going into orbit

Sun-centred (or heliocentric) a model of the universe that places the Sun at the centre with Earth, the planets, and moons revolving around it

superconductors materials that offer little or no resistance to the flow of charges

suspension a heterogeneous mixture in which particles settle slowly after mixing

sustainable resource a resource which can be managed to provide a reliable supply to meet present and future needs

switch used to open or close a circuit to control the flow of current through it

sympiotic an interaction between organisms of different species living in close proximity to each other in a relationship that lasts over time

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

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 lines

technology the application of scientific knowledge and everyday experience in solving practical problems by designing and developing devices, materials, systems, and processes

telescope a device used to magnify objects at great distances

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

thermal pollution occurs when warm water is returned directly to the lake or river from where it is taken, increasing the water temperature

thermocouple a loop of two wires made of different types of metals that converts heat to energy

thermo-electric generator plants that burn fossil fuels to produce electricity

thermonuclear electric generation using the energy released in nuclear fission to generate electricity

thermopile thermocouples connected in series

toxicity the ability of a chemical to cause harm to an organism

trace element a mineral that the body requires in the amount of less than 100 mg/day in order to maintain health

transformers used to “step-up” the voltage for efficient transmission of current over long distances

transgenic an organism produced by moving DNA from one organism to another to create a new genetic combination

transistors electronic switches in modern digital devices

triangulation a method of measuring distance indirectly by creating an imaginary triangle between an observer and an object whose distance is to be estimated

U

unbalanced charges a more correct term for static electricity, because the charges are not stationary; rather they move

universal gravitation Newton’s law states that all objects attract all other objects, and provides an explanation for the planets’ elliptical orbits

V

variable a factor that can influence the outcome of an experiment

variation differences in characteristics of organisms caused by genetic and environmental factors

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

very long baseline interferometry (VLBI) a technology that combines images from telescopes anywhere on Earth using timing marks but not wires

vitamin a molecule that helps enzymes function in the body

volt standard unit for voltage (V)

voltage a common term referring to potential difference

voltmeter the instrument used to measure voltage

W

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

water management the process of maintaining a safe water supply

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

water table in the ground, the level beneath which porous rocks are saturated with water

water treatment the purification of a supply of water

watershed area of land that drains into a body of water

watt (W) a unit of power equivalent to one joule per second; $1\text{ W} = 1\text{ J/s}$

weight the force of gravity exerted on a mass

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

WHMIS an acronym that stands for Workplace Hazardous Materials Information System

work the transfer of energy through motion

X

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

Y

Z

zoospore a flagellated asexual spore; the alga *Chlamydomonas* reproduces by zoospores

zygospore a single-celled reproductive structure formed in sexual reproduction by some fungi; zygospores contain genetic information from two different mating types, + and –

zygote the new cell formed by the process of fertilization