Science

Achievement Aims

Nature of Science

Understanding about science
- Students will learn about science as a knowledge system: the features of scientific knowledge, the processes by which it is developed, and the ways in which the work of scientists interacts with society.

Investigating in science
- Students will carry out science investigations using a variety of approaches: classifying and identifying, pattern seeking, exploring, investigating models, fair testing, making things, or developing systems.

Communicating in science
- Students will develop knowledge of the vocabulary, numeric and symbolic systems, and conventions of science, and use this knowledge to communicate about their own and others' ideas.

Participating and contributing
- Students will bring a scientific perspective to actions and decisions as appropriate.

Living World

Life processes
- Students will understand the processes of life and appreciate the diversity of living things.

Ecology
- Students will understand the interactions of living things with each other and with the non-living environment.

Evolution
- Students will understand the processes that drive change in groups of living things over long periods of time and be able to discuss the implications of these changes.

Planet Earth and Beyond

Earth cycles
- Students will gain an understanding of Earth cycles that shape the structure of planet Earth over geological time.

Astronomical cycles
- Students will gain an understanding of the astronomical cycles that are found in the universe.

Interacting cycles
- Students will understand that the conditions for life are sustained by the interaction of natural cycles and are influenced by human activities.

Physical World

Physical enquiry
- Students will explore and investigate physical phenomena.

Physics concepts
- Students will gain an understanding of interactions between parts of the physical world and the ways they can be represented.

Applying physics
- Students will apply their understanding of physics to real world situations.

Material World

Properties of materials
- Students will explore and develop ideas about the properties of materials, how these relate to their uses, and issues arising from their use.

Chemical reactions
- Students will investigate and classify chemical reactions and identify ways that these are used to address issues and needs in society.

Particles
- Students will use models to represent the particle nature of matter and explain the behaviour of materials. They will communicate their ideas using chemical symbol conventions.

	Levels One and Two	Levels Three and Four
Nature of Science	**Understanding about science** • Students will appreciate that scientists ask questions about our world that lead to investigations and that open-mindedness is important because there may be more than one explanation. **Investigating in science** • Students will extend their experiences and personal explanations of the natural world through exploration, play, and asking questions. **Communicating in science** • Students will build their language and develop their understandings of the many ways the natural world can be represented. **Participating and contributing** • Students will explore and act on an issue that links their science learning to their daily living.	**Understanding about science** • Students will appreciate that science is a way of explaining the world and that science knowledge changes over time. • They will identify ways in which scientists work together and provide evidence to support their ideas. **Investigating in science** • Students will build on prior experiences, working together to share and examine their own and others' knowledge. • They will ask questions, find evidence, and carry out appropriate investigations to develop simple explanations. **Communicating in science** • Students will begin to use a range of scientific symbols, conventions, and vocabulary. • They will engage with a range of text types and begin to question the purposes for which these texts are constructed. **Participating and contributing** • Students will use their growing science knowledge when considering issues of concern to them. • They will explore various aspects of the issue as they make decisions about possible actions.
Living World	**Life processes** • Recognise that all living things have certain requirements so they can stay alive. **Ecology** • Recognise that living things are suited to their particular habitat. **Evolution** • Recognise that there are lots of different living things in the world and that they can be grouped in different ways. • Explain how we know that some living things from the past are now extinct.	**Life processes** • Recognise that there are life processes common to all living things and that these occur in different ways. **Ecology** • Explain how living things are suited to their particular habitat and how they respond to environmental changes. **Evolution** • Begin to group plants, animals, and other living things into science-based classifications. • Explore how the groups of living things we have in the world have changed over long periods of time. Some living things in New Zealand are quite different from living things in other areas of the world.
Planet Earth and Beyond	**Earth cycles** • Observe and describe local natural features and how they can change. **Astronomical cycles** • Share ideas and observations about the Sun and the Moon and their physical effects on Earth. **Interacting cycles** • Describe how natural events and human actions can affect the local environment.	**Earth cycles** • Investigate the cause, rate, and signs of change of natural features. **Astronomical cycles** • Make observations of the Moon, the Sun, and visible planets, starting to develop a sense of the vastness of the solar system. **Interacting cycles** • Identify the conditions that allow life to exist on Earth at this moment in time.
Physical World	**Physical enquiry** • Extend their experiences of physical phenomena, such as movement, forces, electricity and magnetism, light, sound, and heat. • Seek and represent patterns in physical phenomena.	**Physical enquiry** • Use some scientific ideas to explain physical phenomena, such as movement, forces, electricity and magnetism, light, waves, sound, and heat. • Consider, describe, and represent patterns and trends in physical phenomena and use simple scientific models.
Material World	**Properties of materials** • Observe and describe properties of familiar materials and group materials in different ways, based on their properties. **Chemical reactions** • Observe and describe temporary (physical) and permanent (chemical) changes to familiar materials.	**Properties of materials** • Group materials in different ways, based on their physical and chemical properties. Relate properties to the material's use. Distinguish between pure substances and mixtures. **Chemical reactions** • Identify the different ways in which materials can undergo permanent or temporary changes and relate these changes to everyday situations. **Particles** • Begin to develop an understanding of the interaction of particles in phase changes and chemical reactions.

	Level Five	Level Six
Nature of Science	**Understanding about science** • Students will understand that scientists' investigations are informed by current scientific theories and aim to collect adequate evidence that is interpreted through processes of logical argument. **Investigating in science** • Students will develop and carry out investigations that use a variety of approaches. Variables will be considered and logical and justifiable conclusions drawn. **Communicating in science** • Students will use a wider range of science vocabulary, symbols, and conventions (including diagrams, graphs, and formulae). • They will apply their understandings of science to evaluate both popular and scientific texts (including visual and numerical literacy). **Participating and contributing** • Students will develop an understanding of socio-scientific issues by gathering relevant scientific information in order to draw evidence-based conclusions and take action where appropriate.	
Living World	**Life processes** • Describe the organisation of life at the cellular level. • Identify the key structural features and functions involved in the life processes of plants and animals. **Ecology** • Investigate the interdependence of living things in an ecosystem. **Evolution** • Describe the basic processes by which genetic information is passed from one generation to the next.	**Life processes** • Investigate the environmental factors that affect life processes. **Ecology** • Recognise the impact of natural events and human actions on a New Zealand ecosystem. **Evolution** • Explore patterns in the inheritance of genetically controlled characteristics. • Explain the importance of variation within a changing environment.
Planet Earth and Beyond	**Earth cycles** • Investigate the processes that shape and change the surface features of planet Earth. **Astronomical cycles** • Investigate the cycles that result from interactions between the Sun, Moon, and Earth. **Interacting cycles** • Investigate how natural events and human actions can affect conditions for living on Earth.	**Earth cycles** • Understand how plate tectonics shapes and changes the structure of planet Earth. **Astronomical cycles** • Investigate the different parts of the solar system, developing an appreciation of the distances in the solar system. **Interacting cycles** • Investigate how Earth and astronomical cycles can alter the balance of conditions that support life on Earth over time.
Physical World	**Physical enquiry and physical concepts** • Identify physical phenomena and concepts associated with everyday situations involving movement, forces, electricity and magnetism, light, waves, sound, and heat. **Using physics** • Explore issues related to technological applications of physics.	**Physical enquiry and physical concepts** • Demonstrate an understanding of physical phenomena and concepts by explaining and solving straightforward questions and problems. **Using physics** • Explore issues related to environmental and/or technological applications of physics.
Material World	**Properties of materials** • Investigate the physical and chemical properties of a range of substances and relate these to their appropriate and safe use, both in their personal and the wider environment. **Chemical reactions** • Explore and investigate chemical reactions of a range of substances and identify these occurring in everyday situations. **Particles** • Develop an understanding of the nuclear atom model. Distinguish between elements and compounds at the particle level and represent them in appropriate ways.	**Properties of materials** • Identify patterns and trends in the properties of a range of substances. Apply this information to how these substances are used and issues arising from their use. **Chemical reactions** • Observe and classify a range of chemical reactions and factors that affect these. Explore ways in which chemical reactions have been used to address issues and needs in society. **Particles** • Use collision theory to explain the rate of chemical reactions. Develop an understanding of atoms, ions, and molecules and their appropriate representation.

	Level Seven	Level Eight
Nature of Science	**Understanding about science** • Students will understand that scientists have an obligation to connect their new ideas to current and historical scientific knowledge and to present their findings for peer review and debate. **Investigating in science** • Students will develop and carry out investigations that extend their science knowledge, including developing their understanding of the relationship between investigations and scientific theories. **Communicating in science** • Students will use accepted science knowledge, vocabulary, symbols, and conventions when evaluating accounts of the natural world and considering the wider implications of the methods used for their communication/representation. **Participating and contributing** • Students will use relevant information to develop a coherent understanding of socio-scientific issues that concern them and to identify possible responses at both personal and societal levels.	
Living World	**Life processes** • Explore the diverse ways in which animals and plants carry out the life processes. **Ecology** • Explore ecological distribution patterns and explain possible causes for these patterns. **Evolution** • Understand the role of DNA in gene expression. **Ecology and evolution** • Explain how the interaction between ecological factors and natural selection leads to genetic changes within populations.	**Life, ecology, and evolution** • Understand the relationship between organisms and their environment. • Explore the evolutionary processes that have resulted in the diversity of life on Earth and appreciate the place and impact of humans within these processes. • Understand how humans manipulate the transfer of genetic information from one generation to the next and make informed judgments about the social, ethical, and biological implications relating to this manipulation.
Planet Earth and Beyond	**Earth cycles** • Use their understanding of plate tectonics to explain aspects of the New Zealand continental area. **Astronomical cycles** • Explain life cycles of different types of stars in terms of gravity, energy, and time changes. **Interacting cycles** • Understand how human impact can alter the cycles supporting life on Earth.	**Earth cycles** • Understand the cyclic nature of plate tectonics and use this to investigate aspects of New Zealand's geological history. **Astronomical cycles** • Use the concepts of distance, time, and gravity to explore information about galaxies and the universe. **Interacting cycles** • Develop an in-depth understanding of the interrelationship between human activities and natural cycles.
Physical World	**Physical enquiry and physical concepts** • Apply their understanding of physical phenomena and concepts to produce qualitative and quantitative explanations of a variety of new situations. • Analyse data to deduce complex trends and relationships in physical phenomena. **Using physics** • Analyse issues related to environmental and/or technological applications of physics.	**Physical enquiry and physical concepts** • Apply their understanding of physical phenomena and concepts to produce qualitative and quantitative explanations of a variety of complex situations. • Analyse and evaluate data to deduce complex trends and relationships in physical phenomena. **Using physics** • Critically analyse issues related to environmental and/or technological applications of physics.
Material World	**Properties of materials** • Investigate and explain patterns and trends in the properties of a wide range of substances. Apply this information to how these substances are used and issues arising from their use. **Chemical reactions** • Investigate a range of chemical reactions qualitatively and quantitatively and explore contemporary applications of chemical processes. **Particles** • Relate the chemical and physical properties of groups of substances to their structure and bonding. Integrate appropriate chemical conventions into the communication of their ideas.	**Properties of materials** • Investigate the properties of a group of related substances and evaluate the way in which these substances are used and issues arising from their use. **Chemical reactions** • Investigate and classify a wide range of chemical reactions (including qualitative and quantitative analyses) and explore ways in which chemical ideas are used to solve issues in today's society. **Particles** • Use atomic theory to explain periodic trends in the properties of elements and compounds. Integrate appropriate chemical conventions into the communication of their ideas.