Government of **Western Australia**
School Curriculum and Standards Authority

Western Australian Curriculum

Science

Proposed Comparison of Curriculum | Years 7–10
Draft for consultation | Not for implementation

Acknowledgement of Country

Kaya. The School Curriculum and Standards Authority (the Authority) acknowledges that our offices are on Whadjuk Noongar boodjar and that we deliver our services on the country of many traditional custodians and language groups throughout Western Australia. The Authority acknowledges the traditional custodians throughout Western Australia and their continuing connection to land, waters and community. We offer our respect to Elders past and present.

Disclaimer

Any resources such as texts, websites and so on that may be referred to in this document are provided as examples of resources that teachers can use to support their learning programs. Their inclusion does not imply that they are mandatory or that they are the only resources relevant to the course. Teachers must exercise their professional judgement as to the appropriateness of any they may wish to use.

2024/21104[v6]

Contents

Overview

The current Western Australian Curriculum: Science was adopted from the Australian Curriculum version 8.1.

Western Australia provided feedback to the Australian Curriculum, Assessment and Reporting Authority (ACARA) during the consultation for the Australian Curriculum. Teachers advised that the content descriptions needed to be clarified and examples provided to support teaching and learning.

The proposed revisions to the Western Australian Curriculum: Science are adopted and adapted from the Australian Curriculum version 9.

Guide to reading this document

The first row contains the current Western Australian Curriculum: Science curriculum content organised in year levels. The second row contains the endorsed content for Australian Curriculum version 9. The content listed for the Western Australian Curriculum and the Australian Curriculum version 9 is unedited. The third row contains the proposed revised content for consultation.

Strand: Science and understanding

Sub-strand: Biological sciences

	Year 7	Year 8	Year 9	Year 10
Current WA Curriculum	Classification helps organise the diverse group of organisms (ACSSU111)	Cells are the basic units of living things; they have specialised structures and functions (ACSSU149)	Multi-cellular organisms rely on coordinated and interdependent internal systems to respond to changes to their environment (ACSSU175)	Transmission of heritable characteristics from one generation to the next involves DNA and genes (ACSSU184)
	Interactions between organisms can be described in terms of food chains and food webs; human activity can affect these interactions (ACSSU112)	Multi-cellular organisms contain systems of organs carrying out specialised functions that enable them to survive and reproduce (ACSSU150)	Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems (ACSSU176)	The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence (ACSSU185)
Australian Curriculum v9	investigate the role of classification in ordering and organising the diversity of life on Earth and use and develop classification tools including dichotomous keys (AC9S7U01)	recognise cells as the basic units of living things, compare plant and animal cells, and describe the functions of specialised cell structures (AC9S8U01)	compare the role of body systems in regulating and coordinating the body's response to a stimulus, and describe the operation of a negative feedback mechanism (AC9S9U01)	explain the role of meiosis and mitosis and the function of chromosomes, DNA and genes in heredity and predict patterns of Mendelian inheritance (AC9S10U01)
	use models, including food webs, to represent matter and energy flow in ecosystems and predict the impact of changing abiotic and biotic factors on populations (AC9S7U02)	analyse the relationship between structure and function of cells, tissues and organs in a plant and an animal organ system and explain how these systems enable survival of the individual (AC9S8U02)	describe the form and function of reproductive cells and organs in animals and plants, and analyse how the processes of sexual and asexual reproduction enable survival of the species (AC9S9U02)	use the theory of evolution by natural selection to explain past and present diversity and analyse the scientific evidence supporting the theory (AC9S10U02)
Proposed WA Curriculum	Classification helps in ordering and organising the diversity of life on Earth into a hierarchy from kingdom to species; classification tools, including dichotomous keys, can be developed and used to classify organisms For example: • classifying organisms into taxonomic groups, such as organisms into kingdoms, arthropods and vertebrates into classes, mammals into monotremes, marsupials and placentals • developing a classification tool to classify organisms in a local ecosystem • identification of revegetation plants to increase sustainability of a local ecosystem	Cells are the basic units of living things that can be viewed with a compound microscope; plant and animal cells have specialised structures and functions, including the cell membrane, cytoplasm, nucleus, mitochondria, cell wall, chloroplasts and vacuoles	Organisms have mechanisms to respond changes in their environment; endotherms and ectotherms respond differently to changes in external temperature; plant tropisms help them respond to external stimuli For example: • how endotherms, such as mammals and birds, and ectotherms, such as reptiles and fish, use heat transfer mechanisms to respond to changes in external temperature • how surface area to volume ratio can affect heat transfer • plant tropisms, such as phototropism, geotropism and hydrotropism	Cell division processes of meiosis and mitosis produce new cells with chromosome numbers specific to their role; chromosomes are made up of large molecules of DNA; small sections of DNA are called genes For example: • comparing the role and number of chromosomes in the cells produced by mitosis and meiosis • how the work of Franklin, Watson, Crick and Wilkins contributed to the development of the double helix structure of DNA • the effect of the environment on gene expression
	Food chains and food webs can be used to represent energy flow in ecosystems and predict possible impacts of human activity For example: • role of photosynthesis and respiration in the flow of energy in ecosystems • feeding relationships in a local ecosystem • predicting the possible impact of activities that remove an organism from an ecosystem, such as overfishing, spraying with pesticides and introducing predators	Flowering plants and vertebrates contain systems that carry out specialised functions that enable the survival of the individual, including systems for gas exchange, transportation of materials and reproduction For example: • comparing flowering plant and vertebrate systems for ▪ gas exchange, such as stomata and guard cells in flowering plants and respiratory systems in vertebrates ▪ transportation of materials, such as the xylem and phloem, and processes of	Plants and animals have structural, behavioural and physiological adaptations to help them survive in their environment For example: • flowering plant adaptations to ▪ living in different ecosystems, such as local ecosystems, the southwest of Western Australia, deserts and mangroves ▪ bushfires • vertebrate adaptations to living in different ecosystems, such as local ecosystems, desert, polar and marine ecosystems	Patterns of monohybrid inheritance, including autosomal dominant/recessive and sex-linked recessive inheritance, can be predicted using pedigrees and Punnett square crosses For example: • interpreting pedigrees and predicting offspring for ▪ non-sex linked dominant/recessive alleles, such as hair colour in guinea pigs, leaf colour in barley, seed shape and colour and plant height in peas ▪ sex linked recessive alleles, such as red-green colour blindness and haemophilia

	Year 7	Year 8	Year 9	Year 10
	• impact of introduced species on interactions in a local ecosystem, such as foxes, cats and cane toads	capillarity and transpiration in flowering plants and the heart, blood vessels and blood in vertebrates ▪ reproduction, such as the structure of the flower and vertebrate reproductive systems, and the processes of pollination and fertilisation • importance of insect pollination in flowering plants for human food security	Population size and species biodiversity can be affected by abiotic and biotic factors; sampling techniques can be used to monitor abiotic factors and estimate numbers of organisms; ecological monitoring can be used to inform ecosystem health and impacts of human activity For example: • monitoring abiotic factors, such as temperature, pH, nutrients and salinity in a local ecosystem • effect of biotic factors, such as competition, predation, symbiosis and human activity on population size and species biodiversity • using sampling techniques, such as capture/recapture and quadrats to estimate population size in a local ecosystem • monitoring data can be used to inform sustainable practices	The theory of evolution by natural selection explains the past and present diversity of living things, including variation within a species, adaptations and speciation; the theory is supported by a range of scientific evidence, including fossils and anatomical similarities For example: • natural selection can be used to explain ▪ differences in organisms of the same species at different locations, such as colour, size and shape ▪ adaptations of organisms to changing environments, such as changing colour, size, and resistance to antibiotics and pesticides ▪ how isolation can result in one species becoming a different species over time, such as Australian marsupials, Galapagos finches • relative and absolute methods for dating fossils • comparing vertebrate pentadactyl limbs as evidence for evolution • the importance of maintaining genetic diversity • the use of gene banks and insurance populations to preserve hereditary material

Sub-strand: Chemical sciences

	Year 7	Year 8	Year 9	Year 10
Current WA Curriculum	Mixtures, including solutions, contain a combination of pure substances that can be separated using a range of techniques (ACSSU113)	Properties of the different states of matter can be explained in terms of the motion and arrangement of particles (ACSSU151)	All matter is made of atoms that are composed of protons, neutrons and electrons; natural radioactivity arises from the decay of nuclei in atoms (ACSSU177)	The atomic structure and properties of elements are used to organise them in the Periodic Table (ACSSU186)
		Differences between elements, compounds and mixtures can be described at a particle level (ACSSU152)	Chemical reactions involve rearranging atoms to form new substances; during a chemical reaction mass is not created or destroyed (ACSSU178)	Different types of chemical reactions are used to produce a range of products and can occur at different rates (ACSSU187)
		Chemical change involves substances reacting to form new substances (ACSSU225)	Chemical reactions, including combustion and the reactions of acids, are important in both non-living and living systems and involve energy transfer (ACSSU179)	
Australian Curriculum 9	use particle theory to describe the arrangement of particles in a substance, including the motion of and attraction between particles, and relate this to the properties of the substance (AC9S7U05)	classify matter as elements, compounds or mixtures and compare different representations of these, including 2-dimensional and 3-dimensional models, symbols for elements and formulas for molecules and compounds (AC9S8U06)	explain how the model of the atom changed following the discovery of electrons, protons and neutrons and describe how natural radioactive decay results in stable atoms (AC9S9U06)	explain how the structure and properties of atoms relate to the organisation of the elements in the periodic table (AC9S10U06)
	use a particle model to describe differences between pure substances and mixtures and apply understanding of properties of substances to separate mixtures (AC9S7U06)	compare physical and chemical changes and identify indicators of energy change in chemical reactions (AC9S8U07)	model the rearrangement of atoms in chemical reactions using a range of representations, including word and simple balanced chemical equations, and use these to demonstrate the law of conservation of mass (AC9S9U07)	identify patterns in synthesis, decomposition and displacement reactions and investigate the factors that affect reaction rates (AC9S10U07)
Proposed WA Curriculum	Properties of the different states of matter can be explained in terms of the motion and arrangement of atoms and molecules; states can change with the addition or removal of heat energy For example: • comparing the motion and arrangement of atoms and molecules in solids, liquids and gases • relating the properties of solids, liquids and gases, such as volume, shape, flow and compressibility to the motion and arrangement of atoms and molecules • investigating the effect of heating and cooling on solids, liquids and gases	Matter is made up of atoms and can be classified as elements or compounds which can be compared using different representations, including symbols, formulae and 2-dimensional and 3-dimensional models For example: • recalling the symbols for common elements • using the formulae for molecules and compounds to identify the names and number/s of elements they contain • constructing models of elements, molecules and compounds	The atomic number and mass number of an element can be used to determine the number of protons, neutrons and electrons in an atom of the element; isotopes of an element have the same number of protons but different numbers of neutrons in their nuclei, and have the same chemical properties For example: • exploring the isotopes of elements, such as hydrogen, carbon and uranium	The structure and properties of atoms relate to the organisation of the elements in the periodic table For example: • exploring the periodic table comparing the properties of atoms within and between groups of elements • modelling the atomic structure of elements, including electron configuration
		Elements of the periodic table can be classified as metals and non-metals based on their physical properties For example: • exploring the properties of metals and non-metals, such as melting and boiling point, hardness, malleability, brittleness, ductility, heat and electrical conductivity, lustre, density • comparing the properties of metals and non-metals and their position on the periodic table	The periodic table shows the elements arranged in order of increasing atomic number; elements in the same group on the periodic table have similar properties For example: • examining how the periodic table has been refined as science has progressed and new elements have been discovered • exploring the periodic table to examine the similarities and differences between groups of elements	The ability of atoms to form chemical bonds can be explained by the arrangement of electrons in the atom; ionic bonding involves electron transfer and covalent bonding involves sharing of electrons For example: • comparing ionic and covalent bonds • using the naming conventions for ionic and covalent compounds • representing compounds using chemical formulae and 2-dimensional and 3-dimensional models

	Year 7	Year 8	Year 9	Year 10
	Mixtures, including solutions, contain a combination of pure substances that can be separated using a range of techniques, including filtration, decantation, evaporation, crystallisation, chromatography and distillation For example: • investigating saturated and unsaturated solutions and the solubility of different solutes • selecting and using the appropriate techniques to separate ▪ insoluble substances from a mixture, such as sand and pebbles from water ▪ the solute and solvent from a solution, such as salt in water, pigments in felt pens	Changes to substances can be classified as physical or chemical; chemical changes involve the formation of new substances For example: • identifying physical changes, such as changing state, solutions, mixtures, tearing paper, chopping wood • indicators of chemical changes, such as colour change, temperature change, formation of a precipitate, gas, odour, light • identifying the reactants and products in a chemical reaction	Compounds are formed when atoms lose, gain or share electrons; compounds can be represented using chemical formulae and 2-dimensional and 3-dimensional models; positively charged ions and negatively charged ions combine to form ionic compounds For example: • recalling the chemical formulae for common covalent compounds • using a table of common ions to write chemical formulae to represent ionic compounds	Reactions follow general patterns that help to predict the reaction products, including precipitation reactions and reactions of acids with bases, metals and carbonates; word and balanced chemical equations can be used to represent these reactions For example: • modelling the balancing of chemical equations using molecular modelling kits, diagrams or simulations • using indicators to identify acids and bases, and observing the changes in neuralisation reactions • everyday applications of precipitation and acid reactions and indicators, such as ▪ kidney stones, wastewater treatment, metallurgy and precipitation of magnesium and calcium oxides in kettles and water pipes ▪ indigestion, the treatment of acidic soil and fire extinguishers ▪ monitoring the pH of swimming pools, fish tanks and soils
			Chemical reactions involve rearranging atoms to form new substances; word and balanced chemical equations can be used to represent the rearrangement of atoms in a chemical reaction and demonstrate the law of conservation of mass For example: • demonstrating the law of conservation of mass to model the balancing of chemical equations ▪ experimentally ▪ using molecular modelling kits, diagrams or simulations • writing word equations and balanced chemical equations to demonstrate the law of conservation of mass when provided with the chemical formulae for reactants and products	The rate at which a reaction occurs can be altered by changing factors, including temperature, concentration and the surface area of a reactant For example: • investigating factors affecting the rate of reactions, such as changing the ▪ temperature of the reactants ▪ concentration of one or more reactant ▪ surface area of a solid reactant on the rate of reactions

Sub-strand: Earth and space sciences

	Year 7	Year 8	Year 9	Year 10
Current WA Curriculum	Predictable phenomena on Earth, including seasons and eclipses, are caused by the relative positions of the sun, Earth and the moon (ACSSU115)	Sedimentary, igneous and metamorphic rocks contain minerals and are formed by processes that occur within Earth over a variety of timescales (ACSSU153)	The theory of plate tectonics explains global patterns of geological activity	The universe contains features including galaxies, stars and solar systems, and the Big Bang theory can be used to explain the origin of the universe (ACSSU188)
	Some of Earth's resources are renewable but others are non-renewable (ACSSU116)			Global systems, including the carbon cycle, rely on interactions involving the biosphere, lithosphere, hydrosphere and atmosphere (ACSSU189)
	Water is an important resource that cycles through the environment (ACSSU222)			
Australian Curriculum 9	model cyclic changes in the relative positions of the Earth, sun and moon and explain how these cycles cause eclipses and influence predictable phenomena on Earth, including seasons and tides (AC9S7U03)	investigate tectonic activity including the formation of geological features at divergent, convergent and transform plate boundaries and describe the scientific evidence for the theory of plate tectonics (AC9S8U03)	represent the carbon cycle and examine how key processes including combustion, photosynthesis and respiration rely on interactions between Earth's spheres (AC9S9U03)	describe how the big bang theory models the origin and evolution of the universe and analyse the supporting evidence for the theory (AC9S10U03)
		describe the key processes of the rock cycle, including the timescales over which they occur, and examine how the properties of sedimentary, igneous and metamorphic rocks reflect their formation and influence their use (AC9S8U04)		use models of energy flow between the geosphere, biosphere, hydrosphere and atmosphere to explain patterns of global climate change (AC9S10U04)
Proposed WA Curriculum	Celestial objects in the night sky can be classified as planets, stars, moons, asteroids, meteors, comets, constellations and galaxies; planets in our solar system have distinguishing features For example: • comparing the features of planets in our solar system, such as composition, atmosphere, temperature, size, orbit, rotation, tilt of axis, moons and rings • the effect of gravitational forces on planet orbits around the sun • researching Aboriginal and Torres Strait Islander Peoples' knowledge of the night sky	The theory of plate tectonics explains global patterns of geological activity, including the formation of features at divergent, convergent and transform plate boundaries For example: • development of the theory of plate tectonics and evidence supporting the theories • correlating earthquake and volcanic activity to tectonic plates • relating the age and stability of the Australian continent to its plate tectonic history	Global systems, including the carbon and water cycles, rely on interactions involving the biosphere, lithosphere, hydrosphere and atmosphere For example: • predicting the impact of human activity on Earth systems, such as the carbon and water cycles • main potable water resources for Western Australia, such as surface water, ground water and desalinated water	The formation of stars, galaxies and solar systems has continued since the time of the Big Bang For example: • the life cycle of a star from nebula to black hole • comparing different types of galaxies • examining theories that explain the formation of the solar system

	Year 7	Year 8	Year 9	Year 10
	Predictable phenomena on Earth caused by the relative positions of the sun, Earth and the moon, including lunar phases, eclipses, seasons and tides For example: • different regions on Earth experience different seasonal conditions • tidal variations result from the relative positions of the sun, Earth and moon with respect to Earth • investigating Aboriginal and Torres Strait Islander Peoples' calendars and how they predict seasonal changes • exploring luna eclipses, solar eclipses and gravitational lensing	The key processes of the rock cycle are involved in the formation of igneous, sedimentary and metamorphic rocks; the properties of these rocks reflect their formation and influence their use For example: • classifying a range of common rocks using observable physical properties • linking key processes of the rock cycle to processes at tectonic boundaries • exploring the traditional geological knowledge of Aboriginal and Torres Strait Islander Peoples in the selection of different rock types for different purposes Rocks are made of minerals that can be classified using physical properties, including colour, streak, lustre, transparency, hardness and cleavage; useful resources can be extracted from minerals For example: • exploring a local mineral resource • examining the impact of mining on local ecosystems and the community	Changes to global systems can impact global climate For example: • factors that drive the deep ocean currents in regulating global climate • changes in global climate over time • indicators of climate change, such as changes in ocean and atmospheric temperatures, sea levels, biodiversity, species distribution, permafrost and sea ice • strategies designed to reduce climate change or mitigate its effects	Space exploration is contributing to knowledge of the formation and evolution of the universe and Earth, as well as providing useful tools and technologies to improve our life on Earth For example: • data gathered through space rover and probe missions is providing information about the geology and atmosphere of moons and other planets in our solar system • data gathered through space exploration can be used to search for possible life beyond our solar system • applications of space technology including remote sensing of Earth, communication systems and scientific exploration • contribution of the Square Kilometre Array (SKA) to space exploration and the Australian economy • impact of space junk and satellites on future space exploration • importance of Australia's role in space exploration

Sub-strand: Physical sciences

	Year 7	Year 8	Year 9	Year 10
Current WA Curriculum	Change to an object's motion is caused by unbalanced forces, including Earth's gravitational attraction, acting on the object (ACSSU117)	Energy appears in different forms, including movement (kinetic energy), heat and potential energy, and energy transformations and transfers cause change within systems (ACSSU155)	Energy transfer through different mediums can be explained using wave and particle models (ACSSU182)	Energy conservation in a system can be explained by describing energy transfers and transformations (ACSSU190) The motion of objects can be described and predicted using the laws of physics (ACSSU229)
Australian Curriculum 9	investigate and represent balanced and unbalanced forces, including gravitational force, acting on objects, and relate changes in an object's motion to its mass and the magnitude and direction of forces acting on it (AC9S7U04)	classify different types of energy as kinetic or potential and investigate energy transfer and transformations in simple systems (AC9S8U05)	use wave and particle models to describe energy transfer through different mediums and examine the usefulness of each model for explaining phenomena (AC9S9U04) apply the law of conservation of energy to analyse system efficiency in terms of energy inputs, outputs, transfers and transformations (AC9S9U05)	investigate Newton's laws of motion and quantitatively analyse the relationship between force, mass and acceleration of objects (AC9S10U05)
Proposed WA Curriculum	Change to an object's motion is caused by unbalanced forces including gravitational and electrical forces; the unit of measurement for force is the newton For example: • investigating balanced and unbalanced forces and their effect on the motion of an object • using arrows to represent the magnitude and direction of forces acting on an object • the weight of an object on Earth is the result of the gravitational attraction between its mass and that of the Earth • exploring electrical forces, such as electrostatic and electromagnetic forces	The different forms of energy can be classified as either kinetic or potential energy; energy transformations and transfers cause change within systems For example: • forms of kinetic energy, such as electrical, thermal, sound and light energy can be classified as kinetic energy • forms of potential energy, such as gravitational, chemical, nuclear and elastic energy • energy transformations in systems, such as gravitational potential energy to kinetic energy, elastic potential energy in rubber bands or springs to kinetic energy, chemical energy to thermal energy • energy transfers in systems, such as boiling water in a beaker, throwing a ball	Wave and particle models can be used to describe the transfer of thermal, light and sound energy through different mediums For example: • exploring transverse and longitudinal waves, including wavelength, frequency, period, amplitude and speed • examining the electromagnetic spectrum	Motion can be quantitatively determined; quantities, including time, distance, displacement, speed, velocity and acceleration can be classified as scalar or vector; vector diagrams can be used to represent the magnitude and direction of motion For example: • using vector diagrams to illustrate the difference between distance and displacement • exploring the relationship between time intervals and distance or displacement to calculate speed, velocity and acceleration
	Friction is a force that resists the motion of an object For example: • friction can be increased by pressing surfaces together with more force, increasing the surface area in contact and making the surface rougher • friction can be decreased by reducing the pressure between surfaces and surface area in contact, streamlining, polishing, lubricating and using rollers or ball bearings • everyday situations where friction is useful and where it is a nuisance	Electrical energy transfer through a circuit can be affected by the type of circuit; safety switches and circuit breakers are devices installed in buildings to protect people and electrical systems For example: • drawing circuit diagrams, using appropriate symbols, and constructing models of series and parallel circuits • investigating the effect of resistance on energy transfer • comparing safety switches and circuit breakers and researching regulations regarding their use	Thermal energy is transferred by conduction in solids, convection in liquids and gases, and radiation in all states For example: • comparing heat transfer via particle and wave models • investigating conductors and insulators of thermal energy	Newton's laws of motion can be used to predict motion; the relationship between force, mass and acceleration of objects can be quantitatively determined For example: • investigating Newton's three laws of motion • applying Newton's three laws of motion to everyday applications, such as, sport and driving

	Year 7	Year 8	Year 9	Year 10
	Simple machines, including levers, inclined planes and wheels and axles, provide a mechanical advantage For example: • the type of advantage provided by the different classes of levers, inclined planes and wheels and axles • illustrating where simple machines are used every day	Renewable and non-renewable energy resources can be used to generate electricity For example: • comparing the collection, transfer and use of renewable and non-renewable energy resources • exploring how photovoltaic cells produce electricity • considering the availability of the resource, and impacts, such as environmental, ethical, social and economic considerations, of using different renewable and non-renewable energy resources to produce electricity	Light is made up of photons that have both particle and wave properties For example: • comparing the behaviour of photons and light waves • investigating the size, nature and position of images formed by mirrors and lenses • exploring the refraction of light as it passes from one medium to another • investigating the size, nature and position of images formed by plane and curved mirrors, concave and convex lenses • pathway of light entering the eye and focusing on the retina and corrections for eye defects, such as short sightedness, long sightedness, astigmatism and cataracts	The law of conservation of energy can be applied to analyse system efficiency in terms of energy inputs and outputs, transfers and transformations For example: • work is done when energy is transferred and transformed • energy and work are scalar quantities that can be quantitatively determined by calculating gravitational potential and kinetic energy • modelling the efficiency of energy transfers and transformations in a system using Sankey diagrams • calculating energy transformations in a system, such as a ball falling onto a surface and rebounding, a pendulum swing, a roller coaster changing height and speed around its track
			Sound waves are longitudinal waves produced by vibrating objects that travel through solids, liquids and gases at different speeds For example: • why we see lightning before we hear thunder even though they occur at the same time • exploring the energy transfers that occur as sound travels through the ear and to the brain, and hearing conditions, such as conductive and nerve deafness • sound is reflected when it comes into contact with a solid or liquid surface • exploring echoes and their applications, such as echolocation in nature, ultrasound in medicine, depth sounding in oceanography and remote sensing in mineral and oil exploration	

Strand: Science inquiry skills

Sub-strand: Questioning and predicting

	Year 7	Year 8	Year 9	Year 10
Current WA Curriculum	Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge (ACSIS124) (ACSIS139)		Formulate questions or hypotheses that can be investigated scientifically (ACSIS164) (ACSIS198)	
Australian Curriculum 9	develop investigable questions, reasoned predictions and hypotheses to explore scientific models, identify patterns and test relationships (AC9S7I01) (AC9S8I01)		develop investigable questions, reasoned predictions and hypotheses to test relationships and develop explanatory models (AC9S9I01) (AC9S10I01)	
Proposed WA Curriculum	Propose investigable questions and make predictions based on scientific knowledge to explore scientific models, identify patterns and test relationships		Propose investigable questions and hypotheses to test relationships and develop explanatory models	
	(Year 7) For example: • proposing investigable questions, such as ▪ how does the angle of sunlight affect the surface temperature of Earth? ▪ how does load carried affect the force of friction? • making predictions, such as ▪ if the closed seasons for fishing are removed, then the number of fish in the waterways will decrease ▪ if the temperature of a solvent is increased, then the solubility of a solute will increase	(Year 8) For example: • proposing investigable questions, such as ▪ what factors affect the resistance of a wire? ▪ how does temperature affect enzyme activity? • making predictions, such as ▪ if more globes are added to a circuit, then the light produced by each globe gets dimmer ▪ if a saturated solution cools quickly, then the crystals formed will be smaller	(Year 9) For example: • proposing investigable questions, such as ▪ how does car colour affect the internal temperature of a car? ▪ how does surface area to volume ratio affect heat loss? • proposing hypotheses, such as ▪ plants that live in hot, dry climates have fewer stomata in their leaves ▪ indigestion medications work by neutralising the solution in the stomach	(Year 10) For example: • proposing investigable questions, such as ▪ how do safety devices, such as seatbelts, reduce the likelihood of injury in a collision? ▪ are dominant or recessive traits more common in the class? • proposing hypotheses, such as ▪ the rate of a reaction increases as the temperature of reactants increases ▪ the steeper the slope of a ramp the greater the acceleration of an object down the slope

Sub-strand: Planning and conducting

	Year 7	Year 8	Year 9	Year 10
Current WA Curriculum	Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (ACSIS125) (ACSIS140)		Plan, select and use appropriate investigation types, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods (ACSIS165) (ACSIS199)	
	Measure and control variables, select equipment appropriate to the task and collect data with accuracy (ACSIS126) (ACSIS141)		Select and use appropriate equipment, including digital technologies, to collect and record data systematically and accurately (ACSIS166) (ACSIS200)	
Australian Curriculum 9	plan and conduct reproducible investigations to answer questions and test hypotheses, including identifying variables and assumptions and, as appropriate, recognising and managing risks, considering ethical issues and recognising key considerations regarding heritage sites and artefacts on Country/Place (AC9S7I02) (AC9S8I02)		plan and conduct valid, reproducible investigations to answer questions and test hypotheses, including identifying and controlling for possible sources of error and, as appropriate, developing and following risk assessments, considering ethical issues, and addressing key considerations regarding heritage sites and artefacts on Country/Place (AC9S9I02) (AC9S10I02)	
	select and use equipment to generate and record data with precision, using digital tools as appropriate (AC9S7I03) (AC9S8I03)		select and use equipment to generate and record data with precision to obtain useful sample sizes and replicable data, using digital tools as appropriate (AC9S9I03) (AC9S10I03)	

<table>
<tr><th></th><th>Year 7</th><th>Year 8</th><th>Year 9</th><th>Year 10</th></tr>
<tr><td rowspan="4">Proposed WA Curriculum</td><td colspan="2">Plan and conduct reproducible investigations to answer questions; recognising and managing risks and considering ethical issues</td><td colspan="2">Plan and conduct valid and reproducible investigations to answer questions and test hypotheses, developing and following risk assessments, and considering ethical issues</td></tr>
<tr><td>(Year 7)
For example:
• planning and conducting a variety of investigation types, such as fair test investigations, descriptive investigations, comparative investigations and analytical investigations
• selecting the appropriate equipment to collect data, such as using a measuring cylinder to measure volume
• identifying risks and suggesting ways to manage them
• considering ethical issues, such as human consent, animal ethics, ecological ethics, use of heritage sites and artefacts on Country</td><td>(Year 8)
For example:
• planning and conducting a variety of investigation types, such as fair test investigations, descriptive investigations, comparative investigations and analytical investigations
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For example:
• planning and conducting a variety of investigation types, such as fair test investigations, descriptive investigations, comparative investigations and analytical investigations
• outlining strategies to control possible sources of systematic errors and random errors
• developing a risk assessment to identify potential hazards and prevent potential incidents and injuries
• considering ethical issues, such as human consent, animal ethics, ecological ethics, use of heritage sites and artefacts on Country</td><td>(Year 10)
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<tr><td>(Year 7)
For example:
• using digital tools, such as thermometers, balances and force meters to collect data
• recording data in appropriate formats, such as tables, spreadsheets and digital images, using appropriate units of measurement to record data</td><td>(Year 8)
For example:
• using digital tools, such as thermometers, balances, microscopes, voltmeters and ammeters to collect data
• recording data in an appropriate format, such as tables, spreadsheets and digital images, using appropriate units of measurement to record data</td><td>(Year 9)
For example:
• recording data in appropriate formats, such as tables, spreadsheets and digital images, using appropriate units of measurement
• obtain reliable data through a large sample size, replicates and repeating an experiment
using digital tools, such as thermometers, balances, pH meters, light meters and sound meters to collect data</td><td>(Year 10)
For example:
• recording data in an appropriate format, such as tables, spreadsheets and digital images, using appropriate units of measurement
• obtain reliable data through a large sample size, replicates and repeating an experiment
• using digital tools, such as thermometers, balances, pH meters, microscopes and motion sensors to collect data</td></tr>
</table>

Sub-strand: Processing, modelling and analysing

<table>
<tr><th></th><th>Year 7</th><th>Year 8</th><th>Year 9</th><th>Year 10</th></tr>
<tr><td rowspan="2">Current WA Curriculum</td><td colspan="2">Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships in data using digital technologies as appropriate (ACSIS129) (AC9S8I04)</td><td colspan="2">Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies (ACSIS169) (ACSIS203)</td></tr>
<tr><td colspan="2">Summarise data, from students' own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions based on evidence (ACSIS130) (ACSIS145)</td><td colspan="2">Use knowledge of scientific concepts to draw conclusions that are consistent with evidence (ACSIS170) (ACSIS204)</td></tr>
<tr><td rowspan="2">Australian Curriculum 9</td><td colspan="2">select and construct appropriate representations, including tables, graphs, models and mathematical relationships, to organise and process data and information (AC9S7I04) (AC9S8I04)</td><td colspan="2">select and construct appropriate representations, including tables, graphs, descriptive statistics, models and mathematical relationships, to organise and process data and information (AC9S9I04) (AC9S10I04)</td></tr>
<tr><td colspan="2">analyse data and information to describe patterns, trends and relationships and identify anomalies (AC9S7I05) (AC9S8I05)</td><td colspan="2">analyse and connect a variety of data and information to identify and explain patterns, relationships and anomalies (AC9S9I05) (AC9S10I05)</td></tr>
<tr><td rowspan="4">Proposed WA Curriculum</td><td colspan="2">Construct appropriate representations, including tables, graphs, models and mathematical relationships, to organise and process data and information</td><td colspan="2">Select and construct appropriate representations, including tables, graphs, descriptive statistics, models and mathematical relationships, to organise and process data and information</td></tr>
<tr><td>(Year 7)
For example:
constructing column graphs to represent discrete data and line graphs to represent continuous data
processing data by calculating mean and percentages
constructing models, such as solar system models, flow charts, force diagrams, dichotomous keys and simulations</td><td>(Year 8)
For example:
constructing column graphs to represent discrete data and line graphs to represent continuous data
processing data by calculating mean and percentages
constructing models, such as 2-D and 3-D element, compound and molecule models, scale diagram of cells, electrical circuit diagrams, the rock cycle, flow charts and simulations</td><td>(Year 9)
For example:
constructing column graphs to represent discrete data and line graphs to represent continuous data
processing data by calculating percentages, ratios and current, and using descriptive statistics, such as mean, mode, median and range
constructing models, such as chemical formulae, word and chemical equations, light ray diagrams, flow charts and simulations</td><td>(Year 10)
For example:
constructing column graphs to represent discrete data and line graphs represent continuous data
processing data by calculating percentages, ratios, speed, velocity, acceleration and force, and using descriptive statistics, such as mean, mode, median and range
constructing models, such as atomic models, chemical formulae, word and chemical equations, pedigrees, vector diagrams, biogeochemical cycles, flow charts and simulations</td></tr>
<tr><td colspan="2">Analyse data and information to describe patterns, trends and relationships, identify anomalies and draw conclusions based on evidence</td><td colspan="2">Analyse and connect a variety of data and information to identify and explain patterns, trends, relationships and anomalies, and draw conclusions based on evidence</td></tr>
<tr><td>(Year 7)
For example:
analysing data to describe patterns, trends and relationships, such as how the temperature on the surface of Earth is higher when the sun is directly overhead
drawing logical conclusions considering the method of data collection, quality of evidence and limitations or significance of a claim</td><td>(Year 8)
For example:
analysing data to describe patterns, trends and relationships, such as, as the thickness of a wire increases the resistance of the wire increases
drawing logical conclusions considering the method of data collection, quality of evidence and limitations or significance of a claim</td><td>(Year 9)
For example:
analysing data to describe patterns, trends and relationships, such as darker coloured cars absorb more heat
writing conclusions that describe patterns, trends or relationships and providing evidence from the investigation and research to support the conclusion</td><td>(Year 10)
For example:
analysing data to describe the patterns, trends and relationships, such as the steeper the slope of a ramp the greater the acceleration of an object as it travels down the slope
writing conclusions that describe patterns, trends or relationships and providing evidence from the investigation and research to support the conclusion</td></tr>
</table>

Sub-strand: Evaluating

<table>
<tr><th></th><th>Year 7</th><th>Year 8</th><th>Year 9</th><th>Year 10</th></tr>
<tr><td rowspan="2">Current WA Curriculum</td><td colspan="2">Reflect on scientific investigations including evaluating the quality of the data collected, and identifying improvements (ACSIS131) (ACSIS146)</td><td colspan="2">Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data (ACSIS171) (ACSIS205)</td></tr>
<tr><td colspan="2">Use scientific knowledge and findings from investigations to evaluate claims based on evidence (ACSIS132) (ACSIS234)</td><td colspan="2">Critically analyse the validity of information in primary and secondary sources and evaluate the approaches used to solve problems (ACSIS172) (ACSIS206)</td></tr>
<tr><td rowspan="2">Australian Curriculum 9</td><td colspan="2">analyse methods, conclusions and claims for assumptions, possible sources of error, conflicting evidence and unanswered questions (AC9S7I06)</td><td colspan="2">assess the validity and reproducibility of methods and evaluate the validity of conclusions and claims, including by identifying assumptions, conflicting evidence and areas of uncertainty (AC9S9I06) (AC9S10I06)</td></tr>
<tr><td colspan="2">construct evidence-based arguments to support conclusions or evaluate claims and consider any ethical issues and cultural protocols associated with using or citing secondary data or information (AC9S7I07) (AC9S8I07)</td><td colspan="2">construct arguments based on analysis of a variety of evidence to support conclusions or evaluate claims, and consider any ethical issues and cultural protocols associated with accessing, using or citing secondary data or information (AC9S9I07) (AC9S10I07)</td></tr>
<tr><td rowspan="2">Proposed WA Curriculum</td><td colspan="4">Reflect on scientific investigations, including evaluating the quality of the data collected, and identifying improvements
Evaluate validity and reproducibility of methods and validity of conclusions, including identifying possible sources of error, and describe specific ways to improve the quality of the data</td></tr>
<tr><td>(Year 7)
For example:
• reflecting on the quality of the data in relation to the data collection method and amount of data collected
• evaluating whether the investigation was valid and reliable
• suggesting improvements to investigation methods that would increase the accuracy of the data recorded, such as using
▪ the same electronic balance to measure the mass each time
▪ a digital force meter to measure force rather than a spring balance
▪ control of appropriate variables</td><td>(Year 8)
For example:
• reflecting on the quality of the data in relation to the data collection method and amount of data collected
• evaluating whether the investigation was valid and reliable
• suggesting improvements to investigation methods that would increase the accuracy of the data recorded, such as using
▪ the same electronic balance to measure the mass each time
▪ a digital ammeter to measure current
▪ control of appropriate variables</td><td>(Year 9)
For example:
• comparing the data collected with the expected values and comment on the accuracy of the data
• reflecting on the precision of the data collected and identifying sources of error
• linking the quality of the data to the validity of the conclusion
• suggesting specific improvements to the validity of the investigation, such as
▪ ensuring the method tests what was proposed
▪ controlling all specific variables
▪ using a control for comparison
▪ increasing random samples
• suggesting specific improvements to the reliability of the investigation, such as
▪ ensuring consistency of results
▪ having a large enough sample
▪ repeating or replicating the investigation</td><td>(Year 10)
For example:
• comparing the data collected with the expected values and comment on the accuracy of the data
• reflecting on the precision of the data collected and identifying sources of error
• linking the quality of the data to the validity of the conclusion
• suggesting specific improvements to the validity of the investigation, such as
▪ ensuring the method tests what was proposed
▪ controlling all specific variables
▪ using a control for comparison
▪ increasing random samples
• suggesting specific improvements to the reliability of the investigation, such as
▪ ensuring consistency of results
▪ having a large enough sample
▪ repeating or replicating the investigation</td></tr>
</table>

	Year 7	Year 8	Year 9	Year 10
	Construct evidence-based arguments to support conclusions or evaluate claims		Construct arguments based on analysis of a variety of evidence to support conclusions or evaluate claims	
	(Year 7) For example: • using evidence provided by scientific investigations to evaluate claims or conclusions • evaluating the quality of evidence when constructing an argument to support a conclusion or claim • evaluating a claim that one brand of tyre is better on wet roads than another brand of tyre	(Year 8) For example: • using evidence provided by scientific investigations to evaluate claims or conclusions • evaluating the quality of evidence when constructing an argument to support a conclusion or claim • evaluating a claim that one brand of battery lasts longer than another brand of battery	(Year 9) For example: • constructing an argument supported by primary and secondary evidence and reasoning to support or reject hypotheses • evaluating the quality of primary and secondary evidence when constructing an argument to support a conclusion or claim • constructing a scientific argument showing how a range of evidence supports a claim relating to climate change	(Year 10) For example: • constructing an argument supported by primary and secondary evidence and reasoning to support or reject hypotheses • evaluating the quality of primary and secondary evidence when constructing an argument to support a conclusion or claim • constructing a scientific argument showing how a range of evidence supports the theory of natural selection

Sub-strand: Communicating

	Year 7	Year 8	Year 9	Year 10
Current WA Curriculum	Communicate ideas, findings and evidence based solutions to problems using scientific language, and representations, using digital technologies as appropriate (ACSIS133) (ACSIS148)		Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations (ACSIS174) (ACSIS208)	
Australian Curriculum 9	write and create texts to communicate ideas, findings and arguments for specific purposes and audiences, including selection of appropriate language and text features, using digital tools as appropriate (AC9S7I08) (AC9S8I08)		write and create texts to communicate ideas, findings and arguments effectively for identified purposes and audiences, including selection of appropriate content, language and text features, using digital tools as appropriate (AC9S9I08) (AC9S10I08)	
Proposed WA Curriculum	Communicate ideas, findings and arguments for specific purposes and audiences, including selection of appropriate content, language and text features, using digital tools as appropriate		Communicate scientific ideas and information for specific purposes and audiences, including constructing evidence-based arguments and selection of appropriate content, language and text features, using digital tools as appropriate	
	(Year 7) For example: • reporting on scientific investigations, incorporating diagrams, graphical representations and data as appropriate and including examination of accuracy and reproducibility of the data • writing a letter to the editor to express a view about the impact of spraying pesticides on a local ecosystem • creating an informative text for a younger audience to show how the moon affects tides on Earth	(Year 8) For example: • reporting on scientific investigations, incorporating diagrams, graphical representations and data as appropriate and including examination of accuracy and reproducibility of the data • creating a documentary on the rock cycle, selecting appropriate language, models or analogies to engage a specific audience • creating a digital infographic to compare and contrast different forms of energy and highlighting energy transformations within each	(Year 9) For example: • reporting on scientific investigations, incorporating background information, diagrams, graphical representations and data as appropriate, an explanation of the results using scientific knowledge and a discussion that considers validity and reproducibility • summarising the findings of an investigation as a live or virtual poster presentation • creating a digital infographic to highlight the multiple lines of evidence from polar ice caps, ocean temperatures and extreme weather to explain how climate change is impacting Earth	(Year 10) For example: • reporting on scientific investigations, incorporating background information, diagrams, graphical representations and data as appropriate, an explanation of the results using scientific knowledge and a discussion that considers validity and reproducibility • summarising the findings of an investigation as a live or virtual poster presentation • using animation or comic strip software to create an explanation of the Big Bang for an audience of their peers

Sub-strand: Collaborating and applying

	Year 7	Year 8	Year 9	Year 10
Current WA Curriculum	**Nature and development of science**			
	Scientific knowledge has changed peoples' understanding of the world and is refined as new evidence becomes available (ACSHE119) (ACSHE134)		Scientific understanding, including models and theories, is contestable and is refined over time through a process of review by the scientific community (ACSHE157) (ACSHE191)	
	Science knowledge can develop through collaboration across the disciplines of science and the contributions of people from a range of cultures (ACSHE223) (ACSHE226)		Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries (ACSHE158) (ACSHE192)	
Australian Curriculum 9	**Nature and development of science**			
	explain how new evidence or different perspectives can lead to changes in scientific knowledge (AC9S7H01) (AC9S8H01)		explain how scientific knowledge is validated and refined, including the role of publication and peer review (AC9S9H01) (AC9S10H01)	
	investigate how cultural perspectives and world views influence the development of scientific knowledge (AC9S7H02) (AC9S8H02)		investigate how advances in technologies enable advances in science, and how science has contributed to developments in technologies and engineering (AC9S9H02) (AC9S10H02)	
Proposed WA Curriculum	Illustrate how the development of scientific knowledge has benefited from collaboration across disciplines and the contributions of people from a range of cultures		Illustrate how advances in scientific understanding often rely on developments in technologies and engineering and technological and engineering advances are often linked to scientific discoveries	
	(Year 7) For example: • examining why it is important to recognise that different people in society have different perspectives on the introduction of biological controls to eradicate an invasive species • investigating how aeronautical engineers' understanding of the nature of the forces acting in flight have led to changes in the design of aircraft • exploring the contributions of Aboriginal and Torres Strait Islander Peoples' knowledge to science, such as the identification of medicinal properties of endemic plants	(Year 8) For example: • identifying how microscopes and medical imaging have led to improved understanding of cells and organs • investigating how the development of superstrong, lighter alloys has enabled engineers to improve structural components in building, transportation and industry • investigating how knowledge of the location and extraction of mineral resources relies on expertise from across disciplines	(Year 9) For example: • investigating how models can be used to predict the changes in populations due to environmental changes, such as the impact of flooding or fire on rabbit or kangaroo populations • considering how computer modelling has improved knowledge and predictability of phenomena such as climate change and atmospheric pollution • exploring Australian technological advances such as the cochlear implant pioneered by Professor Graeme Clark and the Monash Vision Group's work on a bionic eye	(Year 10) For example: • exploring how the development of fast computers has made the analysis of DNA sequencing possible • exploring how the development of fast computers has made possible the analysis of radio astronomy signals and other data generated by major international science projects such as the Event Horizon Telescope and the Square Kilometre Array • examining how the discovery of gravity waves validated Einstein's theory of general relativity and why this discovery did not occur until 100 years after the theory was proposed

	Year 7	Year 8	Year 9	Year 10
Current WA Curriculum	**Use and influence of science**			
	Solutions to contemporary issues that are found using science and technology, may impact on other areas of society and may involve ethical considerations (ACSHE120) (ACSHE135)		People use scientific knowledge to evaluate whether they accept claims, explanations or predictions, and advances in science can affect people's lives, including generating new career opportunities (ACSHE160) (ACSHE194)	
	People use science understanding and skills in their occupations and these have influenced the development of practices in areas of human activity (ACSHE121) (ACSHE136)		Values and needs of contemporary society can influence the focus of scientific research (ACSHE228) (ACSHE230)	
Australian Curriculum 9	**Use and influence of science**			
	examine how proposed scientific responses to contemporary issues may impact on society and explore ethical, environmental, social and economic considerations (AC9S7H03) (AC9S8H03)		analyse the key factors that contribute to science knowledge and practices being adopted more broadly by society (AC9S9H03) (AC9S10H03)	
	explore the role of science communication in informing individual viewpoints and community policies and regulations (AC9S7H04) (AC9S8H04)		examine how the values and needs of society influence the focus of scientific research (AC9S9H04) (AC9S10H04)	
Proposed WA Curriculum	Illustrate how science understanding and skills have influenced the development of individual, community and workplace practices		Illustrate how proposed scientific responses to contemporary issues may impact on society	
	(Year 7) For example: • investigating everyday applications of physical separation techniques such as desalination plants, sorting waste materials, reducing pollution, extracting products from plants, separating blood products and cleaning up oil spills • exploring how tidal and seasonal changes affect people in a variety of activities, such as fishing and agriculture	(Year 8) For example: • exploring the development of spray-on skin by Professor Fiona Wood and Maria Stoner • exploring how seismic data is collected and shared between governments across the Asia-Pacific region and how governments use this data for alert systems, such as, tsunami alerts • analysing factors that have led to the adoption of solar panels and battery storage by individuals, industries and communities	(Year 9) For example: • investigating strategies implemented to maintain part of the local environment, such as bushland, a beach, a lake, a desert or a shoreline • examining the social impact of adopting climate change mitigating technologies to reduce energy consumption, such as electric vehicles, solar panels and battery storage by individuals, industries and communities • exploring how Marie Curie's discovery of new elements and work with radioisotopes contributed to the treatment of cancers • exploring how communication methods are influenced by new mobile technologies that rely on electromagnetic radiation • considering safe sound levels for humans and implications in the workplace and leisure activities	(Year 10) For example: • using knowledge of science to test claims made in advertising • examining karyotypes and applications of gene technologies, such as gene therapy and genetic engineering and biotechnologies • investigating why agricultural practices have changed to include widespread use of genetically engineered crops • examining how the recent use of female crash test dummies has shown women are at greater risk of injury in a car accident and consider implications for changing car safety features • describing how science is used in the media to explain a natural event or justify people's actions