Science scope and sequence: Foundation to Level 10

| **Foundation to Level 2** | **Levels 3 and 4** | **Levels 5 and 6** | **Levels 7 and 8** | **Levels 9 and 10** |
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| **Achievement standard** |  |  |  |  |
| By the end of Level 2, students make and compare observations about the world around them. They describe situations in their lives where they ask questions about natural phenomena and use patterns from their observations to make scientific predictions.  Students group plants and animals based on observable features, and identify how living things meet their needs in the places they live. They explain how the features of plants and animals enable their survival. They describe the observable properties of the materials that make up objects. They provide examples of objects and mixtures that are made from a combination of materials, and distinguish between the properties of objects or mixtures and those of the materials from which they are made. They identify ways to change materials without changing their material composition. They identify daily and seasonal changes and describe ways these changes affect everyday life. They identify celestial objects and describe patterns they see in the sky. They suggest ways that the use of common materials can be reduced, re-used and recycled, and explain the importance of these actions for sustainability. They identify factors that influence the movement of objects. They describe and predict how different strengths and directions of pushes and pulls change the motion and shape of objects. They describe the effect of sound energy on objects and demonstrate how different sounds can be produced.  Students pose questions about observed patterns or relationships and make predictions related to familiar objects and events. They suggest steps to be followed in an investigation, and follow safe procedures to make and record observations, including informal measurements. They use provided tables and organisers to sort and order data, and represent simple patterns in data. With guidance, they compare their own observations and predictions with those of others, and identify further questions for investigation. They use everyday and some scientific vocabulary to communicate observations, findings and ideas. | By the end of Level 4, students explain the role of data in scientific inquiry. They provide examples to explain how needs have been met or problems have been solved through applying scientific knowledge, skills and data.  Students classify and compare the characteristics of living, once-living and non-living things. They compare the life cycles of different plants and animals, and describe similarities and differences between parents and offspring at different stages of growth. They identify the roles of organisms in a habitat, and construct food chains. They classify solids, liquids and gases based on observable properties, and describe how heating and cooling can cause a change of state. They relate the use and re-use of materials to the materials’ properties. They explain how Earth’s resources can be used in a variety of ways. They list sources of water on Earth, identify key processes in the water cycle, and describe how water can cycle through the environment. They distinguish between weather and climate and explain how human activity can impact climate, and how these impacts may be reduced. They identify different sources of heat energy and measure temperature changes that may occur when heat is transferred from one object to another. They identify forces acting on objects and describe the effects of these.  Students pose questions to identify patterns and relationships, and make predictions based on observations. They plan investigations using planning scaffolds, identify key components of fair tests and describe how they conduct investigations safely. They use familiar classroom instruments and simple procedures to record observations and results, including formal measurements. They construct representations to organise data and information, and identify patterns and simple relationships. They compare their findings with those of others, assess the fairness of their investigations, propose further questions for investigation and draw conclusions. They communicate observations, findings and ideas for an identified purpose and audience, using scientific vocabulary and digital tools where appropriate. | By the end of Level 6, students describe examples of advances in science achieved by scientists who work individually and in teams, building on the work of others. They discuss examples that illustrate how individuals and communities use scientific knowledge, skills and data to inform their actions and make decisions.  Students explain how natural and human-induced changes in the physical conditions of a habitat affect the survival of organisms. They provide examples of how organisms have changed over time and explain how the structural features and behaviours of organisms enable them to survive. They relate the movement and arrangement of the particles present in solids, liquids and gases to their observable properties, and model the particles in different mixtures. They classify and compare reversible and irreversible changes to substances. They model key processes that change Earth’s surface. They identify natural hazards and propose human actions that can reduce their impacts. They model the relationship between the Sun and planets of the solar system and explain how the relative positions of Earth and the Sun relate to the observable phenomena of variable day and night length. They identify sources of light and model different pathways of light to explain observed phenomena. They distinguish between electrical insulators and conductors, and identify the role of circuit components in the transfer and transformation of electrical energy.  Students make reasoned predictions, describe patterns and test relationships when investigating observable phenomena. They plan different scientific investigations including fair tests, describe how risks and ethical issues associated with investigations have been managed, and identify cultural considerations when planning fieldwork. They use equipment to generate and record data, including repeat trials. They construct representations to organise and process data and information, and describe patterns, trends and relationships. They compare their methods and findings with those of others including identification of possible sources of error, suggest improvements to their own and others’ investigations, pose questions for further investigation and select evidence to develop reasoned conclusions. They communicate ideas, findings, patterns, trends and relationships for a specific purpose and audience, including using various presentation formats, scientific vocabulary and digital tools where appropriate. | By the end of Level 8, students explain how new evidence can lead to changes in scientific knowledge. They discuss how people with different understandings, skills, perspectives and worldviews have worked in multidisciplinary teams to develop scientific knowledge. They discuss the relevant ethical, environmental, social and economic considerations associated with a proposed scientific response to a selected socio-scientific issue. They analyse the importance of science communication in shaping viewpoints, policies and regulations.  Students explain how biological diversity is ordered and organised. They explain the role of specialised cell structures and organelles in cellular function, and distinguish between cells in selected examples of plants and animals, and unicellular and multicellular organisms. They analyse the relationship between structure and function at organ and body system levels for a selected plant and an animal, and explain how a disorder in the cells, tissues or organs of these systems affects the survival of each organism. They represent flows of matter and energy in ecosystems and use real and hypothetical scenarios and population data to interpret and predict the effects of environmental changes. They use the particle and kinetic theories of matter to explain the structure, properties and behaviour of substances. They distinguish between pure substances and mixtures, and design procedures to separate mixtures. They classify and represent matter as elements, compounds or mixtures, and distinguish between physical and chemical changes. They distinguish between renewable and non-renewable resources, evaluate the sustainable use of different resources, and compare the benefits and risks of resource extraction and energy production. They apply the theory of plate tectonics to explain geological phenomena including volcanoes, earthquakes, mountain formation and the distribution of earthquakes and volcanic zones around the globe. They explain how the properties of rocks relate to their formation and influence their use. They model the Earth–Sun–Moon system’s cyclic changes to explain the observable phenomena of seasons and tides. They demonstrate how simple machines can be used for a purpose. They represent and explain the effects of forces acting on objects. They compare different forms of energy and represent energy transfers and transformations in simple systems. They undertake a household energy audit and propose ways to decrease energy consumption. They design and construct series and parallel circuits, and observe and make predictions about voltage and current and about energy transfer in the circuits.  Students develop hypotheses and make reasoned predictions to identify patterns, test relationships and analyse and evaluate scientific models when investigating phenomena at various scales. They plan a range of reproducible scientific investigations, document procedures and identify potential ethical issues and intercultural considerations required for fieldwork or use of secondary data. They select and use equipment to generate and record data with precision. They select and construct appropriate representations to organise and process data and information. They analyse and connect data and information to identify and explain patterns, trends, relationships and anomalies. They identify assumptions and sources of error in methods and analyse conclusions and claims with reference to conflicting evidence and unanswered questions. They provide science-based explanations for findings, and use evidence to support conclusions and evaluate claims. They select and use appropriate presentation formats, scientific vocabulary, models and other representations when communicating their ideas, findings and arguments for specific purposes to specific audiences. | By the end of Level 10, students analyse the importance of different scientific methods, critique, replication, publication and peer review in the development of scientific knowledge. They examine the relationship between science, engineering and technologies. They examine how different projected outcomes of the application of scientific knowledge to a selected socio-scientific issue may lead to varied support from individuals and groups in society. They discuss how scientific information and misinformation may inform personal and social decision-making and influence priorities for scientific research.  Students describe how the processes of sexual and asexual reproduction enable survival of the species. They explain the processes that underpin heredity and genetic diversity, and predict the outcomes of monohybrid crosses. They explain how the nervous and endocrine systems use negative feedback to support homeostasis in the body’s internal environment. They distinguish between infectious and non-infectious disease, and compare different infectious disease control measures. They describe the evidence supporting the theory of evolution by natural selection. They explain how ideas about the structure of the atom have changed over time, and model natural radioactive decay to illustrate how stable atoms are formed. They describe patterns and trends in the periodic table. They demonstrate the Law of Conservation of Mass in chemical reactions, and write word and balanced chemical equations for these reactions. They classify energy changes in chemical reactions as exothermic or endothermic. They predict the products of reactions and the effect of changing reaction conditions. They explain how interactions within and between Earth’s interrelated systems affect the carbon cycle. They describe trends in patterns of global climate change and propose strategies to mitigate contributing factors. They discuss the advantages and disadvantages of space exploration. They distinguish between different features in the universe and sequence key events in the origin and evolution of the universe, including an outline of the supporting evidence for the big bang theory. They explain how wave and particle models describe energy transfer, and compare the properties, features and applications of waves. They analyse and represent energy conservation, including efficiency, in systems, and model how different forms of energy are transformed into electrical energy. They use Newton’s laws to describe and predict the motion of objects in a system.  Students formulate and refine questions and hypotheses to make reasoned predictions, test relationships and develop explanatory models when investigating scientific questions, problems and claims. They plan a range of valid, reproducible and safe scientific investigations and explain how they have addressed any ethical and cultural considerations when generating or using primary and secondary data. They select and use equipment to generate and record data, ensuring the use of suitable sample sizes and assessing the precision of multiple measurement readings. They select and construct a range of appropriate representations to organise, process and summarise data and information. They analyse and compare a variety of data and information to identify and explain qualitative and quantitative patterns, trends, relationships, assumptions and anomalies. They evaluate the validity and reproducibility of investigation methods including ways to improve the quality of data, and the validity of conclusions and claims. They provide evidence-based explanations for findings and construct logical arguments based on the evaluation of multiple sources of evidence to justify conclusions and assess claims. They select and use appropriate presentation formats, scientific content, vocabulary, models, conventions, formulas and other representations to achieve their purpose when communicating and justifying their ideas, findings, arguments and proposals to diverse audiences. |
| Content descriptions | | | | |
| Strand: Science as a Human Endeavour | | | | |
| Sub-strand: Nature and development of science | | | | |
| *Students learn that:* | | | | |
| scientific knowledge is based on observations of the natural world using the senses, and scientific tools and instruments  VC2S2H01 | data from observations obtained through scientific inquiry can be used to develop explanations of natural phenomena  VC2S4H01 | scientific knowledge changes over time, often resulting from collaboration or by building on the work of others, and leads to advances in science  VC2S6H01 | scientific knowledge, including models and theories, can change because of new evidence  VC2S8H01 | scientific knowledge is contestable and is validated and refined over time through expanding scientific methods, replication, publication, peer review and consensus  VC2S10H01 |
|  |  |  | multidisciplinary endeavours to advance scientific knowledge make use of people’s different perspectives and worldviews  VC2S8H02 | advances in technologies have enabled advances in science, while science has contributed to developments in technologies and engineering  VC2S10H02 |
| Sub-strand: Use and influence of science | | | | |
| *Students learn that:* | | | | |
| science is used by people in their daily lives, including asking questions and using patterns from observations of the world around them to make scientific predictions  VC2S2H02 | scientific knowledge, skills and data can be used by people to explain how they will meet a need or solve a problem  VC2S4H02 | scientific knowledge, skills and data can be used by individuals and communities to identify problems, consider responses and make decisions  VC2S6H02 | proposed scientific responses to socio-scientific issues impact on society and may involve ethical, environmental, social and economic considerations  VC2S8H03 | the use of scientific knowledge to address socio-scientific issues and shape a more sustainable future for humans and the environment may have diverse projected outcomes that affect the extent to which scientific knowledge and practices are adopted more broadly by society  VC2S10H03 |
|  |  |  | communication of scientific knowledge has a role in informing individual viewpoints, and community policies and regulations  VC2S8H04 | scientific knowledge may be interpreted in different ways by individuals and groups in society; the values and needs of society can influence the focus of scientific research  VC2S10H04 |
| Strand: Science Understanding | | | | |
| Sub-strand: Biological sciences | | | | |
| *Students learn that:* | | | | |
| plants and animals have observable features that can be used to group them in different ways  VC2S2U01 | living things have characteristics that distinguish them from non-living things and things that were once living, including fossils  VC2S4U01 |  | there are similarities and differences within and between groups of organisms living on Earth; the development and use of classification tools, including dichotomous keys, help order and organise human understanding of the diversity of life  VC2S8U01 |  |
| plants and animals have external features that perform different functions to enable their survival; in plants these features include roots, stems, leaves, flowers, fruit, bulbs, trunks and branches while different features in animals enable them to move, breathe, eat and respond to their environment  VC2S2U03 |  |  | cell theory describes cells as the basic units of life; organisms may be unicellular or multicellular and have specialised structures and organelles (including cell walls, cell membranes, cytoplasm, nuclei containing DNA, mitochondria, ribosomes, chloroplasts and vacuoles) that perform specific functions  VC2S8U02 | infectious and non-infectious diseases are caused by different organisms and agents; measures to control the transmission of infectious diseases include personal hygiene, quarantine protocols, medical treatment and public education programs  VC2S10U03 |
| the structure of cells, tissues and organs in a plant and an animal organ system are related to their function; plant and animal organ systems enable survival of the organism  VC2S8U03 | the nervous and endocrine systems work together to regulate and coordinate the body’s response to stimuli, ensuring homeostasis, including through negative feedback mechanisms  VC2S10U02 |
|  | plants and animals have different life cycles; offspring are similar, but not identical, to their parents  VC2S4U02 |  |  | the structures of reproductive cells and organs in plants and animals are related to their functions; processes of sexual and asexual reproduction enable survival of a species  VC2S10U01 |
| genetic inheritance involves the function of DNA, chromosomes, genes and alleles, and the roles of mitosis and meiosis in passing on genetic information to the next generation; the principles of Mendelian inheritance can be used to predict ratios of genotypes and phenotypes in monohybrid crosses involving dominant and recessive traits  VC2S10U04 |
|  |  | organisms have evolved over time, as seen in fossils and scientific records; the structural features and behaviours of living organisms enable them to thrive in their environments  VC2S6U02 |  | the theory of evolution by natural selection includes the processes of variation, isolation and adaptation and is supported by evidence including the fossil record, biogeography and comparative embryology; the theory explains past and present biodiversity and demonstrates how all organisms have some degree of relatedness to each other  VC2S10U05 |
| plants and animals have basic needs, including air, water, food and shelter; the places where they live meet those needs  VC2S2U02 | consumers, producers and decomposers have different roles and interactions within a habitat; food chains can be used to represent feeding relationships  VC2S4U03 | habitats can be described by their physical conditions; changing the physical conditions of a habitat, including by human activity, may affect the growth and survival of organisms  VC2S6U01 | matter and energy flow through ecosystems and can be represented using models, including food webs and food pyramids; populations will be affected by changing biotic and abiotic factors in an ecosystem including habitat loss, climate change, seasonal migration and introduction or removal of species  VC2S8U04 |  |
| Sub-strand: Chemical sciences | | | | |
| *Students learn that:* | | | | |
| objects can be made of one or more different materials; these materials have observable properties  VC2S2U04 | solids, liquids and gases have observable properties; adding or removing heat energy leads to a change of state between solids, liquids and gases  VC2S4U04 | the observable properties of matter (solids, liquids and gases) can be explained by modelling the motion and arrangement of their particles; mixtures (including solutions) can be formed by combining 2 or more different substances  VC2S6U03 | the particle and kinetic theories of matter can be used to describe the arrangement and motion of particles in a substance, including the attraction between particles, and to explain the properties and behaviour of substances, including melting point, boiling point, density, compressibility, gas pressure, viscosity, diffusion, sublimation, and expansion and contraction  VC2S8U05 | the organisation of the elements in the periodic table is related to the structure and properties of atoms; patterns and trends include the significance of rows and periods, metallic and non-metallic properties, atomic size and reactivity  VC2S10U07 |
| materials can be combined in a variety of ways for particular purposes; the properties of objects and mixtures can differ from the properties of the materials from which they are made  VC2S2U05 | the properties of natural and made materials, including fibres, metals, glass and plastics, influence their use and re-use  VC2S4U05 |  | matter can be classified as pure substances such as elements and compounds or impure substances such as mixtures (including solutions), and can be modelled using the particle model; mixtures may have a uniform (homogeneous) or non-uniform (heterogeneous) composition and can be separated based on the properties of their components using techniques including filtration, decantation, evaporation, crystallisation, magnetic separation, distillation and chromatography  VC2S8U06 |  |
|  |  |  | the atomic theory of matter can be used to model and explain the difference between elements, compounds and mixtures; elements, compounds and mixtures can be represented as two-dimensional and three-dimensional models, elements can be represented by symbols, and molecules and compounds can be represented by chemical formulas  VC2S8U07 | the model of the atom changed following the discovery of electrons, protons and neutrons; natural radioactive decay results in a change from unstable to stable atoms  VC2S10U06 |
| materials can be changed physically by different actions without changing their material composition, including by bending, twisting, stretching, crushing, squashing and breaking into smaller pieces  VC2S2U06 |  | changes to substances may be reversible, in which case the substance may be recovered, or irreversible, in which case new substances are formed; for most substances a change of state or dissolving in water is reversible, while irreversible changes include cooking and rusting  VC2S6U04 | physical changes can be distinguished from chemical changes; a chemical change can be identified by a colour change, a temperature change, the production of a gas (including laboratory preparation and testing of oxygen, carbon dioxide and hydrogen gases) or the formation of a precipitate  VC2S8U08 | chemical reactions are described by the Law of Conservation of Mass and involve the rearrangement of atoms; they can be modelled using a range of representations, including word and simple balanced chemical equations  VC2S10U08 |
| chemical reactions include synthesis, decomposition and displacement reactions and can be classified as exothermic or endothermic; reaction rates are affected by factors including temperature, concentration, surface area of solid reactants, and catalysts  VC2S10U09 |
| Sub-strand: Earth and space sciences | | | | |
| *Students learn that:* | | | | |
| taking care of Earth’s water, land and air involves consideration of reducing, re-using and recycling materials to conserve Earth’s resources  VC2S2U09 | water is an important Earth resource that originates from various sources; water cycles through the environment by moving through the sky, landscape and ocean, and involves processes including precipitation, evaporation, transpiration, condensation, melting, freezing, crystallisation, infiltration and run-off  VC2S4U07 |  | the sustainable use of Earth’s resources is influenced by whether the resources are renewable or non-renewable; the processes involved in resource extraction and energy production come with both benefits and risks to sustainability  VC2S8U09 |  |
|  | rocks, minerals and soils are important Earth resources and have observable properties that enable them to be used in a variety of ways  VC2S4U06 | geological processes including weathering, erosion, transportation and deposition can cause slow or rapid changes to Earth’s surface  VC2S6U05 | key processes of the rock cycle occur over different timescales; the properties of sedimentary, igneous and metamorphic rocks not only reflect their formation but also impact their usefulness and determine the methods used when mined  VC2S8U11 | carbon is cycled on Earth through key processes including photosynthesis, respiration, fire, weathering, vulcanism and the combustion of fossil fuels; these processes change the composition of Earth’s interrelated systems (atmosphere, biosphere, hydrosphere and lithosphere) over time  VC2S10U10 |
| Earth is a dynamic planet as demonstrated by tectonic activity, including the formation of geological features at divergent, convergent and transform plate boundaries; the theory of plate tectonics is supported by scientific evidence  VC2S8U10 |
| daily and seasonal changes in the weather and the environment can be observed and affect decisions made in everyday life  VC2S2U07 | weather events and climate have impacts on the land, air, water and living things; human activity can affect climate  VC2S4U08 | sudden geological changes or extreme weather conditions can affect Earth’s surface and atmosphere; the impacts of natural hazards, including earthquakes, volcanic eruptions, wildfires and floods, can be reduced by human actions and technological innovations  VC2S6U06 |  | the dynamics of global climate change can be modelled and explained by examining the interactions between greenhouse gas emissions and energy exchanges within and between Earth’s systems; mitigating human-induced climate change requires addressing various activities including power generation, deforestation, manufacturing, transportation, food production and resource consumption  VC2S10U11 |
| Earth is one of 8 planets in our solar system; observing the sky reveals patterns in the changing positions of the Sun, Moon, planets and stars  VC2S2U08 |  | the force of gravity keeps Earth and other planets in the solar system in orbit around the Sun; cyclic observable phenomena, including variable day and night length, can be related to Earth’s tilt, rotation on its axis and revolution around the Sun  VC2S6U07 | cyclic changes in the relative positions of Earth, the Sun and the Moon can be modelled to show how these cycles cause eclipses and influence predictable phenomena on Earth, including seasons and tides  VC2S8U12 | space exploration seeks to expand knowledge of the origins and structure of the universe and to resolve the challenges of humans travelling and living away from Earth’s surface  VC2S10U12 |
| the universe contains features including galaxies, stars, solar systems and black holes; the big bang theory models the origin and evolution of the universe and is supported by evidence  VC2S10U13 |
| Sub-strand: Physical sciences | | | | |
| *Students learn that:* | | | | |
| the way objects move depends on a variety of factors including their size, shape and material  VC2S2U10 |  |  | simple machines, including the lever, inclined plane, wedge, pulley, screw, and wheel and axle, alter the direction and magnitude of forces  VC2S8U13 |  |
| pushes and pulls are forces that can change an object’s movement or shape and can be represented in terms of strength and direction  VC2S2U11 | forces, including frictional, gravitational, electrostatic and magnetic, can be exerted by one object on another through direct contact or from a distance and affect the motion (speed and direction) of objects  VC2S4U10 |  | balanced and unbalanced forces acting on objects, including gravitational force, may be investigated and represented using force diagrams; changes in an object’s motion can be related to its mass and the magnitude and direction of the forces acting on it  VC2S8U14 | Newton’s laws of motion can be used to quantitatively analyse the relationship between force, mass and acceleration of objects  VC2S10U17 |
| sound can make materials vibrate and vibrating materials can make sound; different actions can be used to produce sounds of varying pitch and volume  VC2S2U12 | heat energy can be generated from different sources; temperature changes may happen when heat is transferred from one object to another  VC2S4U09 | light can be produced from many sources; light travels in a straight path, can form shadows, and can be absorbed, transmitted, reflected or refracted by objects  VC2S6U08 | energy exists in different forms, including thermal, chemical, gravitational and elastic, and may be classified as kinetic or potential; energy transfers (conduction, convection and radiation) and transformations occur in simple systems and can be analysed in terms of energy efficiency  VC2S8U15 | wave and particle models can be used to describe energy transfer (conduction, convection and radiation) through different media; waves (electromagnetic and mechanical) have different properties, features (including amplitude, wavelength, frequency and speed) and applications  VC2S10U14 |
|  |  |  | household energy consumption can be analysed using an energy audit and is affected by appliance choice, building design, season and climate  VC2S8U16 | the Law of Conservation of Energy can be analysed in systems, including Earth systems, by assessing the efficiency of energy inputs, outputs, transfers and transformations  VC2S10U15 |
|  |  | materials may be electrical insulators or conductors; energy can be transferred and transformed in electrical circuits where the components of a circuit play particular roles in the function of the circuit  VC2S6U09 | electrical circuits transfer energy when current flows and can be designed for diverse purposes using different components; the operation of circuits can be explained using the concepts of voltage and current  VC2S8U17 | electricity can be generated as alternating current (AC) using magnets (via turbines turned by wind, water, tides or steam that is generated by the combustion of oil, gas or coal or by nuclear energy) or as direct current (DC) using photovoltaic cells or batteries  VC2S10U16 |
| Strand: Science Inquiry | | | | |
| Sub-strand: Questioning and predicting | | | | |
| *Students learn that:* | | | | |
| experiences can be used as a basis for posing questions to explore observed patterns and relationships, and to make predictions  VC2S2I01 | observations can be used as a basis for posing questions to identify patterns and relationships, and to predict the outcomes of investigations  VC2S4I01 | investigable questions and reasoned predictions can be used in guiding investigations to identify patterns and test relationships  VC2S6I01 | investigable questions, reasoned predictions and hypotheses can be developed in guiding investigations to identify patterns, test relationships and analyse and evaluate scientific models  VC2S8I01 | investigable questions, reasoned predictions and hypotheses can be used in guiding investigations to test and develop explanatory models and relationships  VC2S10I01 |
| Sub-strand: Planning and conducting | | | | |
| *Students learn that:* | | | | |
| scientific questions and predictions can be investigated safely by following procedures that have sequenced steps  VC2S2I02 | scientific investigations to answer questions or test predictions can be planned and conducted using provided scaffolds, including identifying the attributes of fair tests, and considering the safe use of materials and equipment  VC2S4I02 | repeatable scientific investigations to answer questions can be planned and conducted, including, as appropriate, deciding the variables to be changed, measured and controlled in fair tests, considering potential risks, planning for the safe and ethical use of equipment and materials, and obtaining permissions for investigations conducted on Country and Place or in protected areas  VC2S6I02 | reproducible investigations to answer questions and test hypotheses can be planned and conducted, including identifying independent, dependent and controlled variables where applicable, stating assumptions, recognising and managing risks, considering ethical issues and following protocols when accessing cultural sites and artefacts on Country and Place  VC2S8I02 | valid, reproducible investigations to answer questions and test hypotheses can be planned and conducted, including identifying and controlling for possible sources of error and bias in sampling or in making observations; safe, ethical investigations include undertaking risk assessments and following protocols when accessing cultural sites and artefacts on Country and Place  VC2S10I02 |
| observations are made using the senses and recorded, including informal measurements, using digital tools as appropriate  VC2S2I03 | observations, including formal measurements, can be made and recorded by following procedures to use familiar scaled instruments and digital tools as appropriate  VC2S4I03 | equipment can be used to observe, generate, measure and record data with reasonable precision for repeated measurements, using digital tools as appropriate  VC2S6I03 | equipment can be selected and used to generate and record data with attention to precision, using digital tools as appropriate  VC2S8I03 | equipment can be selected and used to generate and record data sets that show precision, including consideration of sample size and using digital tools as appropriate  VC2S10I03 |
| Sub-strand: Processing, modelling and analysing | | | | |
| *Students learn that:* | | | | |
| data and information can be sorted and ordered using provided tables and organisers, and visual or physical models, to show simple patterns  VC2S2I04 | data and information can be organised and represented to identify patterns and simple relationships by constructing tables, graphs and visual or physical models  VC2S4I04 | data and information can be organised and processed to show patterns, trends and relationships by constructing representations including tables, graphs and visual or physical models  VC2S6I04 | data and information can be organised and processed by selecting and constructing representations including tables, graphs, keys, models and mathematical relationships  VC2S8I04 | data and information can be organised, processed and summarised by selecting and constructing representations including tables, graphs, descriptive statistics, models, symbols, formulas and mathematical relationships  VC2S10I04 |
|  |  |  | information and processed data can be analysed to show patterns, trends and relationships, and to identify anomalies  VC2S8I05 | information and processed data can be analysed and compared to identify and explain qualitative and quantitative patterns, trends, relationships and anomalies  VC2S10I05 |
| Sub-strand: Evaluating | | | | |
| *Students learn that:* | | | | |
| observations can be compared to predictions and the observations of others, which may lead to further questions being identified  VC2S2I05 | findings can be compared to those of others, including, as appropriate, whether a test was fair or not, to enable conclusions to be drawn, and may lead to the identification of further questions for investigation  VC2S4I05 | methods and findings can be compared with those of others to identify sources of error, to select evidence in support of reasoned explanations and conclusions, and to develop further questions for investigation  VC2S6I05 | scientific methods, conclusions and claims can be analysed to identify assumptions, possible sources of error, conflicting evidence and unanswered questions  VC2S8I06 | the validity and reproducibility of investigation methods and the validity of conclusions and claims can be evaluated, including by identifying assumptions, conflicting evidence, biases that may influence observations and conclusions, sources of error and areas of uncertainty  VC2S10I06 |
|  |  |  | evidence-based arguments can be constructed to support conclusions or evaluate claims, including consideration of ethical issues and protocols associated with using or citing secondary data or information  VC2S8I07 | arguments based on a variety of evidence can be constructed to support conclusions or evaluate claims, including consideration of any ethical issues and cultural protocols associated with accessing, using or citing secondary data or information  VC2S10I07 |
| Sub-strand: Communicating | | | | |
| *Students learn that:* | | | | |
| observations, findings and ideas can be shared with others by using everyday and some scientific vocabulary  VC2S2I06 | observations, findings and ideas can be communicated for an identified purpose and audience by using scientific vocabulary and digital tools as appropriate  VC2S4I06 | scientific ideas, findings, patterns, trends and relationships can be communicated for a specific purpose and audience, using various presentation formats, scientific vocabulary and digital tools as appropriate  VC2S6I06 | communicating ideas, findings and arguments for specific purposes and audiences involves the selection and use of appropriate presentation formats, scientific vocabulary, models and other representations, and may include the use of digital tools  VC2S8I08 | communicating and justifying scientific ideas, findings and arguments for diverse audiences involves the selection of appropriate presentation formats, content, scientific vocabulary, conventions, models and other representations, and may include the use of digital tools  VC2S10I08 |