Australian CURRICULUM Review

SCIENCE

CONSULTATION CURRICULUM

Comparative information 7–10

AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY

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COMPARISON OF CURRENT AND REVISED CURRICULUM IN SCIENCE

Content descriptions Years 7 to 8
Strand: Science Understanding

Sub-strand: Biological sciences	**Year 7** *Students learn to:*	**Year 8** *Students learn to:*
Original	Classification helps organise the diverse groups of organisms (ACSSU111)	Cells are the basic units of living things; they have specialised structures and functions (ACSSU149)
Proposed	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)	investigate how cells are the basic units of living things, the differences between plant and animal cells, and the function of specialised cell structures and organelles (AC9S8U01)
Original	Interactions between organisms, including the effects of human activities can be represented by food chains and food webs (ACSSU112)	Multi-cellular organisms contain systems of organs carrying out specialised functions that enable them to survive and reproduce (ACSSU150)
Proposed	investigate how models, including food webs and biomass pyramids, represent matter and energy flow in ecosystems and predict the impact of changing abiotic and biotic factors on populations (AC9S7U02)	investigate 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)

Sub-strand: Earth and space sciences	**Year 7** *Students learn to:*	**Year 8** *Students learn to:*
Original	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)
Proposed	investigate how cyclic changes in the relative positions of the Earth, sun and moon can be modelled and explain how these cycles cause eclipses and influence predictable phenomena on Earth, including seasons and tides (AC9S7U03)	investigate the role of energy and forces in tectonic activity, including formation of geological features at divergent, convergent and transform plate boundaries, and describe the scientific evidence for the theory of plate tectonics (AC9S8U03)

Original	Some of Earth's resources are renewable, including water that cycles through the environment, but others are non-renewable (ACSSU116)	
Proposed	*Removed*	

Sub-strand: Physical sciences	**Year 7** *Students learn to:*	**Year 8** *Students learn to:*
Original	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)
Proposed	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)	investigate how different types of energy are classified as kinetic or potential energy and represent energy transfer and transformations in simple systems (AC9S8U04)
Original		
Proposed		investigate processes of electricity generation from a non-renewable and a renewable source, including examining energy transfers and transformations (AC9S8U05)

Sub-strand: Chemical sciences	**Year 7** *Students learn to:*	**Year 8** *Students learn to:*
Original		Properties of the different states of can be explained in terms of the motion and arrangement of particles (ACSSU151)
Proposed	investigate how particle theory describes 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)	*Removed*
Original	Mixtures, including solutions, contain a combination of pure substances that can be separated using a range of techniques (ACSSU113)	Differences between elements, compounds and mixtures can be described at a particle level (ACSSU152)

Proposed	investigate how particles in pure substances and mixtures can be modelled and how differences in the properties of substances can be used to separate mixtures (AC9S7U06)	investigate how matter can be classified as elements, compounds and mixtures, and compare different representations of these, including 2-dimensional and 3-dimensional models, symbols and formulas (AC9S8U06)
Original		Chemical change involves substances reacting to form new substances (ACSSU225)
Proposed		investigate the differences between physical and chemical changes and identify indicators of energy change in chemical reactions (AC9S8U07)

Content descriptions Years 9 to 10
Strand: Science Understanding

Sub-strand: Biological sciences	**Year 9** *Students learn to:*	**Year 10** *Students learn to:*
Original	Multicellular 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)
Proposed	investigate how a body system regulates and coordinates the body's response to stimuli and the role of positive and negative feedback mechanisms (AC9S9U01)	investigate the role of meiosis and mitosis and the function of chromosomes, DNA and genes in heredity and explain and predict patterns of Mendelian inheritance (AC9S10U01)
Original	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)
Proposed	investigate how the processes of sexual and asexual reproduction in animals and plants enable survival of the species (AC9S9U02)	investigate how the theory of evolution by natural selection explains past and present diversity and analyse the scientific evidence supporting the theory (AC9S10U02)

Sub-strand: Earth and space sciences	**Year 9** *Students learn to:*	**Year 10** *Students learn to:*
Original	The theory of plate tectonics explains global patterns of geological activity and continental movement (ACSSU180)	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)
Proposed	investigate how key processes in the carbon cycle, including combustion, photosynthesis and respiration, rely on interactions between the biosphere, geosphere, hydrosphere and atmosphere (AC9S9U03)	investigate how the big bang theory models the origin and evolution of the universe, including the formation of stars and galaxies, and analyse the supporting evidence for the theory (AC9S10U03)
Original		Global systems, including the carbon cycle, rely on interactions involving the biosphere, lithosphere, hydrosphere and atmosphere (ACSSU189)
Proposed		investigate how models of energy flow between the biosphere, geosphere, hydrosphere and atmosphere describe patterns of global climate change and predict future changes (AC9S10U04)

Sub-strand: Physical sciences	**Year 9** *Students learn to:*	**Year 10** *Students learn to:*
Original	Energy transfer through different mediums can be explained using wave and particle models (ACSSU182)	The motion of objects can be described and predicted using the laws of physics (ACSSU229)
Proposed	investigate how wave and particle models describe energy transfer through different mediums and examine the usefulness of each model for explaining phenomena (AC9S9U04)	investigate Newton's laws of motion and quantitatively analyse the relationship between force, mass and acceleration of objects (AC9S10U05)
Original		Energy conservation in a system can be explained by describing energy transfers and transformations (ACSSU190)

Proposed	investigate how energy transfers and transformations in physical systems demonstrate the law of conservation of energy and analyse system efficiency in terms of energy inputs and outputs (AC9S9U05)	*Removed*

Sub-strand: Chemical sciences	**Year 9** *Students learn to:*	**Year 10** *Students learn to:*
Original	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)
Proposed	investigate how the discovery of protons, neutrons and electrons influenced the model of the atom and how natural radioactive decay results in stable atoms (AC9S9U06)	investigate how the Bohr model of the atom explains the structure and properties of atoms and relates to their organisation in the periodic table (AC9S10U06)
Original	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)
Proposed	investigate how the rearrangement of atoms in chemical reactions can be modelled using a range of representations, including word and simple balanced chemical equations, and use these to demonstrate the law of conservation of mass (AC9S9U07)	investigate synthesis, decomposition and displacement reactions, predict their products, and examine the factors that affect reaction rates (AC9S10U07)
Original	Chemical reactions, including combustion and the reactions of acids, are important in both non-living and living systems and involve energy transfer (ACSSU179)	
Proposed	*Removed*	

Content descriptions Years 7 to 10
Strand: Science as a Human Endeavour

Sub-strand: Nature and development of science	**Years 7 and 8** *Students learn to:*	**Years 9 and 10** *Students learn to:*
Original	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)
Proposed	investigate how new evidence or different perspectives can lead to changes in scientific knowledge (AC9S8H01)	investigate how scientific knowledge is validated, including the role of publication and peer review (AC9S10H01)
Original	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 technological advances and are often linked to scientific discoveries (ACSHE158) (ACSHE192)
Proposed	investigate how cultural perspectives and world views influence the development of scientific knowledge (AC9S8H02)	investigate how advances in technologies enable advances in science, and how science has contributed to developments in technologies and engineering (AC9S10H02)

Sub-strand: Use and influence of science	**Years 7 and 8** *Students learn to:*	**Years 9 and 10** *Students learn to:*
Original	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)
Proposed	investigate how proposed scientific responses to contemporary issues may impact on society and explore environmental, social and economic considerations (AC9S8H03)	investigate key factors that contribute to science knowledge and practices being adopted more broadly by society (AC9S10H03)

Original	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)
Proposed	investigate the role of science communication in informing individual viewpoints and community policies and regulations (AC9S8H04)	investigate how the values and needs of society influence the focus of scientific research (AC9S10H04)

Content descriptions Years 7 to 10
Strand: Science Inquiry

Sub-strand: Questioning and predicting	**Years 7 and 8** *Students learn to:*	**Years 9 and 10** *Students learn to:*
Original	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) (SCSIS198)
Proposed	develop investigable questions, observation-based predictions and hypotheses to explore scientific models, identify patterns or test relationships (AC9S8I01)	develop investigable questions, predictions and hypotheses to test relationships or develop explanatory models (AC9S10I01)

Sub-strand: Planning and conducting	**Years 7 and 8** *Students learn to:*	**Years 9 and 10** *Students learn to:*
Original	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)
Proposed	plan and conduct reproducible investigations to answer questions and test hypotheses, including identifying assumptions and, as appropriate, recognising and managing risks, considering ethical	plan and conduct valid, reproducible investigations to answer questions and test hypotheses, including, as appropriate, developing risk assessments, considering ethical issues, and addressing key

	issues and recognising key considerations regarding heritage sites and artefacts on Country or Place (AC9S8I02)	considerations regarding heritage sites and artefacts on Country or Place (AC9S10I02)
Original	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)
Proposed	select and use equipment to generate and record data with precision, using digital technologies as appropriate (AC9S8I03)	select and use data generation equipment with precision to obtain useful sample sizes and repeatable data, using digital technologies as appropriate (AC9S10I03)

Sub-strand: Processing, modelling and analysing	**Years 7 and 8** *Students learn to:*	**Years 9 and 10** *Students learn to:*
Original Processing and analysing data and information	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) (ACSIS144)	Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies (ACSIS169) (ACSIS203)
Proposed Processing, modelling and analysing	select, construct and use appropriate representations, including tables, graphs, mathematical relationships, and models, to organise and process data and information (AC9S8I04)	select and construct appropriate representations including tables, graphs, descriptive statistics, models and mathematical relationships to organise and process data and information (AC9S10I04)
Original Processing and analysing data and information	Summarise data, from students' own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions based on evidence (ACSIS130) (ACSIS145)	Use knowledge of scientific concepts to draw conclusions that are consistent with evidence (ACSIS170) (ACSIS204)
Proposed Processing, modelling and analysing	analyse data and information to identify patterns, trends, relationships and anomalies (AC9S8I05)	analyse and connect a variety of data and information to identify and explain patterns, trends, relationships and anomalies (AC9S10I05)

Sub-strand: Evaluating	**Years 7 and 8** *Students learn to:*	**Years 9 and 10** *Students learn to:*
Original	Reflect on scientific investigations including evaluating the quality of the data collected, and identifying improvements (ACSIS131) (ACSIS146)	Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data (ACSIS171) (ACSIS205)
Proposed	analyse methods, conclusions and claims for assumptions, possible sources of error, conflicting evidence and unanswered questions (AC9S8I06)	assess the validity and reproducibility of methods and evaluate the validity of conclusions and claims, including by identifying conflicting evidence and areas of uncertainty (AC9S10I06)
Original	Use scientific knowledge and findings from investigations to evaluate claims based on evidence (ACSIS132) (ACSIS234)	Critically analyse the validity of information in primary and secondary sources and evaluate the approaches used to solve problems (ACSIS172) (ACSIS206)
Proposed	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 (AC9S8I07)	construct arguments based on 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 (AC9S10I07)

Sub-strand: Communicating	**Years 7 and 8** *Students learn to:*	**Years 9 and 10** *Students learn to:*
Original	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)
Proposed	create multimodal texts to communicate ideas, findings and arguments for specific purposes and audiences, including selection of appropriate language and text features, using digital technologies as appropriate (AC9S8I08)	create multimodal texts to communicate ideas, findings and arguments effectively for identified purposes and audiences, including selection of appropriate content, language and text features, using digital technologies as appropriate (AC9S10I08)

Achievement standards Year 7

	Year 7
Original	By the end of Year 7, students describe techniques to separate pure substances from mixtures. They represent and predict the effects of unbalanced forces, including Earth's gravity, on motion. They explain how the relative positions of Earth, the sun and moon affect phenomena on Earth. They analyse how the sustainable use of resources depends on the way they are formed and cycle through Earth systems. They predict the effect of human and environmental changes on interactions between organisms and classify and organise diverse organisms based on observable differences. Students describe situations where scientific knowledge from different science disciplines and diverse cultures has been used to solve a real-world problem. They explain possible implications of the solution for different groups in society. Students identify questions that can be investigated scientifically. They plan fair experimental methods, identifying variables to be changed and measured. They select equipment that improves fairness and accuracy and describe how they considered safety. Students draw on evidence to support their conclusions. They summarise data from different sources, describe trends and refer to the quality of their data when suggesting improvements to their methods. They communicate their ideas, methods and findings using scientific language and appropriate representations.
Proposed	By the end of Year 7 students explain how biological diversity is ordered and organised. They represent flows of matter and energy in ecosystems and predict the effect of environmental changes. They model cycles in the Earth-sun-moon system and explain the effects of these cycles on Earth phenomena. They represent and explain the effects of forces acting on objects. They use particle theory to explain the physical properties of substances and design and explain processes to separate substances. Students describe the factors that result in scientific knowledge changing over time. They examine scientific responses to contemporary issues and describe the role of science communication. Students plan and conduct safe, reproducible investigations to test relationships or aspects of scientific models. They recognise ethical issues and identify key intercultural considerations for specific field locations or use of secondary data. They use equipment to generate and record data with precision. They construct representations to organise and process data and information. They analyse data and information to identify patterns, trends and relationships. They identify possible sources of error in methods and identify conflicting evidence and unanswered questions when analysing conclusions and claims. They identify evidence to support their conclusions and construct arguments to support or dispute claims. They select and use text features to achieve their purpose when communicating their ideas, findings and arguments to specific audiences.

Achievement standards Years 8 to 9

	Year 8	Year 9
Original	By the end of Year 8, students compare physical and chemical changes and use the particle model to explain and predict the properties and behaviours of substances. They identify different forms of energy and describe how energy transfers and transformations cause change in simple systems. They compare processes of rock formation, including the timescales involved. They analyse the relationship between structure and function at cell, organ and body system levels. Students examine the different science knowledge used in occupations. They explain how evidence has led to an improved understanding of a scientific idea and describe situations in which scientists collaborated to generate solutions to contemporary problems. They reflect on implications of these solutions for different groups in society. Students identify and construct questions and problems that they can investigate scientifically. They consider safety and ethics when planning investigations, including designing field or experimental methods. They identify variables to be changed, measured and controlled. Students construct representations of their data to reveal and analyse patterns and trends, and use these when justifying their conclusions. They explain how modifications to methods could improve the quality of their data and apply their own scientific knowledge and investigation findings to evaluate claims made by others. They use appropriate language and representations to communicate science ideas, methods and findings in a range of text types.	By the end of Year 9, students explain chemical processes and natural radioactivity in terms of atoms and energy transfers and describe examples of important chemical reactions. They describe models of energy transfer and apply these to explain phenomena. They explain global features and events in terms of geological processes and timescales. They analyse how biological systems function and respond to external changes with reference to interdependencies, energy transfers and flows of matter. They describe social and technological factors that have influenced scientific developments and predict how future applications of science and technology may affect people's lives. Students design questions that can be investigated using a range of inquiry skills. They design methods that include the control and accurate measurement of variables and systematic collection of data and describe how they considered ethics and safety. They analyse trends in data, identify relationships between variables and reveal inconsistencies in results. They analyse their methods and the quality of their data, and explain specific actions to improve the quality of their evidence. They evaluate others' methods and explanations from a scientific perspective and use appropriate language and representations when communicating their findings and ideas to specific audiences.

Proposed	By the end of Year 8 students explain the role of specialised cell structures and organelles in cellular function and analyse the relationship between structure and function at organ and body system levels. They apply an understanding of forces, energy and the theory of plate tectonics to explain patterns of change in the geosphere. They compare processes of electricity generation and represent transfer and transformation of energy in simple systems. They represent and classify different types of matter and distinguish between physical and chemical change. Students explain how social, cultural and technological factors can influence development and application of scientific knowledge. They analyse scientific responses to contemporary issues and examine the importance of science communication. Students plan and conduct safe, reproducible investigations to test relationships or explore models. They consider ethical issues and describe any intercultural considerations for specific field locations or use of secondary data. They select and use appropriate equipment to generate and record data with precision. They select and construct appropriate representations to organise and process data and information. They analyse data and information to identify patterns, trends, relationships and anomalies. They identify assumptions and sources of error when analysing methods and identify conflicting evidence or unanswered questions when analysing conclusions and claims. They construct evidence-based arguments to support conclusions or evaluate claims. They select and use language and text features to achieve their purpose when communicating their ideas, findings and arguments to specific audiences.	By the end of Year 9 students explain how body systems provide a coordinated response to stimuli. They examine how the processes of sexual and asexual reproduction enable survival of the species. They examine how interactions within and between Earth's spheres affect the carbon cycle. They explain energy conservation in simple systems and apply wave and particle models to describe energy transfer. They explain observable chemical processes in terms of changes in atomic structure, atomic rearrangement, mass and energy. Students explain the role of publication in validating scientific knowledge and describe the relationship between science, technologies and engineering. They examine key factors that influence interactions between science and society. Students plan and conduct safe, reproducible investigations to test or identify relationships or explore models. They examine ethical and intercultural considerations when acquiring or using primary and secondary data. They select and use equipment to generate and record repeatable data. They select and construct appropriate representations to organise, process and summarise data and information. They analyse and connect data and information to identify and explain patterns, trends, relationships and anomalies. They analyse methods for assumptions and sources of error and evaluate the validity of conclusions and claims. They construct logical, evidence-based arguments to support conclusions or evaluate claims. They select and use content, language and text features to achieve their purpose when communicating their ideas, findings and arguments to specific audiences.

Achievement standard Year 10

	Year 10
Original	By the end of Year 10, students analyse how the periodic table organises elements and use it to make predictions about the properties of elements. They explain how chemical reactions are used to produce particular products and how different factors influence the rate of reactions. They explain the concept of energy conservation and represent energy transfer and transformation within systems. They apply relationships between force, mass and acceleration to predict changes in the motion of objects. Students describe and analyse interactions and cycles within and between Earth's spheres. They evaluate the evidence for scientific theories that explain the origin of the universe and the diversity of life on Earth. They explain the processes that underpin heredity and evolution. Students analyse how the models and theories they use have developed over time and discuss the factors that prompted their review. Students develop questions and hypotheses and independently design and improve appropriate methods of investigation, including field work and laboratory experimentation. They explain how they have considered reliability, safety, fairness and ethical actions in their methods and identify where digital technologies can be used to enhance the quality of data. When analysing data, selecting evidence and developing and justifying conclusions, they identify alternative explanations for findings and explain any sources of uncertainty. Students evaluate the validity and reliability of claims made in secondary sources with reference to currently held scientific views, the quality of the methodology and the evidence cited. They construct evidence-based arguments and select appropriate representations and text types to communicate science ideas for specific purposes.
Proposed	By the end of Year 10 students explain the processes that underpin heredity and genetic diversity and describe the evidence supporting the theory of evolution by natural selection. They sequence key events in the origin and evolution of the universe and describe the supporting evidence for the big bang theory. They examine patterns of global climate change and identify causal factors. They explain how Newton's laws describe and predict motion of objects in a system. They explain patterns and trends in the periodic table and predict the products of reactions and the effect of changing reactant and reaction conditions. Students explain the processes through which scientific knowledge is validated and examine the relationship between science, technology and engineering. They analyse key factors that influence interactions between science and society. Students plan and conduct safe, valid and reproducible investigations to test relationships or develop explanatory models. They explain ethical and intercultural considerations when acquiring or using primary and secondary data. They select and use equipment efficiently to generate and record repeatable data. They select and use effective representations to organise, process and summarise data and information. They analyse and connect a variety of data and information to identify patterns, trends, relationships and anomalies. They assess the validity and reproducibility of methods, and the validity of conclusions and claims. They construct logical arguments based on a variety of evidence to support conclusions and evaluate claims. They select and use content, language and text features effectively to achieve their purpose when communicating their ideas, findings and arguments to diverse audiences.