Levels 7 and 8	Levels 9 and 10
Science Understanding	
Science as a human endeavour	
Scientific knowledge and understanding of the world changes as new evidence becomes available; science knowledge can develop through collaboration and connecting ideas across the disciplines and practice of science	Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community
Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations	Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries
	The values and needs of contemporary society can influence the focus of scientific research
Biological sciences	
There are differences within and between groups of organisms; classification helps organise this diversity	Multicellular organisms rely on coordinated and interdependent internal systems to respond to changes to their environment
Cells are the basic units of living things and have specialised structures and functions	An animal's response to a stimulus is coordinated by its central nervous system (brain and spinal cord); neurons transmit electrical impulses and are connected by synapses
Interactions between organisms can be described in terms of food chains and food webs and can be affected by human activity	The transmission of heritable characteristics from one generation to the next involves DNA and genes
Multicellular organisms contain systems of organs that carry out specialised functions that enable them to survive and reproduce	The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence
	Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems
Chemical sciences	
Mixtures, including solutions, contain a combination of pure substances that can be separated using a range of techniques	All matter is made of atoms which are composed of protons, neutrons and electrons; natural radioactivity arises from the decay of nuclei in atoms
The properties of the different states of matter can be explained in terms of the motion and arrangement of particles	The atomic structure and properties of elements are used to organise them in the periodic table
Differences between elements, compounds and mixtures can be described by using a particle model	Chemical reactions involve rearranging atoms to form new substances; during a chemical reaction mass is not created or destroyed
Chemical change involves substances reacting to form new substances	Different types of chemical reactions are used to produce a range of products and can occur at different rates; chemical reactions may be represented by balanced chemical equations
	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	
Predictable phenomena on Earth, including seasons and eclipses, are caused by the relative positions of the Sun, Earth and the Moon	The theory of plate tectonics explains global patterns of geological activity and continental movement
Some of Earth's resources are renewable, but others are non-renewable	Global systems, including the carbon cycle, rely on interactions involving the atmosphere, biosphere, hydrosphere and lithosphere
Water is an important resource that cycles through the environment	The Universe contains features including galaxies, stars and solar systems; the Big Bang theory can be used to explain the origin of the Universe
Sedimentary, igneous and metamorphic rocks contain minerals and are formed by processes that occur within Earth over a variety of timescales	
Physical sciences	
Change to an object's motion is caused by unbalanced forces acting on the object ; Earth's gravity pulls objects towards the centre of Earth	Electric circuits can be designed for diverse purposes using different components; the operation of circuits can be explained by the concepts of voltage and current
Energy appears in different forms including movement (kinetic energy), heat, light, chemical energy and potential energy; devices can change energy from one form to another	The interaction of magnets can be explained by a field model; magnets are used in the generation of electricity and the operation of motors
Light can form images using the reflective feature of curved mirrors and the refractive feature of lenses, and can disperse to produce a spectrum which is part of a larger spectrum of radiation	Energy flow in Earth's atmosphere can be explained by the processes of heat transfer
The properties of sound can be explained by a wave model	The explanation of the motion of objects involves the interaction of forces and the exchange of energy and can be described and predicted using the laws of physics

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Science Inquiry Skills	
Questioning and predicting	
Identify questions, problems and claims that can be investigated scientifically and make predictions based on scientific knowledge	Formulate questions or hypotheses that can be investigated scientifically, including identification of independent, dependent and controlled variables
Planning and conducting	
Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed	Independently plan, select and use appropriate investigation types, including fieldwork and laboratory experimentation, to collect reliable data, assess risk and address ethical issues associated with these investigation types
In fair tests, measure and control variables, and select equipment to collect data with accuracy appropriate to the task	Select and use appropriate equipment and technologies to systematically collect and record accurate and reliable data, and use repeat trials to improve accuracy, precision and reliability
Recording and processing	
Construct and use a range of representations including graphs, keys and models to record and summarise data from students' own investigations and secondary sources, and to represent and analyse patterns and relationships	Construct and use a range of representations, including graphs, keys, models and formulas, to record and summarise data from students' own investigations and secondary sources, to represent qualitative and quantitative patterns or relationships, and distinguish between discrete and continuous data
Analysing and evaluating	
Use scientific knowledge and findings from investigations to identify relationships, evaluate claims and draw conclusions	Analyse patterns and trends in data, including describing relationships between variables, identifying inconsistencies in data and sources of uncertainty, and drawing conclusions that are consistent with evidence
Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method	Use knowledge of scientific concepts to evaluate investigation conclusions, including assessing the approaches used to solve problems, critically analysing the validity of information obtained from primary and secondary sources, suggesting possible alternative explanations and describing specific ways to improve the quality of data
Communicating	
Communicate ideas, findings and solutions to problems including identifying impacts and limitations of conclusions and using appropriate scientific language and representations	Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations

Achievement Standard	
By the end of Level 8, students explain how evidence has led to an improved understanding of a scientific idea. They discuss how science knowledge can be applied to generate solutions to contemporary problems and explain how these solutions may impact on society. They investigate different forms of energy and explain how energy transfers and transformations cause change in simple systems. They use examples to illustrate how light forms images. They use a wave model to explain the properties of sound. They use the particle model to predict, compare and explain the physical and chemical properties and behaviours of substances. They describe and apply techniques to separate pure substances from mixtures. They provide evidence for observed chemical changes in terms of colour change, heat change, gas production and precipitate formation. They analyse the relationship between structure and function at cell, organ and body system levels. They identify and classify living things. They explain how living organisms can be classified into major taxonomic groups based on observable similarities and differences. They predict the effect of environmental changes on feeding relationships between organisms in a food web. They distinguish between different types of simple machines and predict, represent and analyse the effects of unbalanced forces, including Earth's gravity, on motion. They compare processes of rock formation, including the time scales involved, and analyse how the sustainable use of resources depends on the way they are formed and cycle through Earth systems. They model how the relative positions of Earth, the Sun and the Moon affect phenomena on Earth. Students identify and construct questions and problems that they can investigate scientifically and make predictions based on scientific knowledge. They plan experiments, identifying variables to be changed, measured and controlled. They consider accuracy and ethics when planning investigations, including designing field or experimental methods. Students summarise data from different sources and construct representations of their data to reveal and analyse patterns and relationships, and use these when justifying their conclusions. They explain how modifications to methods could improve the quality of their data and apply their scientific knowledge and investigation findings to evaluate claims made by others. They use appropriate scientific language, representations and simple word equations to communicate science ideas, methods and findings.	By the end of Level 10, students analyse how models and theories have developed over time and discuss the factors that prompted their review. They predict how future applications of science and technology may affect people's lives. They explain the concept of energy conservation and model energy transfer and transformation within systems. They analyse how biological systems function and respond to external changes with reference to the interdependencies between individual components, energy transfers and flows of matter. They evaluate the evidence for scientific theories that explain the origin of the Universe and the diversity of life on Earth. They explain the role of DNA and genes in cell division and genetic inheritance. They apply geological timescales to elaborate their explanations of both natural selection and evolution. They explain how similarities in the chemical behaviour of elements and their compounds and their atomic structures are represented in the way the periodic table has been constructed. They compare the properties of a range of elements representative of the major groups and periods in the periodic table. They use atomic symbols and balanced chemical equations to summarise chemical reactions, including neutralisation and combustion. They explain natural radioactivity in terms of atoms and energy change. They explain how different factors influence the rate of reactions. They explain global features and events in terms of geological processes and timescales, and describe and analyse interactions and cycles within and between Earth's spheres. They give both qualitative and quantitative explanations of the relationships between distance, speed, acceleration, mass and force to predict and explain motion. They use the concepts of voltage and current to explain the operation of electric circuits and use a field model to explain interactions between magnets. Students develop questions and hypotheses that can be investigated using a range of inquiry skills. They independently design and improve appropriate methods of investigation including the control and accurate measurement of variables and systematic collection of data. They explain how they have considered reliability, precision, safety, fairness and ethics in their methods and identify where digital technologies can be used to enhance the quality of data. They analyse trends in data, explain relationships between variables and identify sources of uncertainty. When selecting evidence and developing and justifying conclusions, they account for inconsistencies in results and identify alternative explanations for findings. Students evaluate the validity and reliability of claims made in secondary sources with reference to currently held scientific views, the quality of the methodology and the evidence cited. They construct evidence-based arguments and use appropriate scientific language, representations and balanced chemical equations when communicating their findings and ideas for specific purposes.