

Learning area	Science
Curriculum elements	Rationale/Aims Content descriptions Achievement standards
Year levels	Kindergarten Year 1 Year 2 Year 3 Year 4 Year 5 Year 6 Year 7 Year 8 Year 9 Year 10

Science | Rationale/Aims

Rationale

Science provides an empirical way of answering interesting questions about the biological, physical and technological world. The knowledge it produces has proved to be a reliable basis for action in our personal, social and economic lives. Science is a dynamic, collaborative and creative human endeavour arising from our curiosity and interest in making sense of our world through exploring the unknown, investigating universal mysteries, making predictions and solving problems.

The Australian Curriculum: Science provides opportunities for students to develop understandings about science and its processes, the scope of its contributions to our culture and society, and its applications in our daily lives. The science curriculum addresses the diverse needs of Australian students by providing them with scientific knowledge, understandings and skills to make informed and responsible personal, social, technological and environmental decisions that impact at the local, national and global levels and to participate, if they so wish, in science-rich careers.

In addition to its practical applications, learning science is a valuable pursuit in its own right, providing opportunities for critical and creative thinking, challenge and leisure. The science curriculum provides opportunities for students to experience the joy of scientific discovery and to nurture students' natural curiosity about the world around them. These ideas resonate with the concept of scientific literacy, a term that is well established in the science education literature.

The Australian Curriculum: Science encompasses the three interrelated areas of *Science inquiry skills* (incorporating skills and understanding of science as a way of knowing and doing), *Science as a human endeavour* (incorporating knowledge and understanding of the personal, social, environmental, cultural and historical significance and relevance of science), and *Science understanding* (incorporating knowledge and understanding of the biological, physical, and earth and space sciences).

Aims

The aims of the Australian Curriculum: Science are for students to develop:

- an interest in science and a curiosity and willingness to explore, ask questions and speculate about the changing world in which they live
- an ability to investigate questions about the world using scientific inquiry methods, including questioning, planning and conducting experiments and investigations based on ethical principles, collecting and analysing data, evaluating results, and drawing critical, evidence-based conclusions
- an ability to communicate their scientific understandings and findings to a range of audiences, to justify their own ideas on the basis of evidence, and to evaluate and debate scientific arguments and claims whilst respecting alternative viewpoints and beliefs
- an ability to solve problems and make informed, evidence-based decisions about current and future applications of science while taking into account moral, ethical and social implications
- an understanding of historical and cultural aspects of science as well as contemporary science issues and activities and an understanding of the diversity of careers related to science
- a solid foundation in science knowledge and understanding of the biological, physical and earth and space sciences, including being able to select and integrate science understanding in order to explain and predict phenomena, to apply that understanding to new situations and events, and to appreciate the dynamic nature of science knowledge.

science knowledge.

Science | Strands

Kindergarten Content descriptions

Science Inquiry Skills	Science as a Human Endeavour	Science Understanding
1. Questioning Recognise and identify objects and events of interest in the students' world and ask questions about them	1. Nature of science Scientists are people who explore the world around them and share information about what they find	1. Living things Features and basic needs of humans and other familiar living things
2. Observing Explore and make observations by using the senses, as appropriate, during guided investigations		2. The daily environment Ways the environment influences the daily lives of students
3. Using equipment Follow directions to use equipment safely		3. Everyday materials Names and features of everyday objects and materials
4. Communicating Describe and share observations and ideas using oral language, role play, and writing and/or drawing		4. Movement Ways in which objects of different shapes and sizes move

Achievement standard (Kindergarten)

By the end of Kindergarten, students participate in guided group investigations. They use appropriate senses to explore and describe phenomena and objects of interest. They ask questions about objects and events in their familiar environment and describe observations orally and with writing or drawing. They recognise and describe characteristics of their immediate environment including identifying the features, use and behaviour of familiar living things, materials and objects. They understand that science is about exploring and investigating to answer questions and to find things out. They articulate ideas on how they use science.

Year 1 Content descriptions

Science Inquiry Skills	Science as a Human Endeavour	Science Understanding
1. Questioning and predicting	1. Nature of science	1. Living things
Explore, pose questions and make inferences and predictions about objects and events encountered	Scientists work by asking questions and solving problems (eg about living things)	A variety of living things, where they are found, and how they interact with their local environment and each other
2. Investigation methods	2. Everyday science	2. Local environment
Answer questions by participating in different types of guided investigations including manipulating materials to test what happens, making observations, sorting and using simple information sources	Science is used in everyday life (eg in caring for the local environment)	Physical features of the local environment, including the sky and landscape
3. Using equipment	3. Science and culture	3. Changing materials
Act safely when using familiar equipment and working with others	People from a range of cultures have knowledge that relates to science (eg in relation to materials, living things and the local environment)	Physical changes in everyday materials
4. Observing and measuring		4. Sounds
Collect and record data using ICT as appropriate, including measurements using informal units		Characteristics of sounds, the ways they can be made and how they can be used
5. Communicating		
Represent and communicate observations, measurements and ideas through oral language, role play, writing and drawing		
6. Using observations as evidence		
Compare observations with predictions and use observations as evidence to support students' ideas and to answer questions posed		
7. Reflecting on methods		
Describe investigations including what went well, and where difficulties were encountered		

Achievement standard (Year 1)

By the end of Year 1, students begin to pose questions about familiar situations and make inferences based on their observations. They take part in guided investigations, using simple resources to support inquiry. They communicate their ideas to others in a variety of ways including writing and begin to describe their experiences during investigations. They describe and compare living things and physical features in their local environment and begin to demonstrate understanding of observable features and events through their own questions and observations. They recognise and describe physical changes to everyday materials and describe basic types and sources of sound. They recognise and describe in simple terms how science is involved in familiar situations.

Year 2 Content descriptions

Science Inquiry Skills	Science as a Human Endeavour	Science Understanding
1. Questioning and predicting	1. Nature of science	1. Living and non-living
Explore, pose questions and make inferences and predictions about objects and events encountered	Scientists work by asking questions and solving problems (eg about using Earth's resources)	Differences between living and non-living things
2. Investigation methods	2. Everyday science	2. Growth and change
Answer questions by participating in different types of guided investigations including manipulating materials to test what happens, making observations, sorting and using simple information sources	Science is used in everyday life (eg in using materials, caring for pets)	Living things growing and changing, with offspring similar to parents
3. Using equipment	3. Science and culture	3. Earth's resources
Act safely when using familiar equipment and working with others	People from a range of cultures have knowledge that relates to science (eg in relation to technology, using Earth's resources)	Earth's resources, including water, and the ways they are used
4. Observing and measuring		4. Properties of materials
Collect and record data using ICT as appropriate, including measurements using informal units		The observable properties of everyday materials in relation to their use
5. Communicating		5. Pushes and pulls
Represent and communicate observations, measurements and ideas through oral language, role play, writing and drawing		Pushes and pulls as forces that make things move, stop or change shape
6. Using observations as evidence		
Compare observations with predictions and use observations as evidence to support students' ideas and to answer questions posed		
7. Reflecting on methods		
Describe investigations including what went well, and where difficulties were encountered		

Achievement standard (Year 2)

By the end of Year 2, students collaboratively carry out simple investigations based on questions provided by the teacher. They record observations and information (including using informal measurement), sorting data where appropriate, and begin to use information and observations as evidence to support ideas. They communicate their understanding in more than one way and begin to reflect in simple terms on their experiences when carrying out investigations. They describe the basic characteristics of living things that differentiate them from non-living things, including how they grow and change. They understand that science is about solving everyday problems and wider issues (eg growing food, water supplies). They describe easily observable properties of everyday materials and make suggestions as to how these properties impact on their use. They have an elementary understanding of forces as pushes and pulls.

Year 3 Content descriptions		
Science Inquiry Skills	Science as a Human Endeavour	Science Understanding
1. Questioning and predicting	1. Influence of science	1. Structure and function of living things
Pose questions and recognise those suitable for investigations in familiar contexts and predict what might happen based on prior knowledge	The work of scientists has resulted in discoveries and inventions that we use in our day-to-day lives	The obvious structural features of plants and animals, including humans, and the functions of these features; and how the features of fossils inform understanding about living things of the past
2. Investigation methods	2. Nature of science	2. Life cycles
Collaboratively plan and conduct investigations including testing, making models, using surveys and information research to find answers to questions	Science helps us to understand our world and can be used to make predictions (eg to understand living things past and present)	Life cycles and reproductive processes of plants and animals
3. Fair testing	3. Science in the community	3. Day and night
Recognise whether a test or comparison is fair or not	People in the local community use science in a range of ways (eg in their work, in caring for plants and animals)	Features of the day and night sky and observable changes due to Earth's rotation, including shadows, night and day
4. Using equipment	4. Science and culture	4. Liquids and solids
Safely use appropriate materials, tools, and equipment such as rulers, thermometers and scales to make observations and measurements	Science can draw on and apply knowledge and experience from a range of cultures (eg in relation to plants and animals, astronomy)	The differences between liquids and solids and how they can change under different conditions
5. Observing and measuring		5. Light
Collect and record data using ICT where appropriate, including measurements using formal units		Characteristics of light including sources, the way it travels, forms shadows and is reflected
6. Analysing results		
Use a range of methods including tables and graphs to group, classify, record and represent data and to identify simple patterns and trends, using ICT where appropriate		
7. Communicating		
Represent and communicate ideas and explanations using methods including diagrams, physical representations and simple reports		
8. Developing explanations		
Compare results with predictions, suggesting possible reasons for students' findings		
9. Reflecting on methods		
Reflect on the process of data collection to describe what went well and what could be improved		
Achievement standard (Year 3)		

By the end of Year 3, students are able to generate simple questions based on familiar contexts and make predictions with guidance from the teacher. They make suggestions as to how to test their ideas and collaboratively conduct investigations, using simple methods of collecting data (including some use of formal measurement). They begin to use diagrams, physical representations, and text to communicate ideas; they recognise simple trends in numerical data and share their thoughts about their investigations with others. They have some understanding of plant and animal systems at an observable level, including the relationship between their major structures and functions, life cycles and how a range of people have investigated living things both past (eg using fossil evidence) and present (eg using experiments and observation). They describe properties of solids and liquids that influence the use of materials. They have a basic understanding of sources and properties of light and can use this knowledge to explain familiar observations (eg mirrors, shadows, objects in the sky, day/night). They can describe examples of where science is encountered in familiar situations and they are able to outline how science is used in the local community.

Year 4 Content descriptions		
Science Inquiry Skills	Science as a Human Endeavour	Science Understanding
1. Questioning and predicting	1. Influence of science	1. Grouping living things
Pose questions and recognise those suitable for investigations in familiar contexts and predict what might happen based on prior knowledge	The work of scientists has resulted in discoveries and inventions that we use in our day-to-day lives	Grouping living things, including humans as animals, on the basis of observable characteristics
2. Investigation methods	2. Nature of science	2. Interactions of living things
Collaboratively plan and conduct investigations including testing, making models, using surveys and information research to find answers to questions	Science helps us to understand our world and can be used to make predictions (eg to explain interesting phenomena, in engineering)	Interactions between living things in a habitat, including simple food chains in local environments
3. Fair testing	3. Science in the community	3. Change at the Earth's surface
Recognise whether a test or comparison is fair or not	People in the local community use science in a range of ways (eg in the workplace, in informing sustainable practices)	Some identifiable characteristics of the Earth's surface are the result of natural processes of change, such as weathering and erosion
4. Using equipment	4. Science and culture	4. Properties and uses of materials
Safely use appropriate materials, tools, and equipment such as rulers, thermometers and scales to make observations and measurements	Science can draw on and apply knowledge and experience from a range of cultures (eg in relation to the natural environment, materials and technology)	Materials are selected for particular uses based on their various properties, such as flexibility, strength and biodegradability
5. Observing and measuring		5. Forces and motion
Collect and record data using ICT where appropriate, including measurements using formal units		Forces can cause things to change speed or direction through direct contact or by acting at a distance
6. Analysing results		
Use a range of methods including tables and graphs to group, classify, record and represent data and to identify simple patterns and trends, using ICT where appropriate		
7. Communicating		
Represent and communicate ideas and explanations using methods such as diagrams, physical representations and simple reports		
8. Developing explanations		
Compare results with predictions, suggesting possible reasons for students' findings		
9. Reflecting on methods		
Reflect on the process of data collection to describe what went well and what could be improved		

Achievement standard (Year 4)

By the end of Year 4, students are able to, with guidance, collaboratively plan and carry out single stage investigations based on their own and others' questions. They demonstrate some awareness of fairness in testing and understand the difference between sorting and classifying. They safely use appropriate tools to support investigation, using formal units of measurement most of the time and record information and data using simple tables and graphs, including using ICT. They communicate ideas and explanations using a variety of conventional modes (eg diagrams, physical models, reports), and describe positive and negative aspects of their investigations. They begin to realise that scientists work in particular ways and that discoveries made by scientists impact on our lives every day. They recognise observable patterns (eg classification of living things) and simple relationships in their living environment, (eg food chains) and cause-and-effect relationships in their physical environment (eg effects of forces on motion, changes to the Earth's surface). They identify how science helps us make choices and how it influences both personal and community decisions (eg use of materials and protecting animal habitats).

Year 5 Content descriptions

Science Inquiry Skills	Science as a Human Endeavour	Science Understanding
1. Questioning and predicting	1. Nature of science	1. Micro-organisms
Identify simple questions that can be investigated scientifically and predict the outcome of an investigation	Science ideas and understandings change as new evidence becomes available (eg how ideas about disease and the solar system have developed)	The role of micro-organisms in areas such as human health, food and the environment
2. Investigation methods	2. Influence of science	2. Space and our solar system
Contribute to decisions about the investigation method to use, including using fair tests, models, information research, surveys and data from secondary sources	Science has led to changes in the way people live and its applications both influence and can be influenced by personal and community choices (eg in relation to public health, electricity usage)	The regular and predictable motions of objects in our solar system and how humans have sought to explore and understand space
3. Fair testing	3. Collaboration in science	3. Form and properties of materials
Identify the variables that should be kept the same and decide which one should be changed and which one measured in fair tests	Teams of scientists are often required to work together on projects (eg in medical science, space exploration)	Some materials are composed of observable structure or parts (such as fibres, crystals, layers or grains) and structure or smaller parts can influence the overall properties of materials
4. Using equipment	4. Contribution of scientists	4. Electricity
Collaboratively select equipment and materials and use them safely and appropriately, identifying potential risks	Australian scientists have made a significant contribution to scientific understanding in various fields of human endeavour (eg in medicine, space exploration)	Electrical energy can be transferred and transformed
5. Observing and measuring	5. Science and culture	
Use a range of tools to accurately observe, measure and record data and represent it in a variety of ways including tables and graphical methods, using ICT where appropriate	Science and culture interact to influence personal and community choices (eg in making decisions about health and medicine)	
6. Analysing results		
Identify and describe patterns or relationships in observations and data		
7. Developing explanations		
Compare observations and data with predictions and use as evidence in developing explanations		
8. Communicating		
Use a range of forms to represent and communicate evidence, ideas and explanations including using models and reports		
9. Reflecting on methods		
Reflect on the process of investigation to evaluate the quality of evidence and to suggest improvements to the planning of investigations		

Achievement standard (Year 5)

By the end of Year 5, students begin to pose meaningful questions that can be investigated and become aware of different inquiry methods (eg fair test, survey, secondary sources). They begin to recognise that changing, measuring and keeping some variables the same are part of a fair test. They observe, measure and record data honestly and begin to use tools to make accurate observations and measurements. They recognise simple patterns in data and begin to use data to support explanations, comparing results with any earlier predictions. With assistance, they reflect on broad aspects of their investigation process. They recognise, describe and give simple explanations for a range of cause-and-effect relationships and interactions within systems (eg the role of micro-organisms, form and properties of materials, the solar system). They begin to have an understanding of the properties of electricity and start to consider the microscopic structure of materials. They suggest ways in which science has affected society (eg work, health, leisure and space exploration). They understand that scientists collaborate, solve problems and share their findings and they are able to describe in simple terms the work of at least one Australian scientist.

Year 6 Content descriptions		
Science Inquiry Skills	Science as a Human Endeavour	Science Understanding
<p>1. Questioning and predicting</p> <p>Identify simple questions that can be investigated scientifically and predict the outcome of an investigation</p>	<p>1. Nature of science</p> <p>Science ideas and understandings change as new evidence becomes available (eg how ideas about resource use and sustainable energy use have developed)</p>	<p>1. Relationships of living things</p> <p>Relationships between living things, including food webs, and suitability for particular habitats</p>
<p>2. Investigation methods</p> <p>Contribute to decisions about the investigation method to use, including using fair tests, models, information research, surveys and data from secondary sources</p>	<p>2. Influence of science</p> <p>Science has led to changes in the way people live and its applications both influence, and can be influenced by, personal and community choices (eg in relation to sustainable practices)</p>	<p>2. Using Earth's resources</p> <p>Human activity, such as the use and management of water, energy sources and mineral resources, can have consequences for the environment and other living things</p>
<p>3. Fair testing</p> <p>Identify the variables that should be kept the same and decide which one should be changed and which one measured in fair tests</p>	<p>3. Collaboration in science</p> <p>Teams of scientists are often required to work together on projects (eg in environmental science, in researching sustainable energy sources and technologies)</p>	<p>3. Major events at the Earth's surface</p> <p>The causes and effects of major natural events at the Earth's surface such as earthquakes, tsunamis and volcanic eruptions</p>
<p>4. Using equipment</p> <p>Collaboratively select equipment and materials and use them safely and appropriately, identifying potential risks</p>	<p>4. Contribution of scientists</p> <p>Australian scientists have made a significant contribution to scientific understanding in various fields of human endeavour (eg in agriculture, environmental science, sustainable technology)</p>	<p>4. Changing and using materials</p> <p>Changes to materials caused by heating, cooling or combining can be reversible or irreversible and this influences the use of materials</p>
<p>5. Observing and measuring</p> <p>Use a range of tools to accurately observe, measure and record data and represent it in a variety of ways including tables and graphical methods, using ICT where appropriate</p>	<p>5. Science and culture</p> <p>Science and culture interact to influence personal and community choices (eg in making decisions about resource use and sustainable management of the environment)</p>	<p>5. Sustainable energy transformations</p> <p>Sustainable sources of energy, including water, solar and wind, and how they can be transformed into useful forms of energy</p>
<p>6. Analysing results</p> <p>Identify and describe patterns or relationships in observations and data</p>		
<p>7. Developing explanations</p> <p>Compare observations and data with predictions and use as evidence in developing explanations</p>		
<p>8. Communicating</p> <p>Use a range of forms to represent and communicate evidence, ideas and explanations including using models and reports</p>		
<p>9. Reflecting on methods</p> <p>Reflect on the process of investigation to evaluate the quality of evidence and to suggest improvements to the planning of investigations</p>		
Achievement standard (Year 6)		

By the end of Year 6, students are able to identify simple scientific questions for investigation with minimal guidance and make predictions based on these questions. They begin to plan and conduct investigations independently. They suggest variables to be changed, measured and kept the same in an investigation. They use simple tools and equipment with minimal guidance to make observations and measurements. They are able to use ICT to record and organise data and can use the results of their investigations and other information as evidence to develop explanations. They reflect on general aspects of their investigation process with a view to improve the methods used. They recognise and describe a range of living systems and can explain how some of their components are related (eg food webs, animal habitats, human impacts). They explain cause-and-effect relationships in familiar situations as well as in the wider environment (eg changes to materials, energy transformations, earthquakes and volcanic eruptions). They understand some environmental impacts of human activity such as water and energy use and can use their knowledge of science to suggest ways that humans can care for their environment. They describe how major scientific and technological developments can be influenced by society (eg researching use of sustainable energy sources) and can affect our lives and the environment.

Year 7 Content descriptions		
Science Inquiry Skills	Science as a Human Endeavour	Science Understanding
<p>1. Questioning and predicting</p> <p>Formulate scientific questions to investigate and make predictions based on prior observations and scientific knowledge</p>	<p>1. Nature of science</p> <p>Science helps individuals and communities to make choices about issues in life and evaluate claims made in a range of media and advertising</p>	<p>1. Human body systems</p> <p>The structure and functions of major human body systems, such as the digestive, circulatory, respiratory and excretory systems</p>
<p>2. Investigation methods</p> <p>Collaboratively and individually conduct a range of investigation types including experimental investigations, modelling, field studies, surveys, information research and using data from secondary sources</p>	<p>2. Influence of science</p> <p>Science informs laws and guidelines about health, our community and the environment</p>	<p>2. Growth and reproduction</p> <p>Structures and processes involved with plant and animal growth and reproduction, including human reproduction</p>
<p>3. Fair testing</p> <p>Design fair tests, identifying variables to be changed, measured and controlled, and the need for repeat trials</p>	<p>3. Science careers</p> <p>There are careers and industries that involve knowledge, understanding and applications of science</p>	<p>3. Effects of Earth's movements in space</p> <p>The observable effects of Earth's rotation on its axis and orbital motion around the Sun</p>
<p>4. Using equipment</p> <p>Use some specialised equipment and materials safely and identify and minimise risks to self and others</p>	<p>4. Contribution of scientists</p> <p>Scientists from Australia and elsewhere make major contributions to scientific knowledge, engineering and technology</p>	<p>4. Oceans and atmosphere</p> <p>Characteristics of the oceans and atmosphere that relate to weather and climate, including the water cycle</p>
<p>5. Observing and measuring</p> <p>Collect and record data, making observations and measurements with accuracy appropriate to the task, using ICT where appropriate</p>	<p>5. Science and culture</p> <p>Different cultural groups have different perspectives on science</p>	<p>5. Shaping the Earth</p> <p>The processes which shape geological features and landforms</p>
<p>6. Analysing results</p> <p>Construct and use tables and graphs to represent and analyse data, including using ICT</p>		<p>6. Transferring and transforming energy</p> <p>Useful energy transfers and transformations, such as those involving heat, light, sound, moving objects, electricity and gravity, and how energy is wasted</p>
<p>7. Developing explanations</p> <p>Summarise and explain data, using scientific understanding to draw conclusions</p>		<p>7. Renewable energy sources</p> <p>The differences between renewable and non-renewable sources of energy</p>
<p>8. Communicating</p> <p>Communicate using scientific language, representations and evidence-based arguments</p>		<p>8. Comparing properties of substances</p> <p>Substances can be compared using observable and measurable properties and the uses of these substances are dependent on these properties</p>
<p>9. Reflecting on methods</p> <p>Reflect on the specific method of investigation to identify alternative methods that could be used for exploring scientific ideas</p>		<p>9. Separating substances</p> <p>Separation techniques based on the physical properties of matter and how they are used to extract useful substances</p>
<p>10. Evaluating evidence</p> <p>Evaluate claims from a scientific perspective, including using real findings</p>		

Achievement standard (Year 7)

By the end of Year 7, students are able to formulate questions and predictions to be investigated. They can select, with guidance, an appropriate method to investigate their questions (eg designing a fair test, survey, information research, use of secondary sources) and conduct investigations safely in groups or individually. They record accurate observations (including some use of repeat trials), show results in tables or simple graphs and make conclusions which are largely consistent with their results. They can apply the idea of fair testing in relation to controlling, changing and measuring variables, and reflect on the specific methods used in their own and others' investigations. They summarise data from investigations and secondary sources and clearly communicate their findings using appropriate language and representations, including using ICT. They can describe the basic structure and main functions of human body systems and they begin to use this knowledge to make evidence-based choices about health and lifestyle issues. They are able to compare growth and reproductive processes in living organisms. They begin to gain an understanding of the concept of energy, including energy transformation, and compare the sustainability of different energy sources, relating this to their own use of energy. They can describe and explain the observable effects that result from Earth's rotational and orbital movements in space. They start to develop an understanding of the causes of environmental changes (eg landforms, weather and climate) and can describe in general terms the effect of these changes on people in Australia and other parts of the world. They describe and compare observable and measurable properties and uses of substances. They begin to evaluate how science is used in society (eg advertising, media, health and environmental promotion, engineering and technology, careers) and begin to reflect on how science is used to inform people's ideas of the world around them.

Year 8 Content descriptions		
Science Inquiry Skills	Science as a Human Endeavour	Science Understanding
1. Questioning and predicting	1. Nature of science	1. Cells
Formulate scientific questions to investigate and make predictions based on prior observations and scientific knowledge	Science helps individuals and communities to make choices about issues in life and evaluate claims made in a range of media and advertising	The structure and diversity of cells, which are the basic unit of living things
2. Investigation methods	2. Influence of science	2. Biological classification
Collaboratively and individually conduct a range of investigation types including experimental investigations, modelling, field studies, surveys, information research and using data from secondary sources	Science informs laws and guidelines about health, our community and the environment	Biological classification systems based on observable characteristics of living things
3. Fair testing	3. Science careers	3. Ecosystems
Design fair tests, identifying variables to be changed, measured and controlled, and the need for repeat trials	There are careers and industries that involve knowledge, understanding and applications of science	The interrelationships between organisms, energy and matter in ecosystems, and the effects of human activity on the sustainability of ecosystems
4. Using equipment	4. Contribution of scientists	4. Rocks
Use some specialised equipment and materials safely and identify and minimise risks to self and others	Scientists from Australia and elsewhere make major contributions to scientific knowledge, engineering and technology	The properties, composition and formation of sedimentary, igneous and metamorphic rocks
5. Observing and measuring	5. Science and culture	5. Geology of ecosystems
Collect and record data, making observations and measurements with accuracy appropriate to the task, using ICT where appropriate	Different cultural groups have different perspectives on science	Geological features and their role in establishing and sustaining ecosystems
6. Analysing results		6. Geological evidence of change
Construct and use tables and graphs to represent and analyse data, including using ICT		The role of geological evidence, including the fossil record, in investigating ancient events, past environmental conditions and changes over time
7. Developing explanations		7. Mechanical systems
Summarise and explain data, using scientific understanding to draw conclusions		The motion of objects or parts of a mechanical system, including simple machines, can be explained by the action of forces and energy transformations
8. Communicating		8. Forces
Communicate using scientific language, representations and evidence-based arguments		Forces produced as a result of gravity, magnetism and electric charge and the similarities and differences between these forces and their effects
9. Reflecting on methods		9. Particles
Reflect on the specific method of investigation to identify alternative methods that could be used for exploring scientific ideas		The physical behaviour of solids, liquids and gases can be explained in terms of the position and movement of particles and forces between particles
10. Evaluating evidence		10. Types of substances
Evaluate claims from a scientific perspective, including using real findings		Distinguishing between elements, compounds and mixtures at an observable and particle level.

level.

11. Chemical properties

The chemical properties of substances such as fuels, metals and plastics have a significant impact on their use

Achievement standard (Year 8)

By the end of Year 8, students are able to formulate scientific questions to be investigated, make and justify predictions based on their knowledge and conduct investigations using some specialist equipment (eg testing properties of rocks, testing the effects of forces, comparing the structures of cells, comparing physical and chemical properties). They distinguish between types of variables in designing investigations and routinely record data using correct units, construct graphs to show trends and patterns in their results including using ICT with minimal guidance and draw conclusions based on scientific understanding. They use repeat trials in some investigations (eg in force and motion experiments) and suggest alternative methods if required. They can use their scientific understanding to evaluate scientific claims (eg in media and advertising). They describe, with some examples, how major functions of cells are dependent on variations in their form and structure. They clearly describe the role of energy in ecosystems, in determining properties of matter and in the formation of rocks and can explain the relationships between energy, forces and movement at an observable and particle level. They use classification systems based on observable properties to accurately classify familiar and unfamiliar materials, living organisms and rocks. They are able to use models to explain the properties and nature of matter and relate how everyday uses of materials depend on their physical and chemical properties. They describe how a range of evidence (eg fossil record, geological structures) has led to theories relating to the history of the earth. They can explain in general terms how people from a range of cultures have influenced ecosystems and landscapes over time (eg destruction and conservation of habitat). They identify a range of science-related careers involved in the study and use of Earth's physical and biological resources.

Year 9 Content descriptions		
Science Inquiry Skills	Science as a Human Endeavour	Science Understanding
1. Questioning and predicting	1. Nature and history of science	1. Body systems
Research information from a variety of sources to formulate scientific questions and develop testable hypotheses	Ideas of the world change as scientific theories and models develop	Body systems of animals interact in a coordinated way to provide the requirements for life
2. Investigation methods	2. Influence of science	2. Disease
Choose the most appropriate investigation type for the question including experimental investigations involving repeat trials and replicates and multiple variables	Science provides reliable knowledge and enables valid predictions and conclusions to inform choices	The types and causes of disease in humans and other animals, how the organism responds, and methods of disease control
3. Using equipment	3. Contribution of scientists	3. Geological resources
Select and use specialised equipment and materials that are suitable for the investigation	Scientists are recognised by society in various ways for their contribution to human understanding	The formation, location and extraction of geological materials and energy resources
4. Managing risk	4. Collaboration in science	4. Earth systems
Carry out a risk assessment of a practical activity	Science research commonly involves teams of scientists with expertise from a diversity of specialisations	Interactions between the Earth's spheres, such as carbon and nitrogen cycles, and the impact of humans and natural events on these interactions
5. Observing and measuring	5. Science and culture	5. Sound and light
Collect data in a consistent, efficient, and ethical manner, including methods that use ICT	The knowledge of a cultural group can contribute to scientific understandings in areas such as health, medicine and agriculture	The properties of sound and light determine how they are used and explain their observed characteristics
6. Analysing results	6. Science careers	6. Radiation
Represent and analyse data appropriately including using simple statistical methods and ICT	Science, engineering and technology are interdependent in the work of many careers and industries	Types, sources and uses of electromagnetic radiation
7. Developing explanations		7. Electrical energy
Draw conclusions that are consistent with the evidence and critique these conclusions with reference to scientific concepts		Methods of generating and transferring electrical energy
8. Communicating		8. Atoms
Communicate scientific ideas and information for a particular audience and purpose, including making evidence-based arguments		Atomic theory, including the structure of atoms in terms of protons, neutrons and electrons, and the nature and uses of radioactivity
9. Reflecting on methods		9. Chemical properties
Reflect on the investigation method to identify sources and types of uncertainty and to suggest specific improvements to the methods used		The properties and reactions of chemicals can be used to group them in a variety of useful ways
10. Evaluating evidence		10. Chemical changes
Critique claims about scientific issues including consideration of methodology and use students' own findings and secondary		Chemical reactions, such as respiration, photosynthesis, combustion and reactions of acids, and their role in environmental, industrial or biological processes

use students' own findings and secondary evidence to make informed decisions

Achievement standard (Year 9)

By the end of Year 9, students are able to formulate scientific questions based on a range of sources of information. They can independently plan investigations choosing appropriate methods, collect and report data using consistent techniques and describe meaningful conclusions from data. They use statistical methods with guidance to analyse quantitative data and reflect on any uncertainty in their measurements. They communicate their findings and ideas clearly, making reference to scientific evidence and using a range of representations and scientific language. They describe and compare the use of a range of energy sources in the world. They are able to explain, with examples, how the properties of energy (eg chemical, electrical, heat and light) are related to their use. They use appropriate representations to explain the regulation and interactions of body systems and are able to clearly describe the effects of disturbances to these systems (eg disease and environmental factors). They describe the general impact of developments in science and technology (eg medical treatment and prevention, optics and its applications, energy resources and environmental rehabilitation) and appreciate the range of careers related to these applications. They appreciate the nature of interdependence between the Earth's spheres, including chemical processes involved (eg carbon and nitrogen cycles), and predict how natural events and human activity can affect these natural systems. They are able to accurately describe the structure of atoms and compare the properties and uses of different types of electromagnetic radiation. They identify applications of science that rely on technology and engineering (eg environmental monitoring, electricity generation, applications of radioactivity).

Year 10 Content descriptions

Science Inquiry Skills	Science as a Human Endeavour	Science Understanding
1. Questioning and predicting	1. Nature and history of science	1. Evolution
Research information from a variety of sources to formulate scientific questions and develop testable hypotheses	Ideas of the world change as scientific theories and models develop	Evolution by natural selection and the diversity of plants and animals
2. Investigation methods	2. Influence of science	2. DNA
Choose the most appropriate investigation type for the question including experimental investigations involving repeat trials and replicates and multiple variables	Science provides reliable knowledge and enables valid predictions and conclusions to inform choices	The structure and function of DNA, genes and chromosomes
3. Using equipment	3. Contribution of scientists	3. Genetics
Select and use specialised equipment and materials that are suitable for the investigation	Scientists are recognised by society in various ways for their contribution to human understanding	The role of genes in determining patterns of inheritance and the chemical processes in cells
4. Managing risk	4. Collaboration in science	4. The Universe
Conduct a risk assessment of a practical activity	Science research commonly involves teams of scientists with expertise from a diversity of specialisations	The evidence supporting the big bang theory and the major processes that have produced galaxies and planetary systems
5. Observing and measuring	5. Science and culture	5. Plate tectonics
Collect data in a consistent, efficient, and ethical manner, including methods that use ICT	The knowledge of a cultural group can contribute to scientific understandings in areas such as agriculture, sustainability and technological design	Plate tectonics explains global patterns of geologic activity, continental movement, and the characteristics of the Australian continent
6. Analysing results	6. Science careers	6. Forces and motion
Represent and analyse data appropriately including using simple statistical methods and ICT	Science, engineering and technology are interdependent in the work of many careers and industries	Forces, motion and conservation of energy, their interactions and how they can be described qualitatively and quantitatively
7. Developing explanations		7. Matter and energy
Draw conclusions that are consistent with the evidence and critique these conclusions with reference to scientific concepts		Large and small scale physical systems rely on dynamic interactions between matter and energy
8. Communicating		8. Atoms
Communicate scientific ideas and information for a particular audience and purpose, including making evidence-based arguments		The periodic table as an organiser based on the electronic structure of elements
9. Reflecting on methods		9. Chemical change
Reflect on the investigation method to identify sources and types of uncertainty and to suggest specific improvements to the methods used		Chemical reactions can be represented by symbolic equations and are affected by factors such as temperature, catalysts (including enzymes) and surface area
10. Evaluating evidence		
Critique claims about scientific issues including consideration of methodology and use students' own findings and secondary		

use students' own findings and secondary evidence to make informed decisions

Achievement standard (Year 10)

By the end of Year 10, students are able, with some guidance, to formulate a valid hypothesis. They design and conduct investigations, showing an awareness of the need to minimise uncertainty in measurement, collecting and reporting data accurately. They analyse quantitative and qualitative data, using ICT where appropriate, to form conclusions consistent with scientific theories and ideas. They communicate scientific ideas using appropriate types of representation and consistently correct scientific language, and demonstrate the ability to use scientific evidence in their decision making and in developing arguments about science-related issues. They explain how scientific theories have, and continue to evolve, from a range of evidence. They are able to use scientific theories and models to explain phenomena (eg evolution, properties of elements, energy transfer). They describe the central role of energy in a range of situations, (eg the Universe, geological activity, chemical reactions) and begin to describe quantitative relationships between forces and motion. They explain the behaviour and/or function of substances based on their structure, including at a molecular and atomic level (eg DNA, enzymes, elements). They evaluate how advances in science and technology have impacted on society and the environment and use scientific knowledge across a range of sciences to critique claims and propose responses to contemporary issues (eg genetic engineering, biodiversity and sustainability). They can identify distinct branches of science and can give examples of the multi-disciplinary nature of much contemporary science.