Australian CURRICULUM

SCIENCE

F-10 Version 9.0

About the learning area

AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY

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F–10 AUSTRALIAN CURRICULUM: SCIENCE

ABOUT THE LEARNING AREA

Introduction

The Australian Curriculum: Science has been developed on the basis that all students will study Science from Foundation to Year 10.

Rationale

Science is a dynamic, collaborative and creative human endeavour arising from our desire to make sense of our world. Through science, we explore the unknown, investigate universal phenomena, make predictions and solve problems. Science gives us an empirical way of answering curious and important questions about the changing world we live in. Science knowledge is revised, refined and extended as new evidence arises and has proven to be a reliable basis for action in our personal, social and economic lives.

Science enables students to develop an understanding of important science concepts and processes, the practices used to develop scientific knowledge, science's contribution to our culture and society, and its uses in our lives. It supports students to develop the scientific knowledge, understandings and skills needed to make informed decisions about local, national and global issues, and to succeed in science-related careers.

Also, learning science is a valuable pursuit in its own right. Students can experience the joy of scientific discovery. They can nurture their natural curiosity about the world around them.

In developing scientific literacy, students use critical and creative thinking skills, and challenge themselves to ask questions and draw evidence-based conclusions using scientific knowledge and practices. The wider benefits of scientific literacy include enabling students to engage meaningfully with contemporary issues, evaluate different points of view and make informed decisions.

Learning science is important for a diverse and capable science, technology, engineering and mathematics (STEM) workforce. Transdisciplinary STEM learning can enhance students' scientific and mathematical literacy, design and computational thinking, problem-solving and collaboration skills. Developing STEM competencies enables students to develop, model, analyse and improve solutions to real-world problems, and supports students to access further study and a variety of careers and jobs within or outside of STEM fields.

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Aims

Science aims to ensure that students develop:

- an interest in science as a way of expanding their curiosity and willingness to explore, ask questions about and speculate on the changing world they live in
- a solid foundation of knowledge of the biological, Earth and space, physical and chemical sciences, including being able to select and integrate scientific knowledge and practices to explain and predict phenomena and to apply understanding to new situations and events
- an understanding of scientific inquiry and the ability to use a range of scientific inquiry practices, including questioning; planning and conducting experiments and investigations based on ethical and interculturally aware principles; generating and analysing data; evaluating results; and drawing critical, evidence-based conclusions
- an ability to communicate scientific understanding and findings to a range of audiences, to justify claims with evidence, and to evaluate and debate scientific explanations and arguments
- an ability to solve problems and make informed decisions about current and future uses of science while taking into account ethical, environmental, social and economic implications of decisions
- an understanding of the dynamic nature of science knowledge including historical and global contributions, and an understanding of the relationship between science and society including the diversity of science careers.

Structure

Science is presented in year levels from Foundation to Year 10.

Content is organised under 3 interrelated strands:

- Science understanding
- Science as a human endeavour
- Science inquiry.

Together, the 3 strands provide students with understanding, knowledge and skills through which they can develop a scientific view of the world. Students are challenged to explore science, its concepts, nature and uses through clearly described inquiry practices.

Content under each strand is further organised into sub-strands as shown in Figure 1.

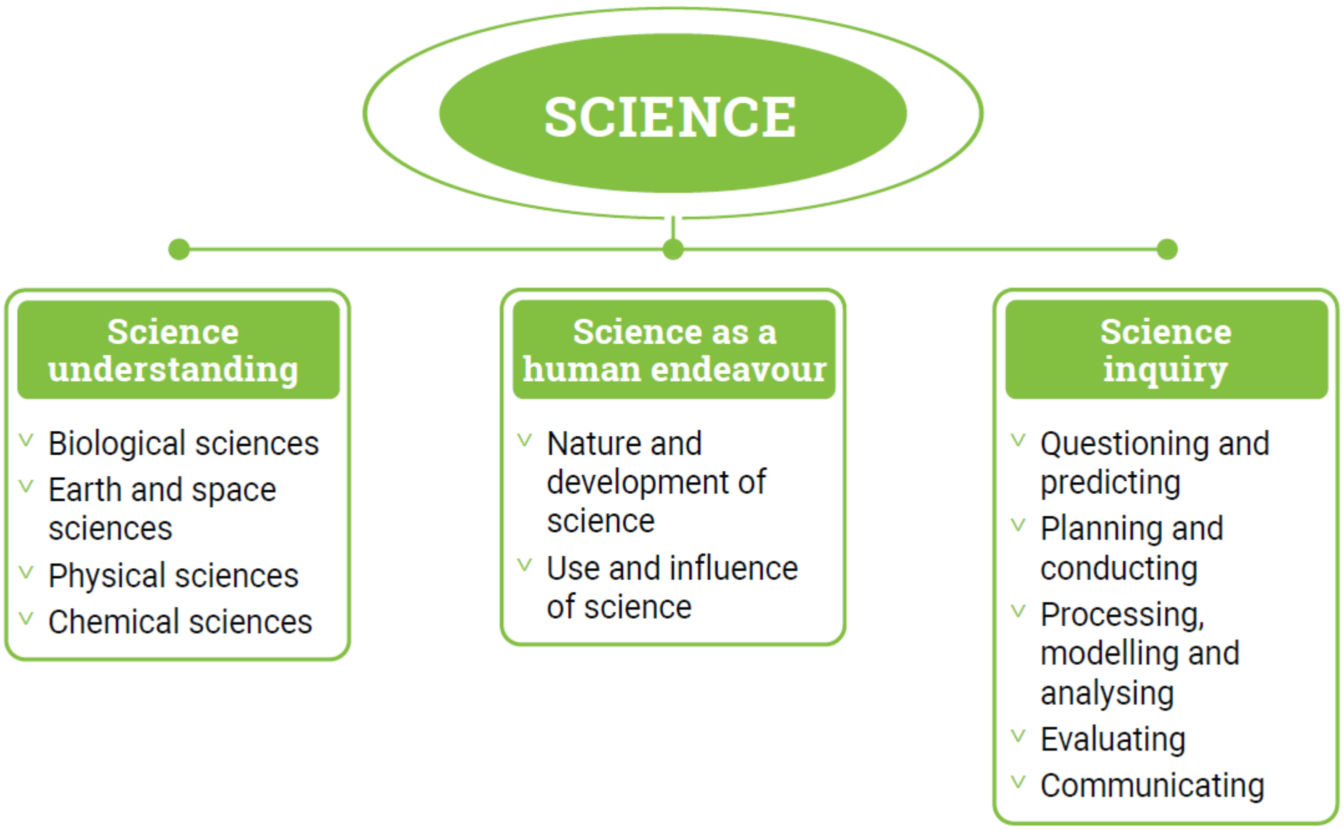

Figure 1: Science content structure

Science understanding

In this strand, students learn to select and integrate appropriate science knowledge to explain and predict phenomena and apply that knowledge to new situations. Science knowledge refers to facts, concepts, principles, laws, theories and models that have been established over time.

Content for *Science understanding* is described by year level.

The strand comprises 4 sub-strands:

Biological sciences

Students develop an understanding of living things, including animals, plants and microorganisms, and their interdependence and interactions within ecosystems. They explore life cycles, body systems, structural adaptations and behaviours; how these features aid survival; and how characteristics are inherited from one generation to the next. They consider the interdependence of biological systems at a range of scales, and identify how these systems respond to change.

In this sub-strand, the following core concepts are developed:

- a diverse range of living things have evolved on Earth over hundreds of millions of years; this process is ongoing
- biological systems are interdependent and interact with each other and their environment
- the form and features of living things are related to the functions that their body systems perform.

Earth and space sciences

Students develop an understanding of Earth's dynamic structure and its place in the cosmos. They learn to view Earth as part of a larger celestial system. They explore how changes on Earth such as day and night and the seasons relate to Earth's rotation and its revolution around the sun. Students explore the interactions and interdependencies of the systems that comprise the Earth system: the geosphere, biosphere, hydrosphere and atmosphere. They appreciate that living things depend on sustainability of the Earth system and investigate the influence of human activity on key processes, cycles and relationships.

In this sub-strand, students develop the core concepts that:

- Earth is part of an astronomical system; interactions between Earth and celestial bodies influence the Earth system
- the Earth system comprises dynamic and interdependent systems; interactions between these systems cause continuous change over a range of scales
- all living things are connected through Earth's systems and depend on sustainability of the Earth system.

Physical sciences

Students develop an understanding of forces and motion, and matter and energy. They investigate how an object's motion is influenced by a range of forces, such as frictional, magnetic, gravitational and electrostatic, and learn how to represent and predict these interactions. They develop an increasingly rich concept of energy and how energy transfer is associated with phenomena involving motion, heat, sound, light and electricity. They appreciate that concepts of force, motion, matter and energy apply to systems ranging in scale from atoms to the universe itself.

In this sub-strand, students develop the core concepts that:

- forces affect the motion and behaviour of objects
- energy can be transferred and transformed from one form to another and is conserved within systems.

Chemical sciences

Students develop an understanding of the composition and behaviour of substances. They classify substances based on their properties, such as solids, liquids and gases; or their composition, such as elements, compounds and mixtures. They explore physical changes, such as changes of state and dissolving, and investigate how chemical reactions result in the production of new substances. Students recognise that all substances consist of atoms, and that chemical reactions involve atoms in substances being rearranged and recombined to form new substances. They explore chemical systems at a range of scales, from sub-atomic to macroscopic, to examine relationships between atoms, properties of substances and energy.

In this sub-strand, students develop the core concepts that:

- the chemical and physical properties of substances are determined by their structure at a range of scales
- substances change and new substances are produced by rearranging atoms; these changes involve energy transfer and transformation.

Science as a human endeavour

In this strand, students learn about the nature of science, including the role of science inquiry in developing science knowledge, and the factors that affect the use and advancement of science. Students learn that through science, humans seek to improve their understanding of and explanations for the natural and physical world, and that science knowledge is refined and revised as new evidence becomes available. They appreciate that science influences society by posing and responding to ethical, environmental and social questions, and individual and collective scientific research is itself influenced by the needs and priorities of society. This strand highlights the development of science as a unique way of knowing and doing, and the role of science in contemporary decision-making and problem-solving.

Content for *Science as a human endeavour* is described in 2-year bands.

The strand comprises 2 sub-strands:

Nature and development of science

Students develop an appreciation of the unique nature of science and scientific knowledge, including that scientific knowledge is based on empirical evidence and can be modified in light of new or reinterpreted evidence. They explore historical and global contributions to scientific knowledge and appreciate that individual and collaborative scientific endeavours are influenced by cultural perspectives and world views.

In this sub-strand, students develop the core concepts that:

- science inquiry values curiosity, creativity, accuracy, objectivity, perseverance and scepticism

- science knowledge is a result of individual and collaborative efforts, and advances reflect historical and global contributions
- science knowledge is built on empirical evidence; however, all science knowledge can be changed in light of new or reinterpreted evidence.

Use and influence of science

Students explore how scientific knowledge and applications affect individuals and communities, including informing their decisions and identifying responses to contemporary issues. They learn that in making decisions about science practices and applications, ethical, environmental and social implications must be taken into account. Students also gain an appreciation for the ways in which science is influenced by the needs and priorities of society.

In this sub-strand, students develop the core concepts that:

- scientific knowledge, practices and products are influenced by ethical, environmental, social and economic factors
- science, technology and engineering are interconnected; advances in one field can lead to advances in other fields
- science knowledge, balanced with ethical and social considerations, contributes to understanding complex contemporary issues and identifying responses.

Science inquiry

This strand is concerned with investigating ideas, developing explanations, solving problems, drawing valid conclusions, evaluating claims and constructing evidence-based arguments. Students learn the essential practices of science, including identifying and posing questions; planning, conducting and reflecting on investigations; processing, analysing and interpreting evidence; and communicating findings.

Science investigations are activities in which ideas, predictions or hypotheses are tested and conclusions are drawn in response to a question or problem. They can involve a range of activities including experimental testing, field work, locating and using information sources, conducting surveys, and using modelling and simulations. The choice of the approach taken will depend on the context and aims of the investigation.

Content for *Science inquiry* is described in 2-year bands.

The strand comprises 5 sub-strands:

Questioning and predicting

Students learn to identify and construct questions, propose hypotheses and predict possible outcomes. Students appreciate the important role of questions, predictions and hypotheses as critical and creative drivers of scientific inquiry.

In this sub-strand, students develop the core concepts that:

- science inquiry involves making observations and predictions, asking questions, and constructing and testing explanations for natural and physical phenomena
- science inquiry may be done to describe a phenomenon, explore relationships, test a theory or model, or design solutions.

Planning and conducting

Students learn to make decisions about how to investigate or solve a problem and carry out an investigation, and generate and record data safely. They consider ethical and cultural issues and protocols associated with the generation or use of data, and recognise and manage risk and safety. Students appreciate the important considerations and practices involved in the design of scientific investigations.

In this sub-strand, students develop the core concept that:

- science inquiries should be designed to systematically generate or collect valid and reliable primary and secondary data in a safe, ethical and interculturally aware way.

Processing, modelling and analysing

Students learn to analyse and represent data in meaningful and useful ways and identify trends, patterns and relationships in data. Students engage in the key practices involved in generating scientific evidence.

In this sub-strand, students develop the core concept that:

- mathematical thinking underpins science practices of representing objects and events, analysing data and modelling relationships.

Evaluating

Students learn to consider the quality of available evidence, and the merit or significance of a claim, proposition, explanation or argument with reference to that evidence. Students engage in the practices involved in refining and revising scientific ideas.

In this sub-strand, students develop the core concept that:

- evaluating evidence enables development of explanations, decision-making and designed solutions.

Communicating

Students learn to convey information or ideas to others in ways appropriate to the purpose and audience. Students engage in the practices involved in effective and purposeful communication for a range of audiences.

In this sub-strand, students develop the core concept that:

- critiquing and communicating science ideas effectively is critical to advancing science and influencing environmental, social and economic futures.

Relationship between the strands

In the practice of science, the 3 strands of *Science understanding, Science as a human endeavour* and *Science inquiry* are closely integrated; the work of scientists reflects the nature and development of science, seeks to respond to and influence society's needs, and is built around scientific inquiry. Students' experiences of science at school should mirror and connect to this multifaceted view of science.

To achieve this, the 3 strands of Science should be taught in an integrated way. The content descriptions of the 3 strands have been written so that at each year this integration is possible. The content of *Science understanding* can inform students' understanding of everyday phenomena, as well as contemporary issues such as use of resources, emerging technologies, climate change and protection of biodiversity. The importance of these areas of science can be emphasised through the content of *Science as a human endeavour*, and students can be encouraged to view historical and contemporary science critically through aspects of the *Science inquiry strand*; for example, by evaluating and communicating.

To support teachers and students to make connections across the strands, sample inquiry questions are provided within each year level overview. These optional inquiry questions can give students context and motivation as they develop their science knowledge, understanding and practices. An inquiry question might provide a useful prompt for a class discussion or a series of learning experiences.

Key ideas

An overarching set of key ideas also supports teachers and students to make connections across the 3 strands of Science. Exploring the key ideas supports the coherence of science understanding within and across year levels, enabling students to connect diverse phenomena and frame their deepening understanding in the context of systems thinking. Systems thinking also underpins science inquiry practices and contributes to developing students' appreciation of science.

The key ideas are:

Patterns, order and organisation

An important aspect of science is recognising patterns in the world around us and ordering and organising phenomena at different scales. As students progress from Foundation to Year 10, they build skills and understanding that will help them to observe and describe patterns at different scales and develop and use classifications to organise events and phenomena and make predictions. As students progress through the primary years, they become more proficient in identifying and describing the relationships that underpin patterns, including cause and effect. Students increasingly recognise that scale plays an important role in the observation of patterns; some patterns may only be evident at certain time and spatial scales.

Form and function

Many aspects of science are concerned with the relationships between form (the make-up of an aspect of an object or organism) and function (the use of that aspect). As students progress from Foundation to Year 10, they see that the functions of living and non-living objects rely on their forms. Students' understanding of forms such as the features of living things or the properties of various materials, and their related functions or uses, is initially based on

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observable behaviours and properties. In later years, students recognise that function often relies on form and that this relationship can be examined at many scales. They apply an understanding of microscopic and atomic structures, interactions of force, and flows of energy and matter to describe relationships between form and function.

Stability and change

Many areas of science involve the recognition, description and prediction of stability and change. Early in their schooling, students recognise that in their observations of the world around them, some properties and phenomena appear to remain stable or constant over time whereas others change. As they progress from Foundation to Year 10, they also recognise that phenomena (such as properties of objects and relationships between living things) can appear stable at one spatial or time scale, but at a larger or smaller scale they may be seen to be changing. Students begin to appreciate that stability can be the result of competing but balanced forces. They become increasingly adept at quantifying change through measurement and looking for patterns of change by representing and analysing data in tables or graphs.

Scale and measurement

Quantification of time and spatial scale is critical to the development of science understanding as it enables the comparison of observations. However, students often find it difficult to work with scales outside their everyday experience – these include the vast distances in space, the incredibly small size of atoms and the slow processes that occur over geological time. As students progress from Foundation to Year 10, their understanding of relative sizes and rates of change develops and they conceptualise events and phenomena at a broader range of scales. They progress from working with scales related to their everyday experiences, and comparing events and phenomena using relative language (such as “bigger” or “faster”) and informal measurement, to working with scales beyond human experience, and quantifying magnitudes, rates of change and comparisons using formal units of measurement.

Matter and energy

Many aspects of science involve identifying, describing and measuring transfers of energy and matter. As students progress through the year levels, they become increasingly able to explain phenomena in terms of the flow of matter and energy. In the early years, students focus on direct experience and observation of phenomena and materials. In later years, they connect observable phenomena with more abstract notions of particles, forces and energy transfer and transformation. They use these understandings to describe and model phenomena and processes involving matter and energy.

Systems

Science often involves thinking, modelling and analysing in terms of systems to understand, explain and predict events and phenomena. As students progress from Foundation to Year 10, they explore, describe and analyse increasingly complex systems. Initially, students identify the observable components of a clearly identified “whole” such as features of plants and animals and parts of mixtures. Across Years 3 to 6 they learn to identify and describe relationships between components within simple systems, and they begin to appreciate that components within living and non-living systems are interdependent. In Years 7 to 10 they are introduced to the processes and relationships that structure systems such as ecosystems, body systems and the carbon cycle. They recognise that within systems, interactions between components can involve forces and changes acting in opposing directions. For a

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system to be in a steady state, these factors need to be in a state of balance or equilibrium. Students are increasingly aware that systems can exist as components within larger systems, and that one important part of thinking about systems is identifying boundaries, inputs and outputs.

Key considerations

Safety

Identifying and managing risk in Science addresses the safe use of equipment and materials as well as safe behaviours in field, classroom or laboratory contexts. It covers all necessary aspects of health, safety and injury prevention and the use of potentially dangerous materials and equipment.

Science learning experiences may involve the use of potentially hazardous substances and hazardous equipment. It is the responsibility of the school to ensure that duty of care is exercised in relation to the health and safety of all students and that school practices meet the requirements of the *Work Health and Safety Act 2011* and *Work Health and Safety Regulations 2011*, in addition to relevant state or territory health and safety guidelines.

In implementing investigations involving food, care must also be taken with regard to food safety and specific food allergies that may result in anaphylactic reactions. The Australasian Society of Clinical Immunology and Allergy has published guidelines for the prevention of anaphylaxis in schools. Some states and territories have their own specific guidelines that should be followed.

When state and territory curriculum authorities integrate the Australian Curriculum into local courses, they will include more specific advice on safety. For more information about relevant guidelines, contact your state or territory curriculum authority.

Animal ethics and biosecurity

Any teaching activities that involve caring for, using or interacting with animals must comply with the *Australian code for the care and use of animals for scientific purposes 2013*, in addition to relevant state or territory guidelines. The Australian Government and state and territory governments may have extra legislation for animal ethics, protection of native animals and biosecurity that could affect how schools use animals.

When state and territory curriculum authorities integrate the Australian Curriculum into local courses, they will include specific advice on the care and use of, or interaction with, animals. Schools must ensure they are aware of and comply with all state, territory and Commonwealth legislation or regulation about the use of animals in schools. For more information about relevant guidelines or to access your animal ethics committee, contact your state or territory curriculum authority.

Australian code for the care and use of animals for scientific purposes, 2013

https://www.nhmrc.gov.au/about-us/publications/australian-code-care-and-use-animals-scientific-purposes

Information correct as at 1 September 2021

Protocols for engaging First Nations Australians

When planning teaching activities involving engagement with First Nations Australians, teachers should follow protocols that describe principles, procedures and behaviours for recognising and respecting First Nations Australians and their intellectual property. Teachers should use approved resources such as those that may be provided by their state or territory school system, or First Nations Australian education consultative groups, or other protocols accredited by First Nations Australians.

While the Australian Curriculum uses the terms “First Nations Australians” and “Australian First Nations Peoples” there may be other terms that First Nations Australians of a particular area or location prefer. It is important to use the terms preferred in a particular area or location.

Meeting the needs of diverse learners

The Australian Curriculum values diversity by providing for multiple means of representation, action, expression and engagement and allows schools the flexibility to respond to the diversity of learners within their community.

All schools have a responsibility when implementing the Australian Curriculum to ensure that students’ learning is inclusive, and relevant to their experiences, abilities and talents.

For some students with diverse languages, cultures, abilities and talents it may be necessary to provide a range of curriculum adjustments so they can access age-equivalent content in the Australian Curriculum and participate in learning on the same basis as their peers.

The experience of science enables students to develop greater understanding of the world around them, as well as developing a range of transferrable skills. Science is in a strong position to address the abilities of all students, but it is recognised that some students may need adjustments to support how they see, hear, communicate, make meaning and access science content. For example, adjustments to the delivery of Science may involve actions such as:

- providing multisensory visual, auditory, tactile, kinaesthetic and/or multimodal learning experiences and resources
- offering alternatives to making observations and representing understanding including through diagrams, physical models, role-play and digital tools
- demonstrating safe use of equipment and providing safety instructions in written, verbal or pictorial forms
- demonstrating steps in an investigation before the activity
- supplying a range of labelled equipment for use during investigations
- creating a “personal science dictionary” that includes the scientific term, the pronunciation, a picture and the term in the student’s first language
- making student thinking explicit, encouraging students to cite evidence or explain the logic they used in drawing conclusions.

Key connections

General capabilities

General capabilities equip young Australians with the knowledge, skills, behaviours and dispositions to live and work successfully. General capabilities support and deepen student engagement with learning area content and are best developed within the context of learning areas.

Opportunities to develop general capabilities in learning area content vary. In addition to Literacy and Numeracy, which are fundamental to all learning areas, the general capabilities of most relevance and application to Science are Critical and Creative Thinking, Digital Literacy, Ethical Understanding and Personal and Social capability.

General capabilities are identified in content descriptions when they are developed or applied through Science learning area content. They are also identified in content elaborations when they offer opportunities to add depth and richness to student learning.

Literacy

In Science, students develop literacy capability as they explore and investigate their world. They comprehend and compose texts including those that give information; describe events and phenomena; recount experiments; present and evaluate data; give explanations; and present ideas, opinions and claims. They comprehend and compose multimodal texts such as charts, graphs, diagrams, pictures, maps, animations, models and visual media. Language structures and text structures are used to link information and ideas, give descriptions and explanations, formulate hypotheses and construct evidence-based arguments capable of expressing an informed position.

Scientific vocabulary is often technical and includes specific terms for concepts and features of the world, as well as terms that encapsulate an entire process in a single word, such as a “photosynthesis”. Language is therefore essential in providing the link between the concept itself and student understanding, and assessing whether the student has understood the concept.

Numeracy

Students use and develop numeracy through investigation of *Science understanding* concepts and application of *Science inquiry* practices. The key ideas of science which underpin *Science understanding* and *Science as a human endeavour* are closely linked to Numeracy through their focus on scale and measurement, and patterns, order and organisation.

Through inquiry practices, students develop numeracy through a focus on measurement and data collection. They identify patterns in data and use mathematical relationships to represent those patterns. They represent observed and secondary data using tables, displays and visualisations, and interpret data to construct evidence-based conclusions and arguments. In later years, they engage in statistical analysis of data and consider issues of validity and reliability of data.

Critical and Creative Thinking

Students develop critical and creative thinking as they learn to generate and evaluate ideas and possibilities when seeking new pathways or solutions. In the Science learning area, critical and creative thinking are embedded in the skills of questioning and predicting, solving problems through planning and conducting investigations, and analysing and evaluating evidence to make decisions and draw conclusions. Students develop an understanding of science concepts through active inquiry that involves selecting appropriate information, evaluating sources of information to formulate hypotheses and reflecting on the processes used to reach evidence-based conclusions.

Creative thinking enables the development of ideas that are new to the individual, and this is intrinsic to the development of scientific understanding. Scientific inquiry promotes critical and creative thinking by encouraging flexibility and open-mindedness as students speculate about their observations of the world and the ability to use and design new processes to solve problems and create solutions. Students' conceptual understanding becomes more sophisticated as they actively acquire an increasingly scientific view of their world and the ability to examine it from new perspectives.

Digital Literacy

Students develop digital literacy as they operate and manage digital systems and practise digital safety and wellbeing while investigating, creating and communicating. In particular, they use digital literacy to access information; collect, analyse and represent data and information; model and interpret concepts and relationships; and communicate science ideas, processes and information.

Digital tools such as animations and simulation software can support student understanding of abstract phenomena, as they give opportunities to view phenomena and test predictions that cannot be investigated through practical investigations in the classroom.

Ethical Understanding

Students develop their understanding of ethical concepts and ethical decision-making processes in relation to science investigations, codes of practice, and the use of scientific information and science applications. They learn about ethical procedures for investigating and working with people, animals, data and materials. Students use scientific information to evaluate claims and to inform ethical decisions about a range of social, environmental and personal issues. They consider their own roles as discerning citizens and learn to analyse biases and assumptions as they apply ethical concepts when making decisions in complex situations.

Personal and Social capability

Students develop self-awareness and self-management skills as they direct their own learning, plan and carry out investigations, and become independent learners who can apply science understanding and practices to make decisions. They build skills in social awareness and social management as they engage in collaborative investigations that require them to work cooperatively in teams, share resources and processes, make group decisions and show leadership. Empathy and respect are developed as students identify and learn about the diverse world views and perspectives that have informed the development of science, and the ways in which different individuals and groups may perceive scientific knowledge, advances or solutions.

Cross-curriculum priorities

Cross-curriculum priorities support the Australian Curriculum to be a relevant, contemporary and engaging curriculum that reflects national, regional and global contexts. Cross-curriculum priorities are incorporated through learning area content; they are not separate learning areas or subjects. They provide opportunities to enrich the content of the learning areas, where most appropriate and authentic, allowing students to engage with and better understand their world.

Opportunities to apply cross-curriculum priorities to learning area content vary. The cross-curriculum priorities of most relevance and meaning to the Science curriculum are Aboriginal and Torres Strait Islander Histories and Cultures and Sustainability.

Aboriginal and Torres Strait Islander Histories and Cultures

In Science, students have opportunities to learn that Australian First Nations Peoples have longstanding scientific knowledge traditions and developed knowledge about the world by making observations, using all the senses, engaging in prediction, hypothesising and testing (trial and error), and making generalisations within specific contexts such as the use of food, natural materials, navigation and sustainability of the environment.

Science gives students opportunities to become aware that First Nations Australians have worked scientifically for millennia and continue to provide significant contributions to developments in science. Content elaborations in each strand include examples of particular First Nations Australians' science knowledges and suggestions for how students can explore cultural techniques and processes employed by First Nations Australians, such as cooking methods, production of pigments and dyes, and fire lighting methods. Through the exploration of the contributions of Australian First Nations Peoples to areas such as medicine, mining, ecology, fire management, habitat restoration and water management, students can investigate the ways First Nations Australians' knowledges and Western knowledges can be used in combination to advance scientific understanding and to care for Country/Place.

Science inquiry provides an opportunity for students to engage in reconciliation, respect and recognition of First Nations Australians and their cultures through respectful approaches to field work, consultation and collaboration. Students consider ethical considerations regarding access to Country and Place, the treatment of cultural heritage sites and respect for intellectual property rights.

Sustainability

In Science, the Sustainability priority provides contexts for investigating and understanding biological, Earth and space, physical and chemical systems. Students explore a range of systems that operate at different time and spatial scales. By investigating the relationship between systems and system components and how systems respond to change, students develop an appreciation for the interconnectedness of Earth's geosphere, biosphere, hydrosphere and atmosphere.

Students explore contexts, such as ecosystem dynamics, weathering and erosion, energy sources, green chemistry and global climate change, with a focus on understanding how science is used to predict possible effects of human and other activity on the Earth system and to develop management plans or alternative technologies that minimise or mitigate these effects. Students appreciate that science provides the basis for decision-making in many areas of society and that these decisions can impact the sustainability of environmental, social and economic systems.

Students can also explore the contributions of First Nations Australians in designing sustainable products, environments and services such as fire management, habitat restoration and water management, and how First Nations Australians' knowledges and contemporary science can be used to advance scientific understanding and to care for Country/Place.

Through Science, students develop the scientific literacy, design, problem-solving and collaboration skills to respond to contemporary challenges to sustainability. Their developing STEM competencies enable them to develop, model, analyse and improve solutions to problems and to design preferred futures.

Learning area connections

Science gives opportunities to integrate and connect content to other learning areas; in particular, Mathematics, Technologies, Humanities and Social Sciences, and Health and Physical Education.

Science and Mathematics

Science and Mathematics share a focus on measurement, empirical reasoning, inquiry, experimentation and investigation. In both learning areas students are introduced to measurement, first using informal units, then using formal units. As students progress, they collect qualitative and quantitative data, which are analysed and represented in graphical forms. Students learn data analysis skills, including identifying trends and patterns from numerical data and graphs. In later years, students explore the use of mathematical relationships to model interactions between system components and make predictions.

Science and Technologies

Science and Technologies share a focus through the Design and Technologies sub-strand, *Technologies contexts*, which gives students an opportunity to apply the core concepts and explanatory models they learn in Science to designed solutions. *Physical sciences* informs *Engineering principles and systems*; *Chemical sciences* informs *Materials and technologies specialisations* and *Food specialisations*; and *Biological sciences* shares concepts and models with *Food and fibre production*.

Science provides a rich context for students to apply skills developed in Digital Technologies as they explore ways to apply computational, systems and design thinking to develop digital solutions. In the primary years, students can design solutions that automate data collection through visual programs and sensors that measure light, soil moisture, temperature or sound levels. In the secondary years, students can design digital solutions that model relationships, explore the possible effects of changing variables or simulate system dynamics.

Science and Humanities and Social Sciences

Science and Humanities and Social Sciences (HASS) share a focus on understanding patterns of continuity and change in the world. In particular, the HASS F–6 *Geography* sub-strand and the Geography 7–10 subject draw on students' scientific understandings of *Biological sciences* and *Earth and space sciences* and give students an opportunity to explore socio-scientific issues through the lens of *Science as a human endeavour*. Science and HASS also share a focus on developing students' inquiry practices, with an emphasis on questioning and data collection and analysis to form evidence-based conclusions. Students build on their experiences of gathering information from a range of sources and identifying perspectives in HASS to support their developing research skills in Science. They can apply the mathematical data analysis practices emphasised in Science to support their analysis and evaluation skills in HASS.

Science and Health and Physical Education

Science and Health and Physical Education (HPE) share a focus on the human body and movement. In HPE, students investigate movement performance in a practical context, and body responses to exercise and activity. Science approaches these topics through the lenses of biological systems and interactions of force and energy. HPE also gives students an opportunity to explore applications of scientific concepts in ways that directly relate to their sense of self and wellbeing within their community.

Resources

A scope and sequence representation of the curriculum, the glossary, and comparative information about Version 8.4 and Version 9.0 are available as a download from the Australian Curriculum Version 9.0 website.

Teacher Background Information

The elaborations that address the Aboriginal and Torres Strait Islander Histories and Cultures cross-curriculum priority are supported by teacher background information designed to assist teachers in preparing culturally appropriate science learning experiences. The teacher background information explains in detail the cultural and historical significance of the elaboration topic and how it connects to the Science curriculum content.