Science scope and sequence: Foundation to Level 6

| **Foundation to Level 2** | **Levels 3 and 4** | **Levels 5 and 6** |
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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. |
| 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 instrumentsVC2S2H01 | data from observations obtained through scientific inquiry can be used to develop explanations of natural phenomenaVC2S4H01 | scientific knowledge changes over time, often resulting from collaboration or by building on the work of others, and leads to advances in scienceVC2S6H01 |
| 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 predictionsVC2S2H02 | scientific knowledge, skills and data can be used by people to explain how they will meet a need or solve a problemVC2S4H02 | scientific knowledge, skills and data can be used by individuals and communities to identify problems, consider responses and make decisionsVC2S6H02 |
| 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 waysVC2S2U01 | living things have characteristics that distinguish them from non-living things and things that were once living, including fossils VC2S4U01 |  |
| 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 environmentVC2S2U03 |  |  |
|  | plants and animals have different life cycles; offspring are similar, but not identical, to their parentsVC2S4U02 |  |
|  |  | 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 |
| plants and animals have basic needs, including air, water, food and shelter; the places where they live meet those needsVC2S2U02 | consumers, producers and decomposers have different roles and interactions within a habitat; food chains can be used to represent feeding relationshipsVC2S4U03 | 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 |
| Sub-strand: Chemical sciences |
| *Students learn that:* |
| objects can be made of one or more different materials; these materials have observable propertiesVC2S2U04 | solids, liquids and gases have observable properties; adding or removing heat energy leads to a change of state between solids, liquids and gasesVC2S4U04 | 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 |
| 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 madeVC2S2U05 | the properties of natural and made materials, including fibres, metals, glass and plastics, influence their use and re-useVC2S4U05 |  |
| materials can be changed physically by different actions without changing their material composition, including by bending, twisting, stretching, crushing, squashing and breaking into smaller piecesVC2S2U06 |  | 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 rustingVC2S6U04 |
| 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 resourcesVC2S2U09 | 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 |  |
|  | rocks, minerals and soils are important Earth resources and have observable properties that enable them to be used in a variety of waysVC2S4U06 | geological processes including weathering, erosion, transportation and deposition can cause slow or rapid changes to Earth’s surfaceVC2S6U05 |
| daily and seasonal changes in the weather and the environment can be observed and affect decisions made in everyday lifeVC2S2U07 | weather events and climate have impacts on the land, air, water and living things; human activity can affect climateVC2S4U08 | 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 |
| 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 SunVC2S6U07 |
| Sub-strand: Physical sciences |
| *Students learn that:* |
| the way objects move depends on a variety of factors including their size, shape and materialVC2S2U10 |  |  |
| 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 |  |
| 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 anotherVC2S4U09 | 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 objectsVC2S6U08 |
|  |  | 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 |
| 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 investigationsVC2S4I01 | investigable questions and reasoned predictions can be used in guiding investigations to identify patterns and test relationshipsVC2S6I01 |
| 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 areasVC2S6I02 |
| observations are made using the senses and recorded, including informal measurements, using digital tools as appropriateVC2S2I03 | observations, including formal measurements, can be made and recorded by following procedures to use familiar scaled instruments and digital tools as appropriateVC2S4I03 | equipment can be used to observe, generate, measure and record data with reasonable precision for repeated measurements, using digital tools as appropriateVC2S6I03 |
| 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 patternsVC2S2I04 | 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 |
| Sub-strand: Evaluating |
| *Students learn that:* |
| observations can be compared to predictions and the observations of others, which may lead to further questions being identifiedVC2S2I05 | 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 investigationVC2S4I05 | 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 investigationVC2S6I05 |
| Sub-strand: Communicating |
| *Students learn that:* |
| observations, findings and ideas can be shared with others by using everyday and some scientific vocabularyVC2S2I06 | observations, findings and ideas can be communicated for an identified purpose and audience by using scientific vocabulary and digital tools as appropriateVC2S4I06 | 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 appropriateVC2S6I06 |