St. Martin de Porres School

Avondale Heights

SCIENCE POLICY

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 broad principles. Science knowledge is contestable and is revised, refined and extended as new evidence arises.

Science as described in the Victorian Curriculum 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 to make informed decisions about local, national and global issues and to participate, if they so wish, in science-related careers.
In addition to its practical applications, learning science is a valuable pursuit in its own right. Students can experience the joy of scientific discovery and nurture their natural curiosity about the world around them. In doing this, they develop critical and creative thinking skills and challenge themselves to identify questions and draw evidence-based conclusions using scientific methods. The wider benefits of this "scientific literacy" are well established, including giving students the capability to investigate the natural world and changes made to it through human activity.

The science curriculum promotes six overarching ideas that highlight certain common approaches to a scientific view of the world and which can be applied to many of the areas of science understanding. These overarching ideas are patterns, order and organisation; form and function; stability and change; systems; scale and measurement; and matter and energy.

GENERAL GOALS

Science as described in the Victorian Curriculum 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 the 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 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 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
- an understanding of historical and cultural contributions to science as well as contemporary science issues and activities and an understanding of the diversity of careers related to science
- 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.

CONTENT

Science has two interrelated strands : *Science Understanding and knowledge,* and *Science Inquiry Skills*.

Together, the two strands of the science curriculum 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 processes.

Science Understanding

Science understanding is evident when a person selects and integrates appropriate science knowledge to explain and predict phenomena, and applies that knowledge to new situations. Science knowledge refers to facts, concepts, principles, laws, theories and models that have been established by scientists over time.

The *Science Understanding* strand comprises four sub-strands. The content is described by level.

Biological sciences

The biological sciences sub-strand is concerned with understanding living things.

Chemical sciences

The chemical sciences sub-strand is concerned with understanding the composition and behaviour of substances.

Earth and space sciences

The Earth and space sciences sub-strand is concerned with Earth's dynamic structure and its place in the cosmos.

Physical sciences

The physical sciences sub-strand is concerned with understanding the nature of forces and motion, and matter and energy.

Science Inquiry Skills

Science inquiry involves identifying and posing questions; planning, conducting and reflecting on investigations; processing, analysing and interpreting evidence; and communicating findings. This strand is concerned with evaluating claims, investigating ideas, solving problems, drawing valid conclusions and developing evidence-based arguments.

Science investigations are activities in which ideas, predictions or hypotheses are tested and conclusions are drawn in response to a question or problem. In science investigations, collection and analysis of data and evidence play a major role.

The content in the *Science Inquiry Skills* strand is described in two-level bands. There are five sub-strands of *Science Inquiry Skills*. These are:

Questioning and predicting : Identifying and constructing questions, proposing hypotheses and suggesting possible outcomes.
Planning and conducting : Making decisions regarding how to investigate or solve a problem and carrying out an investigation, including the collection of data.
Processing and analysing data and information : Representing data in meaningful and useful ways; identifying trends, patterns and relationships in data, and using this evidence to justify conclusions.
Evaluating : Considering the quality of available evidence and the merit or significance of a claim, proposition or conclusion with reference to that evidence.
Communicating : Conveying information or ideas to others through appropriate representations, text types and modes.

INTEGRATING THE STRANDS

The two strands of *Science Knowledge and Understanding*, and *Science Inquiry Skills* are closely aligned; the work of scientists reflects the nature and development of science, is built around scientific inquiry and seeks to respond to and influence society's needs. Students' experiences of school science should mirror and connect to this multifaceted view of science.
The two strands of should therefore be taught in an integrated way.

SIX OVER – ARCHING IDEAS

There are a number of overarching ideas that represent key aspects of a scientific view of the world and bridge knowledge and understanding across the disciplines of science.

These six overarching ideas support the coherence and developmental sequence of science knowledge within and across levels. The overarching 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.

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.

Form and function

Many aspects of science are concerned with the relationships between form (the nature or make-up of an aspect of an object or organism) and function (the use of that aspect).

Stability and change

Many areas of science involve the recognition, description and prediction of stability and change.

Scale and measurement

Quantification of time and spatial scale is critical to the development of science understanding as it enables the comparison of observations.

Matter and energy

Many aspects of science involve identifying, describing and measuring transfers of energy and/or matter.

Systems

Science frequently involves thinking, modelling and analysing in terms of systems in order to understand, explain and predict events and phenomena.

SCOPE AND SEQUENCE – FOUNDATION TO YEAR 2

SUB-STRANDS	FOUNDATION	YEAR 1	YEAR 2
Biological sciences	Living things have basic needs, including food and water	Living things have a variety of external features. Living things live in different places where their needs are met	Living things grow, change and have offspring similar to themselves
Chemical sciences	Objects are made of materials that have observable properties	Everyday materials can be physically changed in a variety of ways	Different materials can be combined, including by mixing, for a particular purpose
Earth and space sciences	Daily and seasonal changes in our environment, including the weather, affect everyday life	Observable changes occur in the sky and landscape	Earth's resources, including water, are used in a variety of ways
Physical sciences	The way objects move depends on a variety of factors, including their size and shape	Light and sound are produced by a range of sources and can be sensed	A push or a pull affects how an object moves or changes shape
Nature and development of science	Science involves exploring and observing the world using the senses	Science involves asking questions about, and describing changes in, objects and events	
Use and influence of science		People use science in their daily lives, including when caring for their environment and living things	
Questioning and predicting	Respond to questions about familiar objects and events	Respond to and pose questions, and make predictions about familiar objects and events	
Planning and conducting	Explore and make observations by using the senses	Participate in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources Use informal measurements in the collection and recording of observations, with the assistance of digital technologies as appropriate	
Processing and analysing data and information	Engage in discussions about observations and use methods such as drawing to represent ideas	Use a range of methods to sort information, including drawings and provided tables. Through discussion, compare observations with predictions	
Evaluating		Compare observations with those of others	
Communicating	Share observations and ideas	Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play	

SCOPE AND SEQUENCE – YEAR 3 - 6

SUB-STRANDS	YEAR 3	YEAR 4	YEAR 5	YEAR 6
Biological sciences	Living things can be grouped on the basis of observable features and can be distinguished from non-living things	Living things have life cycles Living things, including plants and animals, depend on each other and the environment to survive	Living things have structural features and adaptations that help them to survive in their environment	The growth and survival of living things are affected by the physical conditions of their environment
Chemical sciences	A change of state between solid and liquid can be caused by adding or removing heat	Natural and processed materials have a range of physical properties; these properties can influence their use	Solids, liquids and gases have different observable properties and behave in different ways	Changes to materials can be reversible, such as melting, freezing, evaporating; or irreversible, such as burning and rusting
Earth and space sciences	Earth's rotation on its axis causes regular changes, including night and day	Earth's surface changes over time as a result of natural processes and human activity	The Earth is part of a system of planets orbiting around a star (the sun)	Sudden geological changes or extreme weather conditions can affect Earth's surface
Physical sciences	Heat can be produced in many ways and can move from one object to another	Forces can be exerted by one object on another through direct contact or from a distance	Light from a source forms shadows and can be absorbed, reflected and refracted	Electrical circuits provide a means of transferring and transforming electricity Energy from a variety of sources can be used to generate electricity
Nature and development of science	Science involves making predictions and describing patterns and relationships□		Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena Important contributions to the advancement of science have been made by people from a range of cultures	
Use and influence of science	Science knowledge helps people to understand the effect of their actions		Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives Scientific knowledge is used to inform personal and community decisions	
Questioning and predicting	With guidance, identify questions in familiar contexts that can be investigated scientifically and predict what might happen based on prior knowledge		With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be	
Planning and conducting	Suggest ways to plan and conduct investigations to find answers to questions Safely use appropriate materials, tools or equipment to make and record observations, using formal measurements and digital technologies as appropriate		With guidance, plan appropriate investigation methods to answer questions or solve problems Decide which variable should be changed and measured in fair tests and accurately observe, measure and record data, using digital technologies as appropriate Use equipment and materials safely, identifying potential risks	
Processing and analysing data and information	Use a range of methods including tables and simple column graphs to represent data and to identify patterns and trends Compare results with predictions, suggesting possible reasons for findings		Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data using digital technologies as appropriate Compare data with predictions and use as evidence in developing explanations	
Evaluating	Reflect on the investigation, including whether a test was fair or not		Suggest improvements to the methods used to investigate a question or solve a problem	
Communicating	Represent and communicate ideas and findings in a variety of ways such as diagrams, physical representations and simple reports		Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts	

IMPLEMENTATION

Please see the St. Martin de Porres' scope and sequence charts for Geography, Economics, History, Science and Civics & Citizenship, which are developed at each year level as Units of Inquiry.

Each Strand is developed as a unit of Inquiry each year or bi-annually and the dimensions of each developed into learning intentions with the essential content of each domain covered over a two year period.

ASSESSMENT & REPORTING

Students and Staff are involved in identifying essential and preferred learning intentions for each unit of inquiry, from which success criteria for each is articulated, as a basis for assessment in each Inquiry.

The identified learning intentions are placed in the Termly report and parents are informed as to whether their child's work and progress has been judged as 'Below', 'At' or 'Above' the Standard expected at a particular time of year.

EVALUATION

Policy review 2015, 2018.