Rationale
Science provides an empirical way of answering interesting and important 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 desire to make sense of our world through exploring the unknown, investigating universal mysteries, making predictions and solving problems. Science aims to understand a large number of observations in terms of a much smaller number of general principles. Science knowledge is contestable and is revised, refined and extended as new evidence arises.

The Australian Curriculum: Science provides opportunities for students to develop an understanding of important science concepts and processes, the practices used to develop scientific knowledge, of science’s contribution to our culture and society, and its applications in our lives. The curriculum supports students to develop the scientific knowledge, understandings and skills necessary for responsible participation in contemporary society, to make informed and active contributions to science and technology-based careers, and to participate in decision making about science and technology applications. Students develop an understanding of the values, perspectives, and benefits of knowing and using scientific knowledge.

The ability to think and act in scientific ways helps build the broader suite of capabilities in students as confident, self-motivated and active members of our society.

Aims
The Australian Curriculum: Science aims to ensure that students develop:
- an interest in science as a means of expanding their curiosity and willingness to explore, ask questions about and speculate on the changing world in which they live
- an understanding of the vision that science provides of the nature of living things, of Earth and its place in the cosmos, and of the physical and chemical processes that explain the behaviour of all material things
- an understanding of the nature of scientific inquiry and the ability to use a range of inquiry science 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 scientific understanding and findings to a range of audiences, to justify ideas on the basis of evidence, and to evaluate and debate scientific arguments and claims
- an ability to solve problems and make informed, evidence-based decisions about current and future applications of science while taking into account ethical and social implications of decisions
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- an ability to solve problems and make informed, evidence-based decisions about current and future applications of science while taking into account ethical and social implications of decisions
- a solid foundation of knowledge of the biological, chemical, physical, earth and space sciences, including being able to select and integrate the scientific knowledge and methods needed to explain and predict phenomena, to apply that understanding to new situations and events, and to appreciate the dynamic nature of science knowledge.

Key Ideas
In the Australian Curriculum: Science, there are six key ideas that represent key aspects of a scientific view of the world and bridge knowledge and understanding across the disciplines of science. These are embedded within each year level description and guide the teaching/learning emphasis for the relevant year level. These key ideas are designed to support the coherence and developmental sequence of science knowledge within and across year levels. The key ideas frame the development of concepts in the science understanding strand, support key aspects of the science inquiry skills strand and contribute to developing students’ appreciation of the nature of science.

Year 9 Achievement Standard
By the end of Year 9, students explain chemical processes and natural radionuclides in terms of atoms and energy transfers and describe examples of important chemical reactions. They describe models of energy transfer and apply these to explain phenomena. They explain global features and events in terms of chemical processes and timescales. They analyse how biological systems function and respond to external changes with reference to interdependencies, energy transfers and flows of matter. They describe social and technological factors that have influenced scientific developments and predict how future developments may lead to applications of science and technology.

Students design questions that can be investigated using a range of inquiry skills. They design methods that include the control and accurate measurement of variables and systematic collection of data and describe how they considered ethics and safety. They analyse trends in data, identify relationships between variables and reveal inconsistencies in results. They analyse their methods and the quality of their data, and explain specific actions to improve the quality of their evidence. They evaluate others’ methods and explanations from a scientific perspective and use appropriate language and representations when communicating their findings and ideas to specific audiences.

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. Classifying objects and events into groups (such as solid/liquids or living/non-living) and developing criteria for these groupings relies on making observations and identifying patterns of similarity and difference.

As students progress through the primary years, they become more proficient in identifying and describing relationships and broad principles. Science, including cause and effect. Students increasingly recognise that scale plays an important role in the observable phenomena. These patterns may only be evident at certain time and spatial scales. For example, the pattern of day and night is not evident over the span of an hour.

Year 9 Level Description
The science inquiry skills and science as a human endeavour strands are described across a two-year band. In their planning, schools and teachers refer to the expectations outlined in the achievement standard and also to the content of the science understanding strand for the relevant year level to ensure that these two strands are addressed over the two-year period. The three strands of the curriculum are interrelated and their content is taught in an integrated way. The order and detail in which the content descriptions are organised into teaching and learning programs are decisions to be made by the teacher.

Incorporating the key ideas of science
Over Years 7 to 10, students develop their understanding of microscopic and atomistic structure, how systems at a range of scales are shaped by flows of energy and matter and interactions due to forces, and develop the ability to quantify changes and relate amounts.

In Year 9, students consider the operation of systems at a range of scales. They explore ways in which the human body as a system responds to its external environment and the interdependencies between biotic and abiotic components of ecosystems. They are introduced to the notion of the atom as a system of protons, electrons and neutrons, and how this system can change through nuclear decay. They learn that matter can be rearranged through chemical change and that these changes play an important role in many systems. They are introduced to the concept of the conservation of matter and begin to develop a more sophisticated view of energy transfer. They begin to apply their understanding of energy and forces to global systems such as continental movement.

Form and function
Many aspects of science are concerned with the relationships between form (the nature or make-up 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 both living and non-living objects rely on their form. Their understanding of forms such as the features of living things or the nature of a range of materials, and their related functions or how they function, is initially based on observable behaviours and physical properties. In later years, students recognise that function frequently relies on form and how objects and organisms are put together.

Initially, students can identify the observable components of a clearly identified ‘whole’ such as features of plants and animals and parts of machines. Over 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 ways in which objects and living things change and begin to recognise the role of energy and matter in these changes. In later years, they are introduced to more abstract notions of forces, particles, energy and transfer and transformation. They use these understandings to describe and model phenomena and processes involving matter and energy.

Year 9 V.8.3
The theory of plate tectonics explains global patterns of geological activity and continental movement. Energy transfer through different mediums can be explained using wave and particle models, both non-living and living systems and involve energy transfer. Chemical reactions, including combustion and the reactions of acids, are important in their structure at an atomic scale; substances change and new substances are produced by rearranging atoms through physical and chemical change. In this sub-strand, students 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 change to Earth’s surface, recognising that Earth has evolved over 4.5 billion years and that the effect of some of these processes reflects the nature and development of science, and scientific knowledge, including how current knowledge has developed over time through the actions of many people. Use and influence of science. This sub-stand explores how science knowledge and applications affect peoples’ lives, including their work, and how science is influenced by society and can be used to inform decisions and actions. Nature and development of science. This sub-stand develops an appreciation of the unique nature of science and scientific knowledge, including how current knowledge has developed over time through the actions of many people. Use and influence of science. This sub-stand explores how science knowledge and applications affect peoples’ lives, including their work, and how science is influenced by society and can be used to inform decisions and actions.

Science as a human endeavour
Through science, humans seek to improve their environment; matter and energy flow through these systems in scale from atoms to the universe itself.

Science inquiry skills
Science inquiry involves identifying and posing questions; planning, conducting and reflecting on investigations; processing, analysing and evaluating evidence; and communicating findings. This strand is concerned with evaluating claims, investigating ideas, solving problems, drawing valid conclusions and developing evidence-based arguments. The skills students develop give them the tools they need to achieve deeper understanding of the science concepts and how scientific thinking applies to these understandings. Science investigations are activities in which ideas, predictions or hypotheses are tested and conclusions are drawn in response to a question or problem. Investigations can involve a range of activities, including experimental testing, field work, locating and using information, posing questions, conducting surveys, using models and simulations. The choice of the approach taken will depend on the context of scientific cause and effect.}

Biochemical and medical sciences
Multicellular organisms rely on coordinated and interdependent internal systems to respond to challenges to their environment. Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems.

Chemical sciences
All matter is made of atoms that are composed of protons, neutrons and electrons; natural radioactivity arises from the decay of nuclei in atoms. Chemical reactions involve rearranging atoms to form new substances; during a chemical reaction, energy is released or absorbed. Chemical reactions, including combustion and the reactions of acids, are important in both non-living and living systems and involve energy transfer.

Earth and space sciences
The theory of plate tectonics explains global patterns of geological activity and continental movement. Physical sciences
Energy transfer through different mediums can be explained using wave and particle models.