SCIENCE

By the end of **Year 3**

Science as a human endeavour

Science is a part of everyday activities and experiences.

- Science has applications in daily life, including at home, at school, at work and in leisure time
  - *e.g. medicines to treat illness in people and animals; electricity for lights.*
- Science can impact on people and their environments
  - *e.g. knowledge of the effects of the sun's rays influences sun safety precautions.*
- Stewardship of the environment involves conserving natural resources
  - *e.g. strategies to conserve water and preserve wilderness environments.*
- Australian Indigenous knowledge of natural phenomena has developed over time as a result of people observing, investigating and testing in everyday life
  - *e.g. observing changes in the environment to help determine seasons.*

Earth and beyond

Changes in the observable environment influence life.

- Earth and space experience recurring patterns and natural cycles of events, including seasons, weather and moon phases, and these can affect living things
  - *e.g. tides affect life on the shoreline; seasons affect the growth of plants; some animals hibernate in winter.*
- Materials of the earth can be used in various ways
  - *e.g. water for drinking; soil for growing crops.*

By the end of **Year 5**

Science as a human endeavour

Science relates to students' own experiences and activities in the community.

- Scientific ideas can be used to explain the development and workings of everyday items
  - *e.g. scientific notions of energy can help explain how a bicycle moves.*
- Ethics is a significant part of scientific endeavour
  - *e.g. an ethical consideration is whether or not it is appropriate to test products on animals.*
- Science can help to make natural, social and built environments sustainable and may influence personal human activities
  - *e.g. implementing "green" strategies may help to minimise a person's "ecological footprint".*
- Science can contribute to people's work and leisure
  - *e.g. the development of new technologies has contributed to increased efficiency in the workplace; people can have a healthier lifestyle if they understand how their physical development benefits from physical activity and healthy food choices.*
- Cultures from around the world, including those of Aboriginal people and Torres Strait Islander people, have contributed to scientific understanding
  - *e.g. Aboriginal people extract dyes from natural materials; Galileo, an Italian scientist, described motion of objects in the solar system.*

Earth and beyond

Changes and patterns in different environments and space have scientific explanations.

- The earth, solar system and universe are dynamic systems
  - *e.g. the idea that planets orbit the sun and moons orbit planets can be used to explain day and night and the phases of the moon.*
- Changes to the surface of the earth or the atmosphere have identifiable causes, including human and natural activity
  - *e.g. weathering and erosion; air pollution.*

By the end of **Year 7**

Science as a human endeavour

Science impacts on people, their environment and their communities.

- Scientific knowledge has been accumulated and refined over time, and can be used to change the way people live
  - *e.g. use of and changes to technology, including mobile phones and computers; improved medical procedures.*
- Ethical considerations are involved in decisions made about applications of science
  - *e.g. preservation of wilderness environments to help protect endangered species.*
- Scientific knowledge can help to make natural, social and built environments sustainable, at a scale ranging from local to global
  - *e.g. recycling to reduce resource use.*
- Different cultures, including those of Aboriginal people and Torres Strait Islander people, have contributed to science and scientific practice
  - *e.g. Indigenous knowledge of flora and fauna makes contributions to scientific knowledge and the development of pharmaceutical products; traditional Chinese medicine recognises relationships between the human body and the environment; English scientist, Sir Isaac Newton, described gravity.*

Earth and beyond

Interactions and changes in physical systems and environments can be explained and predicted.

- Gravitational attraction between objects in the solar system holds them in fixed orbits, and has predictable effects on the earth
  - *e.g. changing tides are a result of gravitational attraction between the earth, the moon and the sun.*
- Changes to the earth occur over varying time periods and can be interpreted using geological evidence
  - *e.g. changes that are part of the water cycle occur over a shorter time scale than does rock formation;*
    change over time can be identified through fossils and rock layers.

By the end of **Year 9**

Science as a human endeavour

Responsible and informed decisions about real-world issues are influenced by the application of scientific knowledge.

- Immediate and long-term consequences of human activity can be predicted by considering past and present events
  - *e.g. consequences of unsustainable use of fossil fuels can be seen in environmental impacts.*
- Responsible, ethical and informed decisions about social priorities often require the application of scientific understanding
  - *e.g. use of alternative forms of energy; use of recycled water; development of influenza and cervical cancer vaccines.*
- People from different cultures contribute to and shape the development of science
  - *e.g. Australian Indigenous knowledge can be applied to land and water management, food production and waste management.*

Earth and beyond

Events on earth and in space are explained using scientific theories and ideas, including the geological and environmental history of the earth and the universe.

- Scientific ideas and theories offer explanations about the earth that extend to the origins of the universe
  - *e.g. ideas about the expanding universe.*
- Global patterns of change on earth and in its atmosphere can be predicted and modelled
  - *e.g. the effects of rising temperatures on natural environments.*
- Geological evidence can be interpreted to provide information about past and present events
  - *e.g. the earth's surface is shaped by volcanoes and earthquakes, which can be understood in terms of the theory of plate tectonics.*

SCIENCE

By the end of **Year 3**	By the end of **Year 5**	By the end of **Year 7**	By the end of **Year 9**
Energy and change **Energy can be used for different purposes.** • Pushes and pulls affect the shape and motion of objects *e.g. squeezing clay; stretching a spring; throwing a ball.* • Forms of energy, including electricity, light, heat, movement and sound, have different applications *e.g. electricity can light the classroom; most animals use light to see; the sun can warm us; kicking a ball makes it move; blowing musical instruments makes sound.*	**Energy and change** **Actions of forces, and forms and uses of energy, are evident in the everyday world.** • The greater the force on an object, the greater the change in shape or motion *e.g. pressing harder on a plasticine ball makes it flatter; the harder a ball is thrown the further it travels.* • Forces may act at a distance or may need to be in contact with an object to affect it *e.g. magnetic and gravitational forces attract objects from a distance; hitting a ball requires contact with a bat.* • Energy can be transferred from one object to another *e.g. a heater transfers warmth to a nearby human body.* • Different forms of energy used within a community have different sources *e.g. electricity can be generated from a range of sources, including coal and solar energy.*	**Energy and change** **Forces and energy can be identified and analysed to provide explanations that benefit community lifestyles and decision making.** • The motion of an object changes as a result of the application of opposing or supporting forces *e.g. a surfer makes use of a number of forces, including gravity, buoyancy and the motion of the water, to ride a wave.* • Renewable and non-renewable energy sources can be identified and used for different purposes *e.g. wind or coal is used to generate electricity; wind can also be used to pump water.* • Energy can be transferred and transformed *e.g. recharging a car battery transforms electrical energy into chemical energy that is stored in the battery; plants transform light energy from the sun into chemical energy that is stored.*	**Energy and change** **Forces and energy are identified and analysed to help understand and develop technologies, and to make predictions about events in the world.** • An unbalanced force acting on a body results in a change in motion *e.g. a car is slowed by friction from braking.* • Objects remain stationary or in constant motion under the influence of balanced forces *e.g. a book resting on a table; a vehicle travelling at constant speed.* • Energy can be transferred from one medium to another *e.g. the stove transfers heat to the pot of water.* • Transfer of energy can vary according to the medium in which it travels *e.g. some materials are good conductors of heat; light is refracted when it moves from air to water — the pencil appears to bend in a glass of water.* • Energy is conserved when it is transferred or transformed *e.g. a light bulb converts electrical energy into light energy and also produces heat.*
Life and living **Needs, features and functions of living things are related and change over time.** • Animals, plants and non-living things have different features/characteristics *e.g. some animals have fur; unlike plants and animals, rocks do not grow.* • Offspring have similar characteristics to their parents *e.g. dogs have puppies; cats have kittens; birds have chicks.* • Change occurs during the life cycle of living things *e.g. a seed grows into a plant; a joey in the pouch develops into an adult kangaroo.* • Living things depend on the environment and each other *e.g. plants need light to make food; adult birds feed their young.*	**Life and living** **Living things have features that determine their interactions with the environment.** • Living things can be grouped according to their observable characteristics *e.g. insects have six legs; marsupials have pouches; fish have gills and fins.* • Structures of living things have particular functions *e.g. roots bring water and minerals to plants; skeletons give bodies shape and protect vital organs.* • Reproductive processes and life cycles vary in different types of living things *e.g. plants reproduce by seeds, bulbs and cuttings; animals may lay eggs or produce live young.* • Living things have relationships with other living things and their environment *e.g. the relationship between clown fish and an anemone on a coral reef is mutually beneficial.*	**Life and living** **Living things have structures that enable them to survive and reproduce.** • Cells are the basic unit of all living things and perform functions that are needed to sustain and reproduce life *e.g. some organisms are single-celled; complex organisms such as humans are collections of specialised cells.* • Systems of scientific classification can be applied to living things *e.g. dichotomous keys can be designed for groups of organisms.* • Survival of organisms is dependent on their adaptation to their environment *e.g. animals use camouflage to protect themselves; plants in very dry areas may store water in modified structures.* • Different feeding relationships exist within an ecosystem *e.g. producer, consumer, herbivore, carnivore relationships form a food web.*	**Life and living** **Organisms interact with their environment in order to survive and reproduce.** • The diversity of plants and animals can be explained using the theory of evolution through natural selection *e.g. Australian marsupials would have had a common pouched ancestor.* • In ecosystems, organisms interact with each other and their surroundings *e.g. the scavenger role of the crab in the mangroves means that it has a plentiful supply of food and it contributes by cleaning its surroundings.* • Complex organisms depend on interacting body systems to meet their needs internally and with respect to their environment *e.g. the digestive system processes food and the circulatory system distributes it throughout the body.* • All the information required for life is a result of genetic information being passed from parent to offspring *e.g. hereditary information is contained in the genes located on chromosomes.* • Changes in ecosystems have causes and consequences that may be predicted *e.g. bushfires destroy natural bushland, which temporarily changes the ecosystem; birds return to dried-up waterholes after rain.*

SCIENCE

By the end of **Year 3**	By the end of **Year 5**	By the end of **Year 7**	By the end of **Year 9**
Natural and processed materials **Materials have different properties and undergo different changes.** • Materials are categorised according to their observable properties *e.g. texture, colour and solubility can be used to group materials.* • Properties of familiar materials may be changed *e.g. water is usually liquid but is solid when frozen.*	**Natural and processed materials** **Properties, changes and uses of materials are related.** • Materials are composed of smaller parts, some of which may be visible to the naked eye, while others are too small to be seen *e.g. cloth can be made up of interwoven fibres; rocks may be composed of visible crystals.* • Materials are used for a particular purpose because of their specific properties *e.g. lunch boxes and water bottles are made of plastic, because plastic is durable and water resistant.* • The properties of an object can differ from the properties of its component parts *e.g. concrete differs from the cement, water and sand from which it is made.* • Properties of materials are affected by processes of change *e.g. sugar dissolves in water; ingredients interact when a cake is baked.*	**Natural and processed materials** **Properties, changes and uses of substances and mixtures are related to their particular composition.** • Properties of a material will vary according to the type and quantity of components that make up its structure *e.g. the colour of a paint depends on the proportion of different colours in the mixture; durability of Aboriginal arts works is dependent on paint ingredients; different alloys of iron produce different amounts of rust.* • Chemical change produces new substances that have properties different from those of the original substances *e.g. burning paper produces ash.* • Physical change produces no new substances *e.g. changing a solid to a liquid and back to a solid.*	**Natural and processed materials** **The properties of materials are determined by their structure and their interaction with other materials.** • Changes in physical properties of substances can be explained using the particle model *e.g. use of the particle model to describe states of matter.* • Matter can be classified according to its structure *e.g. elements and compounds, or molecules and atoms.* • Chemical reactions can be described using word and balanced equations *e.g. hydrogen plus oxygen gives water or $2H_2 + O_2 = 2H_2O$.* • Reaction rate is affected by various factors, including temperature, concentration and surface area *e.g. milk goes sour more quickly when left at room temperature; a soluble tablet will dissolve faster when it is crushed.*