# Science glossary

## A

abiotic

Existing as a non-living condition or thing in an ecosystem, such as sunlight, temperature, air, rocks and water.

AC (alternating current)

An electric current that reverses direction periodically; commonly used in homes and businesses for electricity.

accuracy

The closeness of a single measurement to a true or accepted value.

adaptation

A physical or behavioural characteristic that is inherited and that results in an individual being more likely to survive and reproduce in its environment.

anomaly

A rare event, item or observation that differs significantly from standard behaviours or patterns.

Asia–Pacific

Describes countries across Asia, including Australasia and the Pacific Island nations.

atomic theory of matter

A theory proposed by John Dalton, which can be summarised as follows:

* All matter is made of atoms that are indivisible and indestructible.
* All atoms of a given element are identical in mass and properties.
* Compounds are formed by a combination of 2 or more different kinds of atoms.
* A chemical reaction is a rearrangement of atoms.

## B

bias

Any trend or deviation from the truth in data collection, data analysis, interpretation and publication that may lead to false conclusions being drawn; bias can occur either intentionally or unintentionally.

biotic

Existing as a living component of an ecosystem, such as plants, animals and bacteria.

## C

causation

A relationship in which one event is the result of the occurrence of the other event. A carefully designed experiment can provide information about causation.

See also: correlation

cell theory

A theory proposed by Theodor Schwann, which can be summarised as follows:

* All organisms are made of cells.
* Cells are the basic units of life.
* Cells come from pre-existing cells that have multiplied.

change of state

The change of a substance from one physical state of matter (solid, liquid, gas) to another.

characteristic

A distinguishing aspect (including features and behaviours) of an object, material, living thing or event.

chemical change

A change in which a substance cannot be easily returned to its previous state, or when 2 or more substances combine to form new substances. Chemical changes produce new substances and are usually not reversible. Examples include cooking of an egg, burning of wood, rusting of iron and a cement mixture setting as concrete.

claim

An assertion that something is true.

climate

The average weather conditions (temperature, precipitation and other weather factors) over several years in a particular place.

conclusion

A judgement based on evidence.

condensation

The change of state from a liquid to a gas (or of water vapour to liquid water when on a cool surface).

conductor

A material through which heat, sound or electrical energy is freely transferred.

consumer (biology)

A living thing that cannot make its own food and must feed on other living things (or living things that have died) to survive.

controlled variable

A variable that is kept constant (or changed in constant ways) during an investigation.

convergent boundary

The place at which 2 tectonic plates collide (e.g. the Pacific Ring of Fire); a chain of volcanoes often forms parallel to convergent plate boundaries and powerful earthquakes are common along these boundaries, with continental crust being made and oceanic crust being destroyed.

correlation

A measure of a relationship that describes the change of a variable in relation to one or more other variables.

See also: causation

Country

The physical environment that a particular Aboriginal and Torres Strait Islander Peoples’ group has a relationship with. Referring to this territory as ‘Country’, rather than land, indicates a reciprocal and deep relationship and one where Country both owns and is owned by the People. The concept of Country includes lands, waters and sky.

## D

data

A set of observations or measurements generated during an investigation that may be quantitative (e.g. volume, temperature, pH) or qualitative (e.g. colour, shape, texture); primary data is collected by the user while secondary data is collected by others.

data generation

The creation or production of new data that can be achieved through various means (e.g. performing experiments, conducting surveys, testing products/designs, collecting data from sources and generating data through algorithms and simulations).

DC (direct current)

An electric current that flows in one direction without changing its polarity; batteries, electronic devices and some specialised industrial applications can use direct current.

decomposer (biology)

A living thing such as fungi and bacteria that breaks down dead organic material.

decomposition (chemistry)

A type of chemical reaction in which a compound breaks down into 2 or more simpler products. Most decomposition reactions require an input of energy in the form of heat, light or electricity. The general form of a decomposition reaction is AB → A + B.

dependent variable

A variable that changes in response to changes to the independent variable in an investigation.

deposition

The process in which sediments, soil and rocks are laid down so that new landforms or land masses are formed or modified.

dichotomous key

A tool used to identify different living and non-living things, based on their observable features, characteristics or traits. Dichotomous keys consist of a series of statements with 2 choices in each statement that will lead users to the correct identification.

digital tools

Digital hardware, software, platforms and resources used to develop and communicate learning, ideas and information.

displacement (chemistry)

A type of chemical reaction (also called a replacement reaction) that may occur when:

* one atom (or group of atoms) in a compound is replaced by another atom (or group of atoms); this is further classified as a single-displacement reaction. The general form of a single-displacement reaction is AB + C → AC + B
* two compounds react to form 2 new components; this is further classified as a double-displacement reaction. The general form of a double-displacement reaction is AB + CD → AC + BD.

divergent boundary

A boundary that occurs when 2 tectonic plates move away from each other (e.g. the Mid-Atlantic Ridge); along divergent boundaries, earthquakes are common and magma (molten rock) rises from Earth’s mantle to the surface, solidifying to create new oceanic crust.

## E

Earth’s systems

The interrelated, interdependent physical, chemical and biological processes that support and sustain ecological integrity, consisting of the atmosphere, biosphere, hydrosphere and lithosphere.

endothermic

A chemical reaction that absorbs energy from its surroundings. Examples include photosynthesis, the evaporation of water and the dissolution of ammonium nitrate in water.

energy

The capacity of an object to do work or transfer heat; energy exists in different forms (e.g. potential, kinetic, electrical, chemical, thermal, mechanical, electromagnetic, nuclear, light, sound).

energy transfer

The movement of energy from one place to another through conduction, convection or radiation.

energy transformation

The change of energy from one form to another (e.g. electrical energy to light energy).

environment

All the surroundings, living and non-living.

erosion

The process by which soil, rocks and other surface materials of Earth are worn away, such as by the action of water, glaciers, wind or waves or by human actions, and are carried away from their original locations to other locations.

evaporation

The transfer of water from the surface of Earth to the atmosphere; heat energy from the Sun causes liquid water to change its state to water vapour and to rise up through the atmosphere.

evidence

Data that is considered reliable and valid, and that can be used to support a particular idea, conclusion or decision.

exothermic

A chemical reaction that releases energy to its surroundings, generally in the form of heat or light. Examples include hydrocarbon combustion, the burning of a candle, neutralisation reactions and respiration.

## F

fair test

An investigation in which one variable (the independent variable) is changed and all other conditions (controlled variables) are kept the same; the dependent variable is what is measured or observed.

food chain

A linear sequence representing organisms, which begins with a producer and ends with a consumer or a decomposer and shows the order in which living things depend on each other for food; each arrow in a food chain (→) starts at a consumed organism and points to the organism that consumes it (e.g. grass → cricket → emu → dingo). The arrow can be read as ‘is eaten by’.

food pyramid (ecology)

A graphical representation of the hierarchy of food relationships in an ecosystem; the pyramid shows energy flow and biomass distribution among different trophic levels in an ecosystem, with the base of the pyramid consisting of primary producers or autotrophs and the higher levels consisting of consumers or heterotrophs.

food web

A representation of the feeding relationships in an ecosystem, typically made up of several interconnected food chains.

force

A push or pull between objects, which may cause one or both objects to change speed and/or direction of their motion or change their shape.

force diagram

A representation that shows the forces acting on an object. Each force is represented as a force arrow and shows the size of the force (the longer the arrow, the bigger the force) and the direction in which the force acts. The arrow is usually labelled with the name of the force and its magnitude in newtons (N).

formal measurement

A measurement based on an agreed standard unit (e.g. metre, second, kilogram).

fossil

Any preserved remains, impressions or traces of any once-living thing, which may include the organism’s remains, such as plant or animal tissues, shells, teeth or bones, but can also include trace fossils (tracks, trails, burrows, faeces) and preserved organic chemicals.

## G

greenhouse effect

A natural process that warms Earth’s surface and the atmosphere. It occurs when the Sun’s energy reaches Earth’s atmosphere: some energy is reflected back into space and the rest is absorbed and re-radiated by greenhouse gases. The enhanced greenhouse effect is primarily driven by human activities and is a major contributor to global warming and climate change.

greenhouse gas

A substance in Earth’s atmosphere that can trap heat, leading to the greenhouse effect. Greenhouse gases include carbon dioxide (CO2), methane (CH4), water vapour (H2O), nitrous oxide (N2O), ozone (O3) and chlorofluorocarbons (CFCs).

## H

habitat

The natural environment of an organism such as a plant or animal.

hypothesis

A testable statement that can be supported or refuted when tested by investigation and includes a relationship between variables.

## I

independent variable

A variable that is changed in an investigation to see what effect it has on the dependent variable.

inference

An informed guess or logical conclusion based on previous experiences, observations and knowledge.

informal measurement

A measurement that is not based on any agreed standard unit (e.g. handspan, pace).

insulators

Materials that inhibit the transfer of heat, sound or electrical energy.

investigation

A scientific process of answering a question, exploring an idea or solving a problem using various research methods, which requires activities such as making observations, planning, collecting and interpreting data, and forming a conclusion.

## K

kinetic theory of matter

A theory of matter that explains the behaviour of matter in terms of the energy and motion of particles. It helps explain transitions between states of matter (solid, liquid, gas, plasma) and can be summarised as follows:

* All particles of matter are in constant motion.
* The properties of matter can be understood by studying the energy and motion of the particles of matter.

## L

law

A simple and precise statement that has been shown, based on available evidence, to be universally reliable; it describes phenomena that occur with unvarying regularity under the same conditions and can be used to predict what will happen in a given situation as demonstrated by a mathematical equation. Examples of laws include Newton’s laws of motion, the Law of Conservation of Mass and the Law of Conservation of Energy.

Law of Conservation of Energy

A law that states that energy cannot be created or destroyed but can be converted from one form of energy to another: this means that any process or isolated [system](https://energyeducation.ca/encyclopedia/System) always has the same amount of [energy](https://energyeducation.ca/encyclopedia/Energy) unless energy is added from the outside.

Law of Conservation of Mass

A law that states that matter and its mass may not be created or destroyed in a closed system but can change forms to other substances.

logical argument

An explanation of an opinion supported by sensible, related and ordered evidence.

## M

mass

The measure for the amount of matter an object contains; the SI unit for mass is the kilogram (kg).

material

Something that is made from matter that can be used for a specific purpose or in the creation of objects; materials can be solids, liquids or gases and include a variety of substances, both natural and synthetic. Materials may be pure substances, mixtures or composites and can be investigated for their properties, structure and performance in different applications. Examples of materials are paper, metals, water, oil, oxygen, polymers, soil, ceramics, fibreglass and concrete.

matter

Anything that has mass and volume.

Mendelian inheritance

An inheritance pattern that follows the laws of segregation and independent assortment in which a gene inherited from either parent segregates into gametes at an equal frequency.

mixture

A combination of 2 or more substances in which each retains its individual properties; mixtures can be homogeneous (uniform throughout, for example air or brass) or heterogeneous (not uniform, such as a vegetable soup or granite rock).

model (noun)

A representation that describes, simplifies, clarifies or explains the workings, structure or relationships within an object, system or idea; models may assist with explanations, predictions and calculations by providing a means of testing and predicting behaviour within limited conditions.

## N

natural resource

A material found in nature and used by people to stay alive or to improve their lives (e.g. light, air, water, plants, animals, soil, stone, minerals and fossil fuels); natural resources may be used ‘raw’ or may be processed to form other materials/products.

negative feedback mechanism

A system’s output that causes a reduction or dampening of the process that led to that output; for example, the pancreas of a non-diabetic person will produce insulin in response to high blood sugar levels in the body so that the additional glucose is stored.

Newton’s laws of motion

Isaac Newton’s 3 laws of motion describe how forces affect the motion of objects:

* First law: An object at rest or in uniform motion will stay that way unless acted upon by a net force.
* Second law: The net force on an object is equal to its mass times its acceleration, F = ma.
* Third law: For every action, there is an equal and opposite reaction, meaning that forces always come in pairs.

non-renewable energy resource

A resource that is consumed faster than it can be replaced and therefore has a finite supply (e.g. rare minerals typically found in meteorites, and fossil fuels such as coal, petroleum and natural gas).

## O

object (noun)

A broad term that refers to a tangible and observable entity that has mass and volume; a term used in everyday (non-scientific) language to describe physical items such as books, hair, rocks and machines.

observable

Able to be seen, heard, felt, tasted or smelled either directly by an individual or indirectly by a measuring device (e.g. ruler, camera, thermometer).

observation

The act of seeing, hearing, feeling, tasting or smelling, either directly by an individual or indirectly by a measuring device.

organism

A living individual entity, typically composed of one or more cells, with general characteristics including the ability to move, respire, grow, reproduce, excrete, metabolise and be responsive to the environment.

outlier

A data point that is far from other data points in a set of data.

## P

particle theory of matter

A theory that helps explain the structure, behaviour and interactions of the parts that make up matter, and that can be summarised as follows:

* All matter is made of tiny particles called atoms.
* The particles of matter are constantly in random motion.
* The particles of matter have spaces between them.
* The particles of matter can be arranged regularly or randomly.
* The particles of matter are attracted to each other and are held together by weak or strong forces.

pattern

A repeated occurrence or sequence.

phenomenon (plural ‘phenomena’)

Something that is observed to occur or to exist; natural phenomena include tides, volcanic eruptions, eclipses, cyclones, biological and chemical processes, weather patterns, lightning, shadows, bee swarms and gravity.

physical change

A change in the properties of a substance such as shape, size or state of matter, with no new substances being formed. Physical changes are usually reversible – that is, the substance can easily be changed back to its original form. Examples include chopping up food, freezing water to form ice, subliming mothballs to form a gas, and mixing oil and water.

Place

‘Place’ is significant for Aboriginal and Torres Strait Islander Peoples.

For Torres Strait Islander Peoples, ‘Place’ is a space mapped out that Torres Strait Islander individuals or groups occupy and regard as their own and that has varying degrees of spirituality. It includes lands, waters and sky.

For Aboriginal Peoples, ‘Place’ refers to the special places that exist within Country, the purposes of which vary significantly. They can include places of ceremony and initiation, birth and the provision of healing and health care; places of learning; and places for Sorry Business. These places vary greatly over the various landscapes and seascapes across the continent. There are some parts of Country that have landmarks that directly relate to the ancestor spirits and the creation of existence. These are especially important as culturally significant places and need to be cared for. There are also other places on Country that are important for ceremony, as mentioned above, which are also considered especially important for Aboriginal communities.

plate tectonic theory

A theory that explains the global distribution of geological phenomena and refers to the movement and interaction of Earth’s lithosphere. This includes the formation, movement, collision and destruction of tectonic plates and the resulting geological events such as seismicity, volcanism, continental drift and mountain-building.

population (ecology)

A group of individuals of the same species that are defined by the geographic area in which they live and interbreed in a common period of time.

precipitation (chemistry)

The formation of an insoluble solid from a solution during a chemical reaction; the solid that forms is called a precipitate.

precipitation (geology)

The process by which liquid or frozen water in the atmosphere falls to Earth as rain, hail or snow, as part of the water cycle.

precision

The closeness of 2 or more measurements to each other.

prediction (science)

An educated expectation about what might happen, based on observations.

presentation format

The structure, layout and organisation of scientific information to be communicated, for example as a laboratory report, scientific poster, essay, flow chart, multimodal presentation, oral presentation, demonstration, annotations, science journal paper, literature review, infographic, storyboard, model construction, diorama, dramatisation/role-play, case study, media analysis or pitch presentation.

producer (biology)

An organism (e.g. plant, algae) that produces its own food or energy, usually using energy from sunlight.

properties

The attributes of an object or material that can be sensed, measured or tested and that determine functionality and manufacturability:

* Physical properties can be observed or measured without changing the composition of the material (e.g. colour, hardness, density, texture, opacity, smell, melting point, boiling point).
* Chemical properties can be determined by observing chemical reactions (e.g. reactivity with acids, combustion point, toxicity).
* Mechanical properties influence the material or object’s reaction to applied loads and affect the object or material’s strength and ability to be moulded into different shapes (e.g. strength, flexibility, elasticity, plasticity, stiffness, thermal and electrical conductivity).

## Q

qualitative data

Measures of ‘types’ that are difficult to measure in a numerical way and that may be represented by a name, symbol or a number code; data about categorical values (e.g. species of fish in a river).

quantitative data

Measures of values or counts that are expressed as numbers; data about numeric variables in an investigation (e.g. how many bird species migrate from Victoria, how much water the local dam holds, how often a blue moon can be seen each year).

## R

reflected (physics)

Changed the direction of light when it bounced off a surface.

refracted

Changed the direction (bending) of light when it passed through one transparent substance into another.

relationship (science)

A connection or association between ideas or between components of systems and structures.

reliability (science)

The extent to which repeated observations and/or measurements taken under identical circumstances will yield similar results.

renewable energy resource

A resource that is naturally replenished on a relatively short timescale (e.g. solar, wind, hydroelectric, tidal, biomass, geothermal sources such as hot springs, and hydrogen fuels).

repeatable investigation

An investigation that has similar results when repeated by the original researcher using the same method and equipment.

repeat trial

A test within an experimental investigation that is carried out more than once under the same set of conditions by the same person/team.

replicable data

Data that can be produced again, similarly to the previous data, using the same method and equipment.

representation (science)

The means by which science ideas and explanations are understood and communicated; representations can take many different forms or modes (e.g. diagrams, annotated sketches, cross-sectional drawings, tables, graphs, flow charts and other graphic organisers, models, symbols and texts used to communicate patterns, and quantitative and qualitative relationships).

reproducible investigation

An investigation that has similar results when repeated by other researchers using the same method and equipment.

## S

senses

Systems used by organisms to gather and respond to information about their environments to aid their survival; each sense provides different information, which is combined with other sensory information and interpreted by the brain and nervous system. The 5 main senses are hearing, sight, smell, touch and taste. The dominant sense varies between different animals, as well as which is the most sensitive. In humans, the dominant sense is sight, and hearing is the most sensitive sense (due to the range of ‘loudness’ over which hearing operates).

simulation

A representation of a process, event or system that imitates the real situation.

socio-scientific issue

A societal challenge that is both scientific and social in nature (e.g. climate change); it is authentic, consequential to society and often reported in the news.

solution

A homogeneous mixture in which one substance (the solute) is uniformly dissolved in another, for example salt water in which the salt is the solute and the water is the solvent.

source of error

A factor within the experimental method that causes the results to differ from the correct result; all of these types of errors (e.g. instrumental, environmental, procedural, methodological) can be either random or systematic.

strength

The state, property or quality of a material or object being physically strong and able to withstand or resist a significant amount of force or pressure without breaking.

substance

A specific type of matter with a uniform composition and properties. Pure substances can be elements (e.g. oxygen (O2) or gold (Au)) or compounds (e.g. water (H2O) and salt (NaCl)). Impure substances include homogeneous mixtures (such as solutions and alloys) and heterogeneous mixtures (such as suspensions, colloids and emulsions).

sustainable

Supporting present needs without compromising the ability of future generations to support their needs.

synthesis (chemistry)

A type of chemical reaction in which 2 or more reactants combine to form a single product (also called a combination reaction). This type of reaction is represented by the general equation A + B → AB. Commonly, 2 different elements may combine to form a compound, or an element and a compound may react to form a new single compound.

system

A set of things that are interconnected in ways that result in the generation of identifiable behavioural patterns over time, such as the solar system, an organ system or the Earth system (atmosphere, biosphere, hydrosphere, lithosphere).

## T

technologies

The knowledge and creative processes that assist people to use tools, resources and systems to solve problems and meet human needs and wants.

theory

A well-substantiated explanation that attempts to describe why a phenomenon occurs based on available evidence and confirmed, repeated observations over time. Theories provide accurate explanations and predictions for a wide range of phenomena and are widely accepted by the scientific community. Examples include atomic theory, the big bang theory, cell theory, plate tectonic theory and the theory of evolution by natural selection.

theory of evolution by natural selection

The theory that genetic mutations beneficial to an individual’s survival are passed on through reproduction, resulting in a new generation of individuals that are more likely to survive to reproduce.

theory of plate tectonics

The theory that explains the movements and interactions of Earth’s lithospheric plates, illustrating the dynamic processes that shape Earth’s crust. The theory has 3 main components: plate movement, sea-floor spreading and subduction zones.

Traditional Owners

The people recognised as having an unbroken connection to a particular Aboriginal or Torres Strait Islander Country or Place. They are often important knowledge keepers and responsible for caring for Country or Place and the people who live there.

transfer plate boundary

A boundary that occurs when 2 tectonic plates slide past each other (e.g. the San Andreas Fault zone); earthquakes are common along these faults, with crust being cracked and broken at transform margins but not made or destroyed.

transportation (geology)

The movement of sediments, soil and rocks across Earth’s surface by water, wind, ice or gravity.

trend

The general direction in which something is changing.

## U

uncertainty (science)

The extent to which something is known; it is a measure of the variability of data.

## V

validity

The extent to which a test measures what was intended; the extent to which data, inferences and actions produced from tests and other processes are accurate.

variable

A factor in an investigation that can be changed (independent), measured/observed (dependent) or kept the same (controlled), for example time, distance, light, temperature.

## W

wave model (physics)

The model that describes a wave as a disturbance that travels through a medium from one location to another location.

weathering

The breaking down or dissolving of rocks, soils and minerals on Earth’s surface without changing their location; this can occur through mechanical, chemical and biological processes.

worldview

A set of concepts, stories and/or beliefs about the nature of the world around us that inform our thinking, knowing, values and actions. These concepts, stories and/or beliefs can have a non-religious, religious and/or spiritual basis.