

Year 9 Science Curriculum and assessment plan

Example A

Level description	Context and cohort considerations	
<p>In Year 9 students consider the operation of systems at a range of scales and how those systems respond to external changes in order to maintain stability. They explore ways in which the human body system responds to changes in the external environment through physiological feedback mechanisms and the reproductive processes that enable a species to respond to a changing environment over time. They are introduced to the notion of the atom as a system of protons, electrons and neutrons, and how this system can change through nuclear decay. They learn that matter can be rearranged through chemical change and that these changes play an important role in many systems. They are introduced to the concepts of conservation of matter and energy and begin to develop a more sophisticated view of energy transfer. They explore these concepts as they relate to the global carbon cycle. Students begin to consider how well a sample or model represents the phenomena under study and use a range of evidence to support their conclusions.</p> <p>Inquiry questions can help excite students' curiosity and challenge their thinking. Following are examples of inquiry questions that could be used to prompt discussion and exploration:</p> <ul style="list-style-type: none"> • Why was the discovery of neutrons important? • How is scientific consensus established? What if it isn't? • Could synthesised organs make organ donation obsolete? • How does the carbon cycle affect life on Earth? • How do different technologies help humans to communicate? 	<p>Year 9 Science is taught in 3 x 70-minute lessons each week. Each Year 9 class has access to a laboratory for two lessons each week. Further access for Term 4 can be negotiated.</p> <p>Unit 1 runs for a full semester with a focus on carbon chemistry. Content from the Earth and space science sub strand is connected with the Chemistry sub strand content.</p> <p>Students have access to their own digital device and a shared laptop bank. Use of the textbook (digital or hardcopy) is encouraged. In Years 9 and 10, students are introduced to online assessment submission protocols in preparation for senior.</p> <p>Teacher aides support practical activities.</p>	
Unit 1 — Understanding carbon: Chemical sciences and Earth and space sciences	Unit 2 — Responding to change: Biological sciences	Unit 3 — Noise pollution: Physical sciences
<p>Duration: 20 weeks</p> <p>To be scientifically literate and informed citizens, students require the knowledge and skills to ask questions, challenge claims and make evidence-based decisions.</p> <p>In this unit, students build on understanding from Year 8 of the model of an atom and describe the role of natural radioactive decay in the creation of stable atoms. They plan and conduct experiments to demonstrate the law of conservation of mass and use word and simple balanced chemical equations to demonstrate this understanding. They rearrange atoms in chemical equations to represent reactions including photosynthesis and cellular respiration.</p> <p>The focus then shifts to exploring the movement of carbon through Earth's spheres, with students identifying the scientific knowledge needed to interpret data on atmospheric carbon. They explain how peer-reviewed scientific publications contribute to understanding of the carbon cycle. Students analyse data to explain the movement of carbon within and between Earth's systems. They develop their digital literacy as they acquire, locate and interpret data, building the skills needed for Year 10.</p>	<p>Duration: 10 weeks</p> <p>Building on Year 8 Biological science, students extend their understanding of the increasing complexity from cells to tissues, organs and systems. Based on the endocrine system, this unit requires students to explain the hormonal control of glucose availability to cells and the negative feedback mechanism that responds to this stimulus.</p> <p>In preparation for studying genetics in Year 10, students describe sexual and asexual reproduction from the cellular to organ levels of organisation and identify the role of these two reproductive processes in the survival of species.</p> <p>Through the Science as a human endeavour strand, students examine how the values and needs of society influence the focus of scientific research.</p>	<p>Duration: 10 weeks</p> <p>Noise cancelling headphones allow us to filter the soundtrack to our daily lives. Would it be possible to apply knowledge of transfer, transformation and conduction of energy to mitigate the noise pollution we inflict on our neighbours?</p> <p>Students demonstrate understanding of energy transfer using particle and wave models, including identifying strengths and weaknesses of each model when used to explain phenomena. They then apply their understanding of transfer and transformation of energy to analyse system efficiency.</p> <p>By investigating the law of conservation of energy in a simple system — testing sound insulation — students explain how advances in sound-dampening technology have been developed. They explore the potential application of these technologies to mitigating environmental noise pollution, such as in the nesting boxes of nocturnal animals in suburban areas.</p> <p>Students develop science inquiry skills and numeracy capabilities through the design process of testing various sound-absorbing materials.</p>

Unit 1 — Understanding carbon: Chemical sciences and Earth and space sciences				Unit 2 — Responding to change: Biological sciences		Unit 3 — Noise pollution: Physical sciences		
	Assessment 1 — Experimental investigation	Term/week	Assessment 2 — Investigation	Term/week	Assessment 3 — Examination	Term/week	Assessment 4 — Experimental investigation	Term/week
Assessment	<p>Description: Students manipulate conditions and observe reactions occurring in closed and open systems to demonstrate understanding of the law of conservation of mass.</p> <p>Technique: Experimental investigation</p> <p>Mode: Practical and written</p> <p>Conditions:</p> <ul style="list-style-type: none"> written response 600–700 words 	Week 9	<p>Description: Students construct a representation of the movement of carbon within and between Earth’s spheres. They research the current imbalance between atmospheric carbon and other carbon compounds and use data to explain the possible causes of the imbalance.</p> <p>Technique: Investigation</p> <p>Mode: Written or multimodal</p> <p>Conditions:</p> <ul style="list-style-type: none"> written response 600–700 words multimodal response 2–3 minutes 	Week 9	<p>Description: Students respond to questions derived from their study of human body systems. They analyse provided data on negative feedback mechanisms.</p> <p>Technique: Examination</p> <p>Mode: Written</p> <p>Conditions:</p> <ul style="list-style-type: none"> 80 minutes, plus 10 minutes planning supervised 	Week 9	<p>Description: Students test sound-dampening materials by analysing the energy conservation in their designed simple system.</p> <p>Technique: Experimental investigation</p> <p>Mode: Practical and written</p> <p>Conditions:</p> <ul style="list-style-type: none"> written response 600–700 words 	Week 8
Achievement standard	<p>By the end of Year 9 students explain how body systems provide a coordinated response to stimuli. They describe how the processes of sexual and asexual reproduction enable survival of the species. They explain how interactions within and between Earth’s spheres affect the carbon cycle. They analyse 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 and mass. Students explain the role of publication and peer review in the development of scientific knowledge and explain the relationship between science, technologies and engineering. They analyse the different ways in which science and society are interconnected.</p> <p>Students plan and conduct safe, reproducible investigations to test or identify relationships and models. They describe how they have addressed any ethical and intercultural considerations when generating or using primary and secondary data. They select and use equipment to generate and record replicable data with precision. 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 the impact of assumptions and sources of error in methods and evaluate the validity of conclusions and claims. They construct logical arguments based on 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 specific audiences.</p>		<p>By the end of Year 9 students explain how body systems provide a coordinated response to stimuli. 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	Unit 1 — Understanding carbon: Chemical sciences and Earth and space sciences	Unit 2 — Responding to change: Biological sciences	Unit 3 — Noise pollution: Physical sciences
Moderation	Consensus: Refer to QCAA moderation advice on the QCAA website under the Assessment tab in the learning area.	Consensus: Refer to QCAA moderation advice on the QCAA website under the Assessment tab in the learning area.	Calibration: Refer to QCAA moderation advice on the QCAA website under the Assessment tab in the learning area.

Content descriptions	Units			Content descriptions	Units			Content descriptions	Units		
Science understanding	1	2	3	Science as a human endeavour	1	2	3	Science inquiry	1	2	3
Biological sciences 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	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Nature and development of science explain how scientific knowledge is validated and refined, including the role of publication and peer review AC9S9H01	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Questioning and predicting develop investigable questions, reasoned predictions and hypotheses to test relationships and develop explanatory models AC9S9I01	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	investigate how advances in technologies enable advances in science, and how science has contributed to developments in technologies and engineering AC9S9H02	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Planning and conducting 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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Earth and space sciences represent the carbon cycle and examine how key processes including combustion, photosynthesis and respiration rely on interactions between Earth's spheres (the geosphere, biosphere, hydrosphere and atmosphere) AC9S9U03	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Use and influence of science analyse the key factors that contribute to science knowledge and practices being adopted more broadly by society AC9S9H03	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	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	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Physical sciences use wave and particle models to describe energy transfer through different mediums and examine the usefulness of each model for explaining phenomena AC9S9U04	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	examine how the values and needs of society influence the focus of scientific research AC9S9H04	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Processing, modelling and analysing select and construct appropriate representations, including tables, graphs, descriptive statistics, models and mathematical relationships, to organise and process data and information AC9S9I04	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
apply the law of conservation of energy to analyse system efficiency in terms of energy inputs, outputs, transfers and transformations AC9S9U05	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>					analyse and connect a variety of data and information to identify and explain patterns, trends, relationships and anomalies AC9S9I05	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Content descriptions	Units			Content descriptions	Units	Content descriptions	Units		
Chemical sciences 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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			Evaluating 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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			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	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
						Communicating 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	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

General capabilities	Units		
	1	2	3
Critical and creative thinking	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Digital literacy	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ethical understanding	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Intercultural understanding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Literacy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Numeracy	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Personal and social capability	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Cross-curriculum priorities	Units		
	1	2	3
Aboriginal and Torres Strait Islander histories and cultures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Asia and Australia's engagement with Asia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sustainability	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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