



Year 10 Work Program — Australian Curriculum:

Science

Identify curriculum	Year level description (highlighted aspects indicate differences from the previous year level)	<p>The <i>Science Inquiry Skills</i> and <i>Science as a Human Endeavour</i> strands are described across a two-year band. In their planning, schools and teachers refer to the expectations outlined in the Achievement Standard and also to the content of the <i>Science Understanding</i> strand for the relevant year level to ensure that these two strands are addressed over the two-year period. The three strands of the curriculum are interrelated and their content should be taught in an integrated way.</p> <p>The order and detail in which the content descriptions are organised into teaching/learning programs are decisions to be made by the teacher.</p> <p>In the Year 10 curriculum students explore systems at different scales and connect microscopic and macroscopic properties to explain phenomena. Students explore the biological, chemical, geological and physical evidence for different theories, such as the theories of natural selection and the Big Bang. Atomic theory is developed to understand relationships within the periodic table. Understanding motion and forces are related by applying physical laws. Relationships between aspects of the living, physical and chemical world are applied to systems on a local and global scale and this enables students to predict how changes will affect equilibrium within these systems.</p>
	Achievement standard	<p>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.</p> <p>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.</p> <p>Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), <i>Australian Curriculum v3.0: Science for Foundation–10</i>, <www.australiancurriculum.edu.au/Science/Curriculum/F-10>.</p>

Teaching and learning	Term overview	Term 1	Term 2	Term 3	Term 4
Teaching and learning		<p>The recipe of life During this term students build on concepts learned in the Biological sciences and Earth and space sciences sub-strands across Years 6–9 and explore genetics and the theory of evolution. Students will:</p> <ul style="list-style-type: none"> understand relevant terminology, such as genotype, phenotype, gene, allele, dominant, recessive, karyotype, chromosome, variation, hereditary, competition, adaptation, analogous and homologous structures, convergent and divergent evolution, and geographical distribution use models and diagrams to represent the relationship between DNA, genes and chromosomes perform a DNA extraction recognise that genetic information passed on to offspring through sexual reproduction is from both parents by meiosis and fertilisation predict ratios of offspring genotypes and phenotypes in crosses involving dominant/recessive alleles or in genes that are sex-linked describe mutations as changes in DNA or chromosomes and outline the factors that contribute to causing mutations 	<p>Chemical reactions matter During this term students investigate natural and processed materials, learning to classify them by their patterns of interactions with other materials, their properties and structures. Students will:</p> <ul style="list-style-type: none"> research the periodic table and its development and refinement over time recognise that elements in the same group of the periodic table have similar properties understand that atomic structure explains the position of elements in the periodic table relate electronic configuration to the formation of compounds investigate chemical reactions and represent them using word and balanced symbol equations plan safe and fair methods to investigate the factors that affect the rate of chemical reactions explore how rates of everyday chemical processes are increased or decreased explore a variety of chemical processes and techniques used to identify and produce materials investigate the extraction of useful substances such as fuels and metals, for example extracting a metal from its ore 	<p>Road Science During this term students learn the mathematical and experimental foundations of our understanding of forces, motion and energy. Within the context of Galileo's experiments on motion, they conduct an extended experimental investigation. This unit has two overarching aims — that students understand:</p> <ul style="list-style-type: none"> the historical and cultural development of science and how scientific theories can change or be overthrown over time the importance of mathematics and precise measurement in physics. <p>Students will:</p> <ul style="list-style-type: none"> gather data (such as measurements of distance and time, speed, force, mass and acceleration) to analyse motion, using appropriate technology represent motion graphically interpret graphs of motion use Newton's laws to describe and explain the motion of objects use mathematical equations to solve problems related to the motion of objects research the experiments and arguments that Galileo used to overthrow Aristotle's ideas on motion 	<p>The big ideas of science In the first half of this term students gain an understanding of the dynamic nature of Earth and its place in the universe. They explore the relationship between technological advances and scientific discoveries. Students will:</p> <ul style="list-style-type: none"> investigate how human activity affects global systems model a cycle (such as the water, carbon, nitrogen or phosphorus cycle) within the biosphere examine the factors that drive the deep ocean currents and their role in regulating global climate explain the causes and effects of the greenhouse effect investigate the effect of climate change on sea levels and biodiversity explain the evidence that supports the Big Bang theory and calculation of the age of the universe describe the evolution of the universe, including the formation of galaxies and stars. <p>The term culminates with students further developing an appreciation of the place of evidence, models, explanation and theories in the development of scientific knowledge.</p> <ul style="list-style-type: none"> the theory of evolution and the role of Darwin in its development the field of genetics and the roles of Mendel, Watson, Crick and Franklin in its development the periodic table and the role of Mendeleev in its development modern cosmology and the role of scientists (such as Hubble, Hawking and Hoyle) in its development Newtonian physics and the role Galileo played in overthrowing Aristotelian physics geosciences and the scientific evidence for past and present climate change.

	Aboriginal and Torres Strait Islander perspectives	<p>Science provides opportunities for students to strengthen their appreciation and understanding of Aboriginal peoples and Torres Strait Islander peoples and their living cultures. Specific content and skills within relevant sections of the curriculum can be drawn upon to encourage engagement with:</p> <ul style="list-style-type: none"> Aboriginal and Torres Strait Islander frameworks of knowing and ways of learning Indigenous contexts in which Aboriginal and Torres Strait Islander peoples live Aboriginal peoples' and Torres Strait Islander peoples' contributions to Australian society and cultures. <p>Science provides opportunities to explore aspects of Australian Indigenous knowing with connection to, and guidance from, the communities who own them. Using a respectful inquiry approach, students have the opportunity to explore non-Indigenous science interpretations of Aboriginal and Torres Strait Islander lifestyles including knowledge of natural phenomena; native flora and fauna; and land, water and waste management. Using an inquiry approach enables students to learn science in contexts that are valued by Aboriginal and Torres Strait Islander students, their peers and communities, acknowledging their values and approaches to learning.</p>							
	General capabilities and cross-curriculum priorities	Opportunities to engage with: 	Opportunities to engage with: 	Opportunities to engage with: 	Opportunities to engage with: 				
	Key to general capabilities and cross-curriculum priorities	 Literacy  Numeracy  ICT capability  Critical and creative thinking  Ethical behaviour  Personal and social capability  Intercultural understanding  Aboriginal and Torres Strait Islander histories and cultures  Asia and Australia's engagement with Asia  Sustainability							
Develop assessment	Assessment For advice and guidelines on assessment, see www.qsa.qld.edu.au	<p>A folio is a targeted selection of evidence of student learning and includes a range of responses to a variety of assessment techniques. A folio is used to make an overall on-balance judgment about student achievement and progress at appropriate points and informs the reporting process.</p>							
		Term 1		Term 2		Term 3		Term 4	
		Week	Assessment instrument	Week	Assessment instrument	Week	Assessment instrument	Week	Assessment instrument
		2–7	<ul style="list-style-type: none"> ERT Genetics report and model making 	3–6	EEI (Written) Plan and conduct a fair investigation to investigate the factors that affect the rate of a chemical reaction.			2-4	OPTIONAL ERT - Structures
Develop assessment		9	Supervised assessment: Short and extended responses (Written)	9	Supervised assessment: Short and extended responses (Written) Focusing on knowledge and understanding of: <ul style="list-style-type: none"> properties and structures of matter patterns of interactions of matter representation of chemical reactions. The assessment package <i>Reaction rate test</i> in the QSA Assessment Bank could be used in this unit.	9	Supervised assessment: Short responses, paragraph responses and practical exercises (Written)	7	Supervised assessment: Short responses, paragraph responses and practical exercises (Written)
	Make judgments and use feedback	Moderation	Teachers develop tasks and plan units. Teachers co-mark tasks to ensure consistency of judgments.		Teachers develop tasks and plan units. Teachers select representative folios and meet to ensure consistency of judgments before marking tasks.		Teachers develop tasks and plan units.		Teachers develop tasks and plan units. Teachers select representative folios and meet to ensure consistency of judgments before marking tasks.

Year 10 Science: review for balance and coverage of content descriptions

Science Understanding	1	2	3	4
Biological sciences				
The transmission of heritable characteristics from one generation to the next involves DNA and genes (ACSSU184)	✓			✓
The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence (ACSSU185)	✓			✓
Chemical sciences				
The atomic structure and properties of elements are used to organise them in the Periodic Table (ACSSU186)		✓		✓
Different types of chemical reactions are used to produce a range of products and can occur at different rates (ACSSU187)		✓		✓
Earth and space sciences				
The universe contains features including galaxies, stars and solar systems and the Big Bang theory can be used to explain the origin the universe (ACSSU188)				✓
Global systems, including the carbon cycle, rely on interactions involving the biosphere, lithosphere, hydrosphere and atmosphere (ACSSU189)				✓
Physical sciences				
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)			✓	✓

Science as a Human Endeavour	1	2	3	4
Nature and development of science				
Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community (ACSHE191)		✓		✓
Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries (ACSHE192)	✓		✓	✓
Use and influence of science				
People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions (ACSHE194)	✓			✓
Advances in science and emerging sciences and technologies can significantly affect people's lives, including generating new career opportunities (ACSHE195)	✓	✓		
The values and needs of contemporary society can influence the focus of scientific research (ACSHE230)	✓	✓		✓

Science Inquiry Skills	1	2	3	4
Questioning and predicting				
Formulate questions or hypotheses that can be investigated scientifically (AC SIS198)		✓	✓	
Planning and conducting				
Plan, select and use appropriate investigation methods, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods (AC SIS199)		✓	✓	
Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data (AC SIS200)	✓	✓	✓	✓
Processing and analysing data and information				
Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies (AC SIS203)	✓	✓	✓	✓
Use knowledge of scientific concepts to draw conclusions that are consistent with evidence (AC SIS204)	✓	✓	✓	✓
Evaluating				
Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data (AC SIS205)		✓	✓	✓
Critically analyse the validity of information in secondary sources and evaluate the approaches used to solve problems (AC SIS206)	✓		✓	✓
Communicating				
Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations (AC SIS208)	✓	✓	✓	✓

Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), *Australian Curriculum v3.0: Science for Foundation–10*, <www.australiancurriculum.edu.au/Science/Curriculum/F-10>.