# AusVELS TO GO

# PRIMARY SCIENCE

*Based on Australian Curriculum, Assessment and Reporting Authority (ACARA) materials*

*Optimised for double-sided printing*

- ***GENERAL INFORMATION***
  *Overarching ideas*
  *Level Descriptions*
  *Examples of Inquiry Questions (from the VCAA)*
  *Relationship between the strands*

- ***SCOPE AND SEQUENCES*** *(Foundation – Level 6)*
  *Science Understanding*
  *Science as a Human Endeavour*
  *Science Inquiry Skills*

- ***LEVEL OVERVIEWS*** *(Foundation – Level 6)*

- ***QUICK GUIDES*** *(Foundation – Level 6)*
  *Content Descriptions*
  *Elaborations*
  *Progression Points (from the VCAA)*
  *Achievement Standards*

*This document is an arrangement and interpretation of the curriculum information provided on the AusVELS and VCAA websites. It is designed by teachers for teachers – as a quick and easy reference guide.*

*Please refer to the original sources for full curriculum details and resource materials in their accurate and intended form: AusVELS (http://ausvels.vcaa.vic.edu.au/) and the VCAA (http://www.vcaa.vic.edu.au).*

## KEY COMPONENTS OF AUSVELS

### Content descriptions:

- describe the knowledge, concepts, skills and processes that teachers are expected to teach and students are expected to learn
- do not prescribe approaches to teaching
- are intended to ensure that learning is appropriately ordered and that unnecessary repetition is avoided
- include skills and concepts that may be revisited, strengthened and extended at later levels as needed

### Elaborations:

- are provided to illustrate and exemplify content
- assist teachers to develop a common understanding of the content descriptions
- are not intended to be comprehensive content points that all students need to be taught

### Progression points: *(Sourced from the VCAA)*

- assist teachers in the assessment and reporting of student achievement by illustrating how a student might show evidence of progression
- can be modified by schools to reflect curriculum structure and timing of when knowledge and skills are taught and assessed
- should be used in conjunction with other tools such as annotated student work samples
- are not to be used as a definitive or mandated set of progression measures for student assessment

### Achievement standards:

- describe the quality of learning (the extent of knowledge, the depth of understanding, and the sophistication of skills) that students should typically demonstrate by a particular point in their schooling, and that would indicate the student is well placed to commence the learning required at the next level of achievement
- comprise a written description and student work samples

# GENERAL INFORMATION

The six overarching ideas that frame the Australian Curriculum: Science are:

## 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. As students progress from Foundation to Level 10, they build skills and understanding that will help them to observe and describe patterns at different scales, and develop and use classifications to organise events and phenomena and make predictions. Classifying objects and events into groups (such as solid/liquid/gas or living/non-living) and developing criteria for those groupings relies on making observations and identifying patterns of similarity and difference. As students progress through the primary levels, they become more proficient in identifying and describing the relationships that underpin patterns, including cause and effect. Students increasingly recognise that scale plays an important role in the observation of patterns; some patterns may only be evident at certain time and spatial scales. For example, the pattern of day and night is not evident over the time scale of an hour.

## 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). As students progress from Foundation to Level 10, they see that the functions of both living and non-living objects rely on their forms. Their understanding of forms such as the features of living things or the nature of a range of materials, and their related functions or uses, is initially based on observable behaviours and physical properties. In later levels, students recognise that function frequently relies on form and that this relationship can be examined at many scales. They apply an understanding of microscopic and atomic structures, interactions of force and flows of energy and matter to describe relationships between form and function.

## Stability and change

Many areas of science involve the recognition, description and prediction of stability and change. Early in their schooling, students recognise that in their observations of the world around them, some properties and phenomena appear to remain stable or constant over time, whereas others change. As they progress from Foundation to Level 10, they also recognise that phenomena (such as properties of objects and relationships between living things) can appear to be stable at one spatial or time scale, but at a larger or smaller scale may be seen to be changing. They begin to appreciate that stability can be the result of competing, but balanced forces. Students become increasingly adept at quantifying change through measurement and looking for patterns of change by representing and analysing data in tables or graphs.

## Scale and measurement

Quantification of time and spatial scale is critical to the development of science understanding as it enables the comparison of observations. Students often find it difficult to work with scales that are outside their everyday experience - these include the huge distances in space, the incredibly small size of atoms and the slow processes that occur over geological time. As students progress from Foundation to Level 10, their understanding of relative sizes and rates of change develops and they are able to conceptualise events and phenomena at a wider range of scales. They progress from working with scales related to their everyday experiences and comparing events and phenomena using relative language (such as 'bigger' or 'faster') and informal measurement, to working with scales beyond human experience and quantifying magnitudes, rates of change and comparisons using formal units of measurement.

## Matter and energy

Many aspects of science involve identifying, describing and measuring transfers of energy and/or matter. As students progress through Foundation to Level 10, they become increasingly able to explain phenomena in terms of the flow of matter and energy. Initially, students focus on direct experience and observation of phenomena and materials. They are introduced to the ways in which objects and living things change and begin to recognise the role of energy and matter in these changes. In later levels, they are introduced to more abstract notions of particles, forces and energy transfer and transformation. They use these understandings to describe and model phenomena and processes involving matter and energy.

## Systems

Science frequently involves thinking, modelling and analysing in terms of systems in order to understand, explain and predict events and phenomena. As students progress through Foundation to Level 10, they explore, describe and analyse increasingly complex systems.

Initially, students identify the observable components of a clearly identified ‘whole’ such as features of plants and animals and parts of mixtures. Over Levels 3 to 6 they learn to identify and describe relationships between components within simple systems, and they begin to appreciate that components within living and non-living systems are interdependent. In Levels 7 to 10 they are introduced to the processes and underlying phenomena that structure systems such as ecosystems, body systems and the carbon cycle. They recognise that within systems, interactions between components can involve forces and changes acting in opposing directions and that for a system to be in a steady state, these factors need to be in a state of balance or equilibrium. They are increasingly aware that systems can exist as components within larger systems, and that one important part of thinking about systems is identifying boundaries, inputs and outputs.

**SCIENCE** **LEVEL DESCRIPTIONS** **Foundation–Level 6**

The science content includes the three strands of Science Understanding, Science Inquiry Skills and Science as a Human Endeavour. The three strands of the curriculum are interrelated and their content is taught in an integrated way. The order and detail in which the content descriptions are organised into teaching/learning programs are decisions to be made by the teacher.

| | LEVEL DESCRIPTION |
|---|---|
| **Foundation** | From Foundation to Level 2, students learn that observations can be organised to reveal patterns, and that these patterns can be used to make predictions about phenomena.<br><br>In Foundation, students observe and describe the behaviours and properties of everyday objects, materials and living things. They explore change in the world around them, including changes that impact on them, such as the weather, and changes they can effect, such as making things move or change shape. They learn that seeking answers to questions and making observations is a core part of science and use their senses to gather different types of information. |
| **Level 1** | From Foundation to Level 2, students learn that observations can be organised to reveal patterns, and that these patterns can be used to make predictions about phenomena.<br><br>In Level 1, students infer simple cause-and-effect relationships from their observations and experiences, and begin to link events and phenomena with observable effects. They observe changes that can be large or small and happen quickly or slowly. They explore the properties of familiar objects and phenomena, identifying similarities and differences. Students begin to value counting as a means of comparing observations, and are introduced to ways of organising their observations. |
| **Level 2** | From Foundation to Level 2, students learn that observations can be organised to reveal patterns, and that these patterns can be used to make predictions about phenomena.<br><br>In Level 2, students describe the components of simple systems, such as stationary objects subjected to pushes or pulls, or combinations of materials, and show how objects and materials interact through direct manipulation. They observe patterns of growth and change in living things, and describe patterns and make predictions. They explore the use of resources from Earth and are introduced to the idea of the flow of matter when considering how water is used. They use counting and informal measurements to make and compare observations and begin to recognise that organising these observations in tables makes it easier to show patterns. |
| **Level 3** | Over Levels 3 to 6, students develop their understanding of a range of systems operating at different time and geographic scales.<br><br>In Level 3, students observe heat and its effects on solids and liquids and begin to develop an understanding of energy flows through simple systems. In observing day and night, they develop an appreciation of regular and predictable cycles. Students order their observations by grouping and classifying; in classifying things as living or non-living they begin to recognise that classifications are not always easy to define or apply. They begin to quantify their observations to enable comparison, and learn more sophisticated ways of identifying and representing relationships, including the use of tables and graphs to identify trends. They use their understanding of relationships between components of simple systems to make predictions. |
| **Level 4** | Over Levels 3 to 6, students develop their understanding of a range of systems operating at different time and geographic scales.<br><br>In Level 4, students broaden their understanding of classification and form and function through an exploration of the properties of natural and processed materials. They learn that forces include non-contact forces and begin to appreciate that some interactions result from phenomena that can't be seen with the naked eye. They begin to appreciate that current systems, such as Earth's surface, have characteristics that have resulted from past changes and that living things form part of systems. They understand that some systems change in predictable ways, such as through cycles. They apply their knowledge to make predictions based on interactions within systems, including those involving the actions of humans. |
| **Level 5** | Over Levels 3 to 6, students develop their understanding of a range of systems operating at different time and geographic scales.<br><br>In Level 5, students are introduced to cause and effect relationships that relate to form and function through an exploration of adaptations of living things. They explore observable phenomena associated with light and begin to appreciate that phenomena have sets of characteristic behaviours. They broaden their classification of matter to include gases and begin to see how matter structures the world around them. Students consider Earth as a component within a solar system and use models for investigating systems at astronomical scales. Students begin to identify stable and dynamic aspects of systems, and learn how to look for patterns and relationships between components of systems. They develop explanations for the patterns they observe. |
| **Level 6** | Over Levels 3 to 6, students develop their understanding of a range of systems operating at different time and geographic scales.<br><br>In Level 6, students explore how changes can be classified in different ways. They learn about transfer and transformations of electricity, and continue to develop an understanding of energy flows through systems. They link their experiences of electric circuits as a system at one scale, to generation of electricity from a variety of sources at another scale and begin to see links between these systems. They develop a view of Earth as a dynamic system, in which changes in one aspect of the system impact on other aspects; similarly they see that the growth and survival of living things are dependent on matter and energy flows within a larger system. Students begin to see the role of variables in measuring changes and learn how look for patterns and relationships between variables. They develop explanations for the patterns they observe, drawing on evidence. |

The VCAA has provided the following examples of inquiry questions for each progression point.

| | **EXAMPLES OF SUITABLE INQUIRY QUESTIONS INCLUDE:** |
|---|---|
| **F.5** | - How are human adults different from human babies?<br>- How are dogs similar to/different from cats?<br>- How are ligers similar to/different from tigers and lions?<br>- How does the 'skin' of fish feel different to the 'skin' of penguins? Cats? Chickens?<br>- How can sound be described?<br>- What does water look like?<br>- How can light be described?<br>- Does everyone describe a single object in the same way?<br>- Why is accurate observation important when describing materials or objects?<br>- How are the needs of pet dogs similar to, and different from, the needs of pet fish?<br>- How can plants be looked after during times of drought or water restrictions? |
| **1.0** | - In which situations is it better to sort objects on the basis of colour rather than size?<br>- In which situations is it better to sort objects on the basis of size rather than colour?<br>- Why is sorting important?<br>- How do you sort your toys?<br>- How would a blind person sort and identify their clothes?<br>- What makes sounds change?<br>- Which keeps food fresher, paper or plastic?<br>- What happens to the texture and flavour of a jelly when it is cooled at different rates?<br>- Do all fish 'drink' and 'breathe' in the same way?<br>- How can different fish be sorted into groups, and why would it be useful for us to sort them into groups? |
| **1.5** | - What materials can be used to construct a home-made piano/guitar/flute?<br>- How do the materials in the clothes worn on a hot day differ from the materials in the clothes worn on a rainy day?<br>- Can a woollen jumper be re-woven to create a summer outfit?<br>- Can paper be used to make a raincoat?<br>- Are different types of clouds associated with different weather?<br>- How do the seasons affect what we eat and what we do, and how can we make changes to do things 'out of season'?<br>- How can paints be made from natural ochres and plant materials, and how are they affected by sunlight?<br>- Are scale patterns in fish related to swim speed?<br>- What if an octopus had to live where a shark/eel/penguin lives?<br>- How does the colour, shape and texture of a fish's 'skin' help it to live in its habitat?<br>- What if humans had fins? |
| **2.0** | **Achievement Standard** |
| **2.5** | - Does watering seedlings with soda water affect their growth?<br>- How do the life cycles of plants compare with the life cycle of animals?<br>- If you consider the seven general features of living things, can fire be classified as a living thing?<br>- How does a sundial work? How do aeroplanes fly?<br>- How does a compost heap/garden change over time?<br>- Can chocolate be continuously heated and cooled without affecting its taste, colour or texture?<br>- What temperatures and light conditions enable propagation and growth of plants?<br>- How are buildings kept cool in summer and warm in winter?<br>- How are chocolate-covered sweets manufactured?<br>- Can the weather be predicted accurately?<br>- How is revegetation and the restoration of animal habitats managed after a bushfire?<br>- How can erosion due to wind or tides be minimised? |
| **3.0** | - What type of shoe sole 'grips' the best on different surfaces?<br>- What proportion of the dinners you eat in a week rely on cooking or freezing?<br>- Can you make an anti-gravity toy?<br>- Which materials should be used, and how can they be combined, to build a nest or a birdbox to meet the needs of a native bird?<br>- Are fertilisers and pesticides always beneficial?<br>- Do all plants grow better in greenhouses?<br>- How can the stages in the life cycles of plants and animals be manipulated to promote species survival?<br>- How do flotation devices work?<br>- How can an understanding of friction help sports shoe designers to develop shoes that grip?<br>- How can an understanding of heating and cooling as well as mixing of solids and liquids help chefs create new foods from starting ingredients?<br>- Does the speed of cooling affect the texture of jellies, ice creams and toffees?<br>- Does the same type of fertiliser work equally well for growing tomato seedlings as for sprouting bean shoots?<br>- How is pollution measured and controlled? |

Source: Victorian Curriculum and Assessment Authority

The VCAA has provided the following examples of inquiry questions for each progression point.

| | **EXAMPLES OF SUITABLE INQUIRY QUESTIONS INCLUDE:** |
|---|---|
| **3.5** | - Should new roads be built through native bushland?<br>- What safety measures are taken in summer during 'controlled burning' activities?<br>- Should there be a limit to how fast cars can travel?<br>- Should living things or chemicals be introduced into ecosystems to control population growth of selected animals and/or plants?<br>- What personal actions can be taken to reduce, reuse and recycle materials and how can the effectiveness of these actions be measured?<br>- How can we save water at school and at home?<br>- How can a device be constructed to keep things hot/cold?<br>- Which flotation devices are most effective and how can they be improved?<br>- How can magnets be used to construct toys?<br>- How does sea litter affect the survival of sea creatures? |
| **4.0** | **Achievement Standard** |
| **4.5** | - Why is Pluto no longer classified as a planet?<br>- Is the mould that grows on wholemeal bread different from the mould that grows on other types of breads?<br>- How can electric circuits be wired to construct a burglar alarm or to light up a model doll's house?<br>- In what ways are the three primary pigment colours similar to/different from the seven primary light colours?<br>- How has the invention of the cochlear implant been an improvement on the use of hearing aids?<br>- How would life be different if hearing or sight is suddenly lost, and how could the other senses be used to compensate?<br>- How has William Farrer's work on disease-resistant wheat strains impacted on Australian crop yields? |
| **5.0** | - Does mould grow faster in the dark?<br>- How could the features of a fish be changed so that it could live in both water and on land?<br>- How are minerals extracted from their ores?<br>- Is it possible for a meteor to strike and destroy Earth?<br>- How is water/air quality affected by human activities?<br>- How do glasses help people to see better, and how do different laser eye surgery techniques work to improve vision?<br>- How can we build more sensitive motion-detectors?<br>- How can the water cycle be manipulated so that arid environments may have greater access to clean water?<br>- What adaptations enable extremophiles found in volcanoes or at the bottom of the ocean to survive in their environments? How can sustainable fishing be promoted?<br>- How does increasing water temperature affect the solubility of different substances, and what impact could this have on marine life? |
| **5.5** | - How do bionic eyes work?<br>- How far away can telescopes 'see'?<br>- What types of microscopes are there, and how small are the objects that can be seen?<br>- How would the introduction of a solar-powered scarecrow affect ecosystem relationships?<br>- What causes ocean acidification and what impact will it have on ocean/terrestrial ecosystems?<br>- How can efficiencies of wind turbines, solar panels, biogas generators and/or geothermal energy converters be improved, and how viable are they as alternatives to fossil fuels for electricity generation?<br>- Are some laser eye surgery methods safer than others?<br>- How did Copernicus convince others that the solar system is heliocentric rather than geocentric?<br>- How can electrical circuits be wired up in a model house to switch on lights selectively?<br>- Which form of alternative energy would best replace the use of energy derived from fossil fuels in a given location?<br>- How can rusting be prevented or slowed? |
| **6.0** | **Achievement Standard** |

Source: Victorian Curriculum and Assessment Authority

### *The three strands of science should be taught in an integrated way…*

In the practice of science, the three strands of Science Understanding, Science as a Human Endeavour and Science Inquiry Skills are closely integrated; 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.

To achieve this, the three strands of the Australian Curriculum: Science should be taught in an integrated way. The content descriptions of the three strands have been written so that at each level this integration is possible. In the earlier levels, the 'Nature and development of science' sub-strand within the Science as a Human Endeavour strand focuses on scientific inquiry. This enables students to make clear connections between the inquiry skills that they are learning and the work of scientists. As students progress through the curriculum they investigate how science understanding has developed, including considering some of the people and the stories behind these advances in science.

They will also recognise how this science understanding can be applied to their lives and the lives of others. As students develop a more sophisticated understanding of the knowledge and skills of science they are increasingly able to appreciate the role of science in society. The content of the Science Understanding strand will inform students' understanding of contemporary issues, such as climate change, use of resources, medical interventions, biodiversity and the origins of the universe. The importance of these areas of science can be emphasised through the content of the Science as a Human Endeavour strand, and students can be encouraged to view contemporary science critically through aspects of the Science Inquiry Skills strand, for example by analysing, evaluating and communicating.

# SCOPE AND SEQUENCES

## *Foundation – Level 6*

**Content descriptions for each of the three content strands, showing the sequence of learning across each sub-strand.*

| Foundation | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 | Level 6 |
|---|---|---|---|---|---|---|
| **BIOLOGICAL SCIENCES** | | | | | | |
| Living things have basic needs, including food and water | Living things have a variety of external features<br><br>Living things live in different places where their needs are met | Living things grow, change and have offspring similar to themselves | Living things can be grouped on the basis of observable features and can be distinguished from non-living things | Living things have life cycles<br><br>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** | | | | | | |
| 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 | 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** | | | | | | |
| 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 | 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** | | | | | | |
| 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 | 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<br><br>Energy from a variety of sources can be used to generate electricity |

| Foundation | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 | Level 6 |
|---|---|---|---|---|---|---|
| **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 | | 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<br><br>Important contributions to the advancement of science have been made by people from a range of cultures | |
| **USE AND INFLUENCE OF SCIENCE** | | | | | | |
| | People use science in their daily lives, including when caring for their environment and living things | | 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<br><br>Scientific knowledge is used to inform personal and community decisions | |

| Foundation | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 | Level 6 |
|---|---|---|---|---|---|---|
| **QUESTIONING AND PREDICTING** | | | | | | |
| Respond to questions about familiar objects and events | Respond to and pose questions, and make predictions about familiar objects and events | | 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** | | | | | | |
| 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<br><br>Use informal measurements in the collection and recording of observations, with the assistance of digital technologies as appropriate | | Suggest ways to plan and conduct investigations to find answers to questions<br><br>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<br><br>Decide which variable should be changed and measured in fair tests and accurately observe, measure and record data, using digital technologies as appropriate<br><br>Use equipment and materials safely, identifying potential risks | |
| **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<br><br>Through discussion, compare observations with predictions | | Use a range of methods including tables and simple column graphs to represent data and to identify patterns and trends<br><br>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<br><br>Compare data with predictions and use as evidence in developing explanations | |
| **EVALUATING** | | | | | | |
| | Compare observations with those of others | | 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** | | | | | | |
| 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 | | 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 | |

# LEVEL OVERVIEWS

## *Foundation – Level 6*

**Content descriptions from all three content strands, grouped according to level.*

| **Science Understanding** | | Term 1 | Term 2 | Term 3 | Term 4 |
|---|---|---|---|---|---|
| Biological sciences | Living things have basic needs, including food and water | | | | |
| Chemical sciences | Objects are made of materials that have observable properties | | | | |
| Earth and space sciences | Daily and seasonal changes in our environment, including the weather, affect everyday life | | | | |
| Physical sciences | The way objects move depends on a variety of factors, including their size and shape | | | | |
| **Science as a Human Endeavour** | | Term 1 | Term 2 | Term 3 | Term 4 |
| Nature and development of science | Science involves exploring and observing the world using the senses | | | | |
| **Science Inquiry Skills** | | Term 1 | Term 2 | Term 3 | Term 4 |
| Questioning and predicting | Respond to questions about familiar objects and events | | | | |
| Planning and conducting | Explore and make observations by using the senses | | | | |
| Processing and analysing data and information | Engage in discussions about observations and use methods such as drawing to represent ideas | | | | |
| Communicating | Share observations and ideas | | | | |

| **Science Understanding** | | Term 1 | Term 2 | Term 3 | Term 4 |
|---|---|---|---|---|---|
| Biological sciences | Living things have a variety of external features | | | | |
| | Living things live in different places where their needs are met | | | | |
| Chemical sciences | Everyday materials can be physically changed in a variety of ways | | | | |
| Earth and space sciences | Observable changes occur in the sky and landscape | | | | |
| Physical sciences | Light and sound are produced by a range of sources and can be sensed | | | | |
| **Science as a Human Endeavour** *(Level 1 & 2)* | | Term 1 | Term 2 | Term 3 | Term 4 |
| Nature and development of science | 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 | | | | |
| **Science Inquiry Skills** *(Level 1 & 2)* | | Term 1 | Term 2 | Term 3 | Term 4 |
| Questioning and predicting | Respond to and pose questions, and make predictions about familiar objects and events | | | | |
| Planning and conducting | 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 | 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 | Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play | | | | |

| **Science Understanding** | | Term 1 | Term 2 | Term 3 | Term 4 |
|---|---|---|---|---|---|
| Biological sciences | Living things grow, change and have offspring similar to themselves | | | | |
| Chemical sciences | Different materials can be combined, including by mixing, for a particular purpose | | | | |
| Earth and space sciences | Earth's resources, including water, are used in a variety of ways | | | | |
| Physical sciences | A push or a pull affects how an object moves or changes shape | | | | |
| **Science as a Human Endeavour** *(Level 1 & 2)* | | Term 1 | Term 2 | Term 3 | Term 4 |
| Nature and development of science | 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 | | | | |
| **Science Inquiry Skills** *(Level 1 & 2)* | | Term 1 | Term 2 | Term 3 | Term 4 |
| Questioning and predicting | Respond to and pose questions, and make predictions about familiar objects and events | | | | |
| Planning and conducting | 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 | 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 | Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play | | | | |

| **Science Understanding** | | Term 1 | Term 2 | Term 3 | Term 4 |
|---|---|---|---|---|---|
| Biological sciences | Living things can be grouped on the basis of observable features and can be distinguished from non-living things | | | | |
| Chemical sciences | A change of state between solid and liquid can be caused by adding or removing heat | | | | |
| Earth and space sciences | Earth's rotation on its axis causes regular changes, including night and day | | | | |
| Physical sciences | Heat can be produced in many ways and can move from one object to another | | | | |
| **Science as a Human Endeavour** *(Level 3 & 4)* | | Term 1 | Term 2 | Term 3 | Term 4 |
| Nature and development of science | Science involves making predictions and describing patterns and relationships | | | | |
| Use and influence of science | Science knowledge helps people to understand the effect of their actions | | | | |
| **Science Inquiry Skills** *(Level 3 & 4)* | | Term 1 | Term 2 | Term 3 | Term 4 |
| Questioning and predicting | With guidance, identify questions in familiar contexts that can be investigated scientifically and predict what might happen based on prior knowledge | | | | |
| 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 | | | | |
| 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 | | | | |
| Evaluating | Reflect on the investigation; including whether a test was fair or not | | | | |
| Communicating | Represent and communicate ideas and findings in a variety of ways such as diagrams, physical representations and simple reports | | | | |

| **Science Understanding** | | Term 1 | Term 2 | Term 3 | Term 4 |
|---|---|---|---|---|---|
| Biological sciences | Living things have life cycles | | | | |
| | Living things, including plants and animals, depend on each other and the environment to survive | | | | |
| Chemical sciences | Natural and processed materials have a range of physical properties; These properties can influence their use | | | | |
| Earth and space sciences | Earth's surface changes over time as a result of natural processes and human activity | | | | |
| Physical sciences | Forces can be exerted by one object on another through direct contact or from a distance | | | | |
| **Science as a Human Endeavour** *(Level 3 & 4)* | | Term 1 | Term 2 | Term 3 | Term 4 |
| Nature and development of science | Science involves making predictions and describing patterns and relationships | | | | |
| Use and influence of science | Science knowledge helps people to understand the effect of their actions | | | | |
| **Science Inquiry Skills** *(Level 3 & 4)* | | Term 1 | Term 2 | Term 3 | Term 4 |
| Questioning and predicting | With guidance, identify questions in familiar contexts that can be investigated scientifically and predict what might happen based on prior knowledge | | | | |
| 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 | | | | |
| 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 | | | | |
| Evaluating | Reflect on the investigation; including whether a test was fair or not | | | | |
| Communicating | Represent and communicate ideas and findings in a variety of ways such as diagrams, physical representations and simple reports | | | | |

| **Science Understanding** | | Term 1 | Term 2 | Term 3 | Term 4 |
|---|---|---|---|---|---|
| Biological sciences | Living things have structural features and adaptations that help them to survive in their environment | | | | |
| | | | | | |
| Chemical sciences | Solids, liquids and gases have different observable properties and behave in different ways | | | | |
| Earth and space sciences | The Earth is part of a system of planets orbiting around a star (the sun) | | | | |
| Physical sciences | Light from a source forms shadows and can be absorbed, reflected and refracted | | | | |
| **Science as a Human Endeavour** *(Level 5 & 6)* | | Term 1 | Term 2 | Term 3 | Term 4 |
| Nature and development of science | 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 | 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 | | | | |
| **Science Inquiry Skills** *(Level 5 & 6)* | | Term 1 | Term 2 | Term 3 | Term 4 |
| Questioning and predicting | 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 | 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 | 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 | Suggest improvements to the methods used to investigate a question or solve a problem | | | | |
| Communicating | Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts | | | | |

| **Science Understanding** | | Term 1 | Term 2 | Term 3 | Term 4 |
|---|---|---|---|---|---|
| Biological sciences | The growth and survival of living things are affected by the physical conditions of their environment | | | | |
| Chemical sciences | Changes to materials can be reversible, such as melting, freezing, evaporating; or irreversible, such as burning and rusting | | | | |
| Earth and space sciences | Sudden geological changes or extreme weather conditions can affect Earth's surface | | | | |
| Physical sciences | Electrical circuits provide a means of transferring and transforming electricity | | | | |
| | Energy from a variety of sources can be used to generate electricity | | | | |
| **Science as a Human Endeavour** *(Level 5 & 6)* | | Term 1 | Term 2 | Term 3 | Term 4 |
| Nature and development of science | 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 | 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 | | | | |
| **Science Inquiry Skills** *(Level 5 & 6)* | | Term 1 | Term 2 | Term 3 | Term 4 |
| Questioning and predicting | 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 | 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 | 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 | Suggest improvements to the methods used to investigate a question or solve a problem | | | | |
| Communicating | Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts | | | | |

# QUICK GUIDES

## *Science Understanding*

## *Foundation – Level 6*

*Each Quick Guide contains the content descriptions and elaborations for each level, with progression points and achievement standards broken down into smaller parts and aligned with the most relevant content descriptions.*

*Note that this breakdown of progression points and achievement standards and their alignment with content descriptions is the interpretation of Bellbridge Primary School, not necessarily intended by the VCAA or ACARA.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 0.5** | **Achievement Standard F.0** |
|---|---|---|---|
| **BIOLOGICAL SCIENCES** | | No progression point examples are provided at this level. | By the end of the Foundation level, students:<br><br>Describe the properties and behaviour of familiar objects.<br><br>Suggest how the environment affects them and other living things. |
| Living things have basic needs, including food and water | • identifying the needs of humans such as warmth, food and water, using students' own experiences<br>• recognising the needs of living things in a range of situations such as pets at home, plants in the garden or plants and animals in bushland<br>• comparing the needs of plants and animals | | |
| **CHEMICAL SCIENCES** | | | |
| Objects are made of materials that have observable properties | • sorting and grouping materials on the basis of observable properties such as colour, texture and flexibility<br>• thinking about how the materials used in buildings and shelters are suited to the local environment<br>• investigating different forms of clothing used for different activities<br>• comparing the traditional materials used for clothing from around the world | | |
| **EARTH AND SPACE SCIENCES** | | | |
| Daily and seasonal changes in our environment, including the weather, affect everyday life | • linking the changes in the daily weather to the way we modify our behaviour and dress for different conditions, including examples from different cultures<br>• investigating how changes in the weather might affect animals such as pets, animals that hibernate, or migratory animals<br>• learning how Aboriginal and Torres Strait Islander concepts of time and weather patterns explain how things happen in the world around them | | |
| **PHYSICAL SCIENCES** | | | |
| The way objects move depends on a variety of factors, including their size and shape | • observing the way different shaped objects such as balls, blocks and tubes move<br>• comparing the way different sized, but similar shaped, objects such as tennis balls, golf balls, marbles and basketballs roll and bounce<br>• observing how the movement of different living things depends on their size and shape | | |

** In Science, reporting of student achievement commences at Level 3.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point F.5** | **Progression Point 1.0** |
|---|---|---|---|
| **BIOLOGICAL SCIENCES** | | | At Level 1, the student is working towards the Level 2 standard. |
| Living things have a variety of external features | • recognising common features of animals such as head, legs and wings<br>• describing the use of animal body parts for particular purposes such as moving and feeding<br>• identifying common features of plants such as leaves and roots<br>• describing the use of plant parts for particular purposes such as making food and obtaining water | | |
| Living things live in different places where their needs are met | • exploring different habitats in the local environment such as the beach, bush and backyard<br>• recognising that different living things live in different places such as land and water<br>• exploring what happens when habitats change and some living things can no longer have their needs met | | |
| **CHEMICAL SCIENCES** | | | |
| Everyday materials can be physically changed in a variety of ways | • predicting and comparing how the shapes of objects made from different materials can be physically changed through actions such as bending, stretching and twisting<br>• exploring how materials such as water, chocolate or play dough change when warmed or cooled | No progression point examples are provided at this level. | No progression point examples are provided at this level. |
| **EARTH AND SPACE SCIENCES** | | | |
| Observable changes occur in the sky and landscape | • exploring the local environment to identify and describe natural, managed and constructed features<br>• recording short and longer term patterns of events that occur on Earth and in the sky, such as the appearance of the moon and stars at night, the weather and the seasons | | |
| **PHYSICAL SCIENCES** | | | |
| Light and sound are produced by a range of sources and can be sensed | • recognising senses are used to learn about the world around us: our eyes to detect light, our ears to detect sound, and touch to feel vibrations<br>• identifying the sun as a source of light<br>• recognising that objects can be seen when light from sources is available to illuminate them<br>• exploring different ways to produce sound using familiar objects and actions such as striking, blowing, scraping and shaking<br>• comparing sounds made by musical instruments using characteristics such as loudness, pitch and actions used to make the sound | | |

** In Science, reporting of student achievement commences at Level 3.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 1.5** | **Achievement Standard 2.0** |
|---|---|---|---|
| **BIOLOGICAL SCIENCES** | | No progression point examples are provided at this level. | By the end of Level 2, students:<br><br>Identify and describe a range of habitats.<br>(Level 1 Biological)<br><br>Identify and describe the different uses of materials and resources.<br>(Level 2 Chemical & Earth/Space)<br><br>Describe the effects of interacting with materials and objects.<br>(Level 1 & 2 various)<br><br>Describe changes to objects, materials, living things and things in their local environment.<br>(Level 1 & 2 various) |
| Living things grow, change and have offspring similar to themselves | • representing personal growth and changes from birth<br>• recognising that living things have predictable characteristics at different stages of development<br>• exploring different characteristics of life stages in animals such as egg, caterpillar and butterfly<br>• observing that all animals have offspring, usually with two parents | | |
| **CHEMICAL SCIENCES** | | | |
| Different materials can be combined, including by mixing, for a particular purpose | • exploring the local environment to observe a variety of materials, and describing ways in which materials are used<br>• investigating the effects of mixing materials together<br>• suggesting why different parts of everyday objects such as toys and clothes are made from different materials<br>• identifying materials such as paper that can be changed and remade or recycled into new products | | |
| **EARTH AND SPACE SCIENCES** | | | |
| Earth's resources, including water, are used in a variety of ways | • identifying the Earth's resources including water, soil and minerals, and describing how they are used in the school<br>• describing how a resource such as water is transferred from its source to its point of use<br>• considering what might happen to humans if there were a change in a familiar available resource, such as water<br>• identifying actions at school such as turning off dripping taps, that can conserve resources | | |
| **PHYSICAL SCIENCES** | | | |
| A push or a pull affects how an object moves or changes shape | • exploring ways that objects move on land, through water and in the air<br>• exploring how different strengths of pushes and pulls affect the movement of objects<br>• identifying toys from different cultures that use the forces of push or pull<br>• considering the effects of objects being pulled towards the Earth | | |

** In Science, reporting of student achievement commences at Level 3.*

*Levels and sub-strands in brackets, such as: (Level 1 Biological) indicate a reasonably clear correlation to Content Descriptions found in those locations.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 2.5** *A student progressing towards Level 4 may, for example:* | **Progression Point 3.0** *A student progressing towards Level 4 may, for example:* |
|---|---|---|---|
| **BIOLOGICAL SCIENCES** | | | At Level 3, the student is working towards the Level 4 standard. |
| Living things can be grouped on the basis of observable features and can be distinguished from non-living things | • recognising characteristics of living things such as growing, moving, sensitivity and reproducing<br>• recognising the range of different living things<br>• sorting living and non-living things based on characteristics<br>• exploring differences between living, once living and products of living things | Describe everyday changes in biological, chemical, earth and space, and physical science contexts.<br><br>*For example:*<br>• the melting of ice to form water<br>• storm damage<br>• use of magnets to open and close doors<br>• use of pushes and pulls to move or change the shape of objects<br>• the distinction between things that are living, were once living or are products of living things<br>• beach erosion | Explain how changes in biological, chemical, earth and space, and physical science contexts may be of benefit to society.<br><br>*For example:*<br>• the use of heating and cooling in cooking<br>• use of electromagnets<br>• the use of pushes and pulls such as brakes in bicycles to make objects move and stop<br>• growing plants from seedlings as a food source<br>• adding fertilisers to change the composition and characteristics of different soils |
| **CHEMICAL SCIENCES** | | | |
| A change of state between solid and liquid can be caused by adding or removing heat | • investigating how liquids and solids respond to changes in temperature, for example water changing to ice, or melting chocolate<br>• exploring how changes from solid to liquid and liquid to solid can help us recycle materials<br>• predicting the effect of heat on different materials | | |
| **EARTH AND SPACE SCIENCES** | | | |
| Earth's rotation on its axis causes regular changes, including night and day | • recognising the sun as a source of light<br>• constructing sundials and investigating how they work<br>• describing timescales for the rotation of the Earth<br>• modelling the relative sizes and movement of the sun, Earth and moon | | |
| **PHYSICAL SCIENCES** | | | |
| Heat can be produced in many ways and can move from one object to another | • describing how heat can be produced such as through friction or motion, electricity or chemically (burning)<br>• identifying changes that occur in everyday situations due to heating and cooling<br>• exploring how heat can be transferred through conduction<br>• recognising that we can feel heat and measure its effects using a thermometer | | |

** In Science, reporting of student achievement commences at Level 3.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 3.5** *A student progressing towards Level 4 may, for example:* | **Achievement Standard 4.0** |
|---|---|---|---|
| **BIOLOGICAL SCIENCES** | | Analyse how changes in biological, chemical, earth and space, and physical science contexts may both benefit and harm society.<br><br>*For example:*<br>• forest destruction and regeneration in bushfires<br>• the effect of magnets on navigation<br>• the risks and benefits of space travel<br>• forces at work in cars, buses and trains<br>• planting of indigenous, native or introduced plant species<br>• consideration of the properties of materials in contributing to pollution or managing waste | By the end of Level 4, students:<br><br>Describe structural features common to living things.<br>(Level 3 Biological)<br><br>Explain how heat is involved in changes of state between solid and liquid.<br>(Level 3 Chemical)<br><br>Explain the effects of Earth's rotation on its axis.<br>(Level 3 Earth/Space)<br><br>Distinguish between temperature and heat.<br>(Level 3 Physical)<br><br>Use examples to illustrate how heat is produced and transferred.<br>(Level 3 Physical)<br><br>Explain how the key stages in the life cycle of a plant or animal relate to growth and species survival.'<br>(Level 4 Biological)<br><br>Describe relationships that assist the survival of living things.<br>(Level 4 Biological)<br><br>Link the observable properties of materials to their use.<br>(Level 4 Chemical)<br><br>Discuss how natural and human processes cause changes to Earth's surface.<br>(Level 4 Earth/Space)<br><br>Use contact and non-contact forces to describe interactions between objects.<br>(Level 4 Physical)<br><br>. |
| Living things have life cycles | • making and recording observations of living things as they develop through their life cycles<br>• describing the stages of life cycles of different living things such as insects, birds, frogs and flowering plants<br>• comparing life cycles of animals and plants<br>• recognising that environmental factors can affect life cycles such as fire and seed germination | | |
| Living things, including plants and animals, depend on each other and the environment to survive | • investigating how plants provide shelter for animals<br>• investigating the roles of living things in a habitat, for instance producers, consumers or decomposers<br>• observing and describing predator-prey relationships<br>• predicting the effects when living things in feeding relationships are removed or die out in an area<br>• recognising that interactions between living things may be competitive or mutually beneficial | | |
| **CHEMICAL SCIENCES** | | | |
| Natural and processed materials have a range of physical properties; These properties can influence their use | • describing a range of common materials, such as metals or plastics, and their uses<br>• investigating a particular property across a range of materials<br>• selecting materials for uses based on their properties<br>• considering how the properties of materials affect the management of waste or can lead to pollution | | |
| **EARTH AND SPACE SCIENCES** | | | |
| Earth's surface changes over time as a result of natural processes and human activity | • collecting evidence of change from local landforms, rocks or fossils<br>• exploring a local area that has changed as a result of natural processes, such as an eroded gully, sand dunes or river banks<br>• investigating the characteristics of soils<br>• considering how different human activities cause erosion of the Earth's surface<br>• considering the effect of events such as floods and extreme weather on the landscape, both in Australia and in the Asia region | | |
| **PHYSICAL SCIENCES** | | | |
| Forces can be exerted by one object on another through direct contact or from a distance | • observing qualitatively how speed is affected by the size of a force<br>• exploring how non-contact forces are similar to contact forces in terms of objects pushing and pulling another object<br>• comparing and contrasting the effect of friction on different surfaces, such as tyres and shoes on a range of surfaces<br>• investigating the effect of forces on the behaviour of an object through actions such as throwing, dropping, bouncing and rolling<br>• exploring the forces of attraction and repulsion between magnets | | |

*Levels and sub-strands in brackets, such as: (Level 4 Physical) indicate a reasonably clear correlation to Content Descriptions found in those locations.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 4.5** *A student progressing towards Level 6 may, for example:* | **Progression Point 5.0** *A student progressing towards Level 6 may, for example:* |
|---|---|---|---|
| **BIOLOGICAL SCIENCES** | | Describe how components within systems function together in biological, chemical, earth and space, and physical science contexts.<br><br>*For example:*<br>• the distinction between a star, a moon and a planet<br>• the structural features and adaptations of living things that enable them to survive in their environment<br>• effects of different cooking processes on food<br>• the components of electric circuits | At Level 5, the student is working towards the Level 6 standard.<br><br>Analyse the effects of system change in biological, chemical, earth and space, and physical science contexts.<br><br>*For example:*<br>• construction and use of a device for tracking the apparent movement of the Sun during the day<br>• plant responses to sunlight<br>• ecosystem changes due to biotic and/or abiotic factors<br>• comparison of rates of rusting in salt, humid and dry air conditions<br>• mining operations<br>• generation of electricity from wind or solar energy<br>• comparison of effects on the current in a circuit by changing the number of batteries (arranged in series) or changing the number of light bulbs (arranged in series and/or parallel) |
| Living things have structural features and adaptations that help them to survive in their environment | • explaining how particular adaptations help survival such as nocturnal behaviour, silvery coloured leaves of dune plants<br>• describing and listing adaptations of living things suited for particular Australian environments<br>• exploring general adaptations for particular environments such as adaptations that aid water conservation in deserts | | |
| **CHEMICAL SCIENCES** | | | |
| Solids, liquids and gases have different observable properties and behave in different ways | • recognising that substances exist in different states depending on the temperature<br>• observing that gases have mass and take up space, demonstrated by using balloons or bubbles<br>• exploring the way solids, liquids and gases change under different situations such as heating and cooling<br>• recognising that not all substances can be easily classified on the basis of their observable properties | | |
| **EARTH AND SPACE SCIENCES** | | | |
| The Earth is part of a system of planets orbiting around a star (the sun) | • identifying the planets of the solar system and comparing how long they take to orbit the sun<br>• modelling the relative size of and distance between Earth, other planets in the solar system and the sun<br>• recognising the role of the sun as a provider of energy for the Earth | | |
| **PHYSICAL SCIENCES** | | | |
| Light from a source forms shadows and can be absorbed, reflected and refracted | • drawing simple labelled ray diagrams to show the paths of light from a source to our eyes<br>• comparing shadows from point and extended light sources such as torches and fluorescent tubes<br>• classifying materials as transparent, opaque or translucent based on whether light passes through them or is absorbed<br>• recognising that the colour of an object depends on the properties of the object and the colour of the light source<br>• exploring the use of mirrors to demonstrate the reflection of light<br>• recognising the refraction of light at the surfaces of different transparent materials, such as when light travels from air to water or air to glass | | |

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 5.5** *A student progressing towards Level 6 may, for example:* | **Achievement Standard 6.0** |
|---|---|---|---|
| **BIOLOGICAL SCIENCES** | | Explain the dynamic interactions within and between systems in biological, chemical, earth and space, and physical science contexts.<br><br>*For example:*<br>• space exploration beyond the solar system<br>• volcanic and cyclonic activity over time<br>• comparison of natural and enhanced greenhouse effects and the gases involved in global warming<br>• rehabilitation of mine sites<br>• sustainability of energy and mineral sources<br>• construction and explanation of the operation of a burglar alarm | By the end of Level 6, students:<br><br>Analyse how structural and behavioural adaptations of living things enhance their survival.<br>(Level 5 Biological)<br><br>Compare the properties and behaviours of solids, liquids and gases.<br>(Level 5 Chemical)<br><br>Describe the key features of our solar system.<br>(Level 5 Earth/Space)<br><br>Explain everyday phenomena associated with the absorption, reflection, refraction and dispersion of light.<br>(Level 5 Physical)<br><br>Predict and describe the effect of environmental changes on individual living things.<br>(Level 6 Biological)<br><br>Compare observable changes to materials and classify these changes as reversible or irreversible.<br>(Level 6 Chemical)<br><br>Explain how natural events cause rapid change to Earth's surface.<br>(Level 6 Earth/Space)<br><br>Construct electrical circuits and distinguish between open and closed circuits.<br>(Level 6 Physical)<br><br>Compare different ways in which energy can be transformed from one form to another to generate electricity and evaluate their suitability for particular purposes.<br>(Level 6 Physical) |
| The growth and survival of living things are affected by the physical conditions of their environment | • investigating how changing the physical conditions for plants impacts on their growth and survival such as salt water, use of fertilizers and soil types<br>• observing the growth of fungi such as yeast and bread mould in different conditions<br>• researching organisms that live in extreme environments such as Antarctica or a desert<br>• considering the effects of physical conditions causing migration and hibernation | | |
| **CHEMICAL SCIENCES** | | | |
| Changes to materials can be reversible, such as melting, freezing, evaporating; or irreversible, such as burning and rusting | • describing what happens when materials are mixed<br>• investigating the solubility of common materials in water<br>• investigating the change in state caused by heating and cooling of a familiar substance<br>• investigating irreversible changes such as rusting, burning and cooking<br>• exploring how reversible changes can be used to recycle materials | | |
| **EARTH AND SPACE SCIENCES** | | | |
| Sudden geological changes or extreme weather conditions can affect Earth's surface | • investigating major geological events such as earthquakes, volcanic eruptions and tsunamis in Australia, the Asia region and throughout the world<br>• recognising that earthquakes can cause tsunamis<br>• describing how people measure significant geological events<br>• exploring ways that scientific understanding can assist in natural disaster management to minimise both long- and short-term effects<br>• considering the effect of drought on living and non-living aspects of the environment | | |
| **PHYSICAL SCIENCES** | | | |
| Electrical circuits provide a means of transferring and transforming electricity | • recognising the need for a complete circuit to allow the flow of electricity<br>• investigating different electrical conductors and insulators<br>• exploring the features of electrical devices such as switches and light globes | | |
| Energy from a variety of sources can be used to generate electricity | • investigating how moving air and water can turn turbines to generate electricity<br>• investigating the use of solar panels<br>• considering whether an energy source is sustainable | | |

*Levels and sub-strands in brackets, such as: (Level 6 Physical) indicate a reasonably clear correlation to Content Descriptions found in those locations.*

# QUICK GUIDES

## *Science as a Human Endeavour*

## *Foundation – Level 6*

*Each Quick Guide contains the content descriptions and elaborations for each level, with progression points and achievement standards broken down into smaller parts and aligned with the most relevant content descriptions.*

*Note that this breakdown of progression points and achievement standards and their alignment with content descriptions is the interpretation of Bellbridge Primary School, not necessarily intended by the VCAA or ACARA.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 0.5** | **Achievement Standard F.0** |
|---|---|---|---|
| **NATURE AND DEVELOPMENT OF SCIENCE** | | No progression point examples are provided at this level. | *[Refer to other strands for details of Foundation Achievement Standard]* |
| Science involves exploring and observing the world using the senses | • recognising that observation is an important part of exploring and investigating the things and places around us<br>• sharing observations with others and communicating their experiences<br>• exploring and observing using hearing, smell, touch, seeing and taste | | |

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 0.5** | **Progression Point 1.0** |
|---|---|---|---|
| **NATURE AND DEVELOPMENT OF SCIENCE** | | | At Level 1, the student is working towards the Level 2 standard. |
| Science involves asking questions about, and describing changes in, objects and events | • jointly constructing questions about the events and features of the local environment with teacher guidance<br>• recognising that descriptions of what we observe are used by people to help identify change | | |
| **USE AND INFLUENCE OF SCIENCE** | | | |
| People use science in their daily lives, including when caring for their environment and living things | • considering how science is used in activities such as cooking, fishing, transport, sport, medicine and caring for plants and animals<br>• considering that technologies used by Aboriginal and Torres Strait Islander people require an understanding of how materials can be used to make tools and weapons, musical instruments, clothing, cosmetics and artworks<br>• exploring how musical instruments can be used to produce different sounds<br>• comparing how different light sources are used in daily life<br>• identifying ways that science knowledge is used in the care of the local environment such as animal habitats, and suggesting changes to parks and gardens to better meet the needs of native animals | No progression point examples are provided at this level. | No progression point examples are provided at this level. |

** Content Descriptions remain the same from Level 1 to Level 2.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 1.5** | **Achievement Standard 2.0** |
|---|---|---|---|
| **NATURE AND DEVELOPMENT OF SCIENCE** | | No progression point examples are provided at this level. | By the end of Level 2, students:<br><br>Describe examples of how people use science in their daily lives. |
| Science involves asking questions about, and describing changes in, objects and events | • describing everyday events and experiences and changes in our environment using knowledge of science<br>• suggesting how everyday items work, using knowledge of forces or materials<br>• identifying and describing sources of water | | |
| **USE AND INFLUENCE OF SCIENCE** | | | |
| People use science in their daily lives, including when caring for their environment and living things | • monitoring information about the environment and Earth's resources, such as rainfall, water levels and temperature<br>• finding out about how Aboriginal and Torres Strait Islander people use science to meet their needs, including food supply<br>• exploring how different cultures have made inks, pigments and paints by mixing materials<br>• identifying the ways humans manage and protect resources, such as reducing waste and caring for water supplies<br>• recognising that many living things rely on resources that may be threatened, and that science understanding can contribute to the preservation of such resources | | |

** Content Descriptions remain the same from Level 1 to Level 2.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 2.5** *A student progressing towards Level 4 may, for example:* | **Progression Point 3.0** *A student progressing towards Level 4 may, for example:* |
|---|---|---|---|
| **NATURE AND DEVELOPMENT OF SCIENCE** | | | At Level 3, the student is working towards the Level 4 standard. |
| Science involves making predictions and describing patterns and relationships | • making predictions about change and events in our environment<br>• researching how knowledge of astronomy has been used by some Aboriginal and Torres Strait Islander people<br>• considering how posing questions helps us plan for the future | Identify science activities occurring in the local community.<br><br>*For example:*<br>• environmental monitoring<br>• plant propagation in greenhouses<br>• snow-making in ski resorts | Describe how science is used in peoples' occupations.<br><br>*For example:*<br>• gardeners, mechanics, chefs, chemists or doctors |
| **USE AND INFLUENCE OF SCIENCE** | | | |
| Science knowledge helps people to understand the effect of their actions | • considering how heating affects materials used in everyday life<br>• investigating how science helps people such as nurses, doctors, dentists, mechanics and gardeners<br>• considering how materials including solids and liquids affect the environment in different ways<br>• deciding what characteristics make a material a pollutant<br>• researching Aboriginal and Torres Strait Islander people's knowledge of the local natural environment, such as the characteristics of plants and animals | | |

** Content Descriptions remain the same from Level 3 to Level 4.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 3.5** *A student progressing towards Level 4 may, for example:* | **Achievement Standard 4.0** |
|---|---|---|---|
| **NATURE AND DEVELOPMENT OF SCIENCE** | | | By the end of Level 6, students: |
| Science involves making predictions and describing patterns and relationships | • exploring ways in which scientists gather evidence for their ideas and develop explanations<br>• considering how scientific practices such as sorting, classification and estimation are used by Aboriginal and Torres Strait Islander people in everyday life | | Describe how they use science investigations to identify patterns and respond to questions. |
| **USE AND INFLUENCE OF SCIENCE** | | Explain how science can be used to inform personal actions. | |
| Science knowledge helps people to understand the effect of their actions | • investigating how a range of people, such as clothing designers, builders or engineers use science to select appropriate materials for their work<br>• considering methods of waste management and how they can affect the environment<br>• exploring how science has contributed to a discussion about an issue such as loss of habitat for living things or how human activity has changed the local environment<br>• considering how to minimise the effects of erosion caused by human activity | *For example:*<br>• in resource management<br>• in the selection of objects for a particular purpose | Describe situations where science understanding can influence their own and others' actions. |

** Content Descriptions remain the same from Level 3 to Level 4.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 4.5** *A student progressing towards Level 6 may, for example:* | **Progression Point 5.0** *A student progressing towards Level 6 may, for example:* |
|---|---|---|---|
| **NATURE AND DEVELOPMENT OF SCIENCE** | | | At Level 5, the student is working towards the Level 6 standard. |
| Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena | • developing an understanding of the behaviour of light by making observations of its effects<br>• testing predictions relating to the behaviour of solids, liquids and gases by conducting observational experiments<br>• researching how scientists were able to develop ideas about the solar system through the gathering of evidence through space exploration | Explain how the work of a particular Australian scientist has benefited society.<br><br>*For example:*<br>• Graeme Clarke's bionic ear<br>• William Farrer's work on disease-resistant wheat strains | Explain how scientific collaboration has led to developing knowledge about, or solutions to, science-related problems.<br><br>*For example:*<br>• the investigation of the living conditions of extremophiles by ecologists<br>• the Human Genome Project<br>• mapping of global geological activity<br>• Antarctic research involving monitoring of plankton levels<br>• International Space Station collaborative research to solve problems in medicine and ecology, climate modelling, or determination of the effects of over-fishing |
| Important contributions to the advancement of science have been made by people from a range of cultures | • describing how scientists from a range of cultures have improved our understanding of the solar system, such as Copernicus, Khayyám and Galileo<br>• researching the different types of scientists who work in teams in space exploration, and Australia's involvement in space exploration<br>• learning how Aboriginal and Torres Strait Islander people used observation of the night sky to assist with navigation | | |
| **USE AND INFLUENCE OF SCIENCE** | | | |
| Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives | • investigating how the development of materials such as plastics and synthetic fabrics have led to the production of useful products<br>• describing how technologies developed to aid space exploration have changed the way people live, work and communicate<br>• exploring objects and devices that include parts that involve the reflection, absorption or refraction of light such as mirrors, sunglasses and prisms | | |
| Scientific knowledge is used to inform personal and community decisions | • considering how best to ensure growth of plants<br>• considering how decisions are made to grow particular plants and crops depending on environmental conditions<br>• comparing the benefits of using solid, liquid or gaseous fuels to heat a home<br>• describing the safety aspects of using gases | | |

** Content Descriptions remain the same from Level 5 to Level 6.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 5.5** *A student progressing towards Level 6 may, for example:* | **Achievement Standard 6.0** |
|---|---|---|---|
| **NATURE AND DEVELOPMENT OF SCIENCE** | | Compare different approaches to developing scientific knowledge or solving a scientific problem, including the role of scientific debate.<br><br>*For example:*<br>• development of alternative energy sources to generate electricity<br>• Copernicus' modelling of the solar system<br>• development of different techniques to perform particular tasks | By the end of Level 6, students:<br><br>Explain how scientific knowledge develops from many people's contributions and how scientific understandings, discoveries and inventions affect peoples' lives. |
| Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena | • investigating how knowledge about the effects of using the Earth's resources has changed over time<br>• describing how understanding of the causes and effects of major natural events has changed as new evidence has become available<br>• investigating the use of electricity, including predicting the effects of changes to electric circuits<br>• considering how gathering evidence helps scientists to predict the effect of major geological or climatic events | | |
| Important contributions to the advancement of science have been made by people from a range of cultures | • investigating how people from different cultures have used sustainable sources of energy, for example water and solar power<br>• exploring institutions and locations where contemporary Australian scientists conduct research on catastrophic natural events<br>• learning how Aboriginal and Torres Strait Islander knowledge, such as the medicinal and nutritional properties of Australian plants, is being used as part of the evidence base for scientific advances<br>• investigating the development of earthquake measurements from the Chinese invention of the seismograph in the second century | | |
| **USE AND INFLUENCE OF SCIENCE** | | | |
| Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives | • researching the scientific work involved in global disaster alerts and communication, such as cyclone, earthquake and tsunami alerts<br>• investigating how electrical energy is generated in Australia and around the world<br>• researching the use of methane generators in Indonesia<br>• considering how electricity and electrical appliances have changed the way some people live | | |
| Scientific knowledge is used to inform personal and community decisions | • considering how personal and community choices influence our use of sustainable sources of energy<br>• investigating how understanding of catastrophic natural events helps in planning for their early detection and minimising their impact<br>• recognising that science can inform choices about where people live and how they manage natural disasters<br>• considering how guidelines help to ensure the safe use of electrical devices<br>• discussing the use of electricity and the conservation of sources of energy | | |

** Content Descriptions remain the same from Level 5 to Level 6.*

# QUICK GUIDES

## *Science Inquiry Skills*

## *Foundation – Level 6*

*Each Quick Guide contains the content descriptions and elaborations for each level, with progression points and achievement standards broken down into smaller parts and aligned with the most relevant content descriptions.*

*Note that this breakdown of progression points and achievement standards and their alignment with content descriptions is the interpretation of Bellbridge Primary School, not necessarily intended by the VCAA or ACARA.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 0.5** | **Achievement Standard F.0** |
|---|---|---|---|
| **QUESTIONING AND PREDICTING** | | No progression point examples are provided at this level. | By the end of the Foundation level, students:<br><br>Share and record observations of familiar objects and events. |
| Respond to questions about familiar objects and events | • considering questions relating to the home and school and objects used in everyday life | | |
| **PLANNING AND CONDUCTING** | | | |
| Explore and make observations by using the senses | • using sight, hearing, touch, taste and smell so that students can gather information about the world around them | | |
| **PROCESSING AND ANALYSING DATA AND INFORMATION** | | | |
| Engage in discussions about observations and use methods such as drawing to represent ideas | • taking part in informal and guided discussions relating to students' observations<br>• using drawings to represent observations and ideas and discussing their representations with others | | |
| **COMMUNICATING** | | | |
| Share observations and ideas | • working in groups to describe what students have done and what they have found out<br>• communicating ideas through role play and drawing | | |

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point F.5** | **Progression Point 1.0** |
|---|---|---|---|
| **QUESTIONING AND PREDICTING** | | No progression point examples are provided at this level. | At Level 1, the student is working towards the Level 2 standard. |
| Respond to and pose questions, and make predictions about familiar objects and events | • thinking about "What will happen if……?" type questions about everyday objects and events<br>• using the senses to explore the local environment to pose interesting questions and making predictions about what will happen | | |
| **PLANNING AND CONDUCTING** | | | |
| Participate in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources | • manipulating objects and making observations of what happens<br>• researching ideas collaboratively using big books, web pages and ICT within the classroom<br>• exploring different ways of solving science questions through guided discussion<br>• sorting information and classifying objects based on easily observable characteristics with teacher guidance | | |
| Use informal measurements in the collection and recording of observations, with the assistance of digital technologies as appropriate | • using units that are familiar to students from home and school, such as cups (cooking), hand spans (length) and walking paces (distance) to make and record observations with teacher guidance | | No progression point examples are provided at this level. |
| **PROCESSING AND ANALYSING DATA AND INFORMATION** | | | |
| Use a range of methods to sort information, including drawings and provided tables | • using matching activities, including identifying similar things, odd-one-out and opposites<br>• exploring ways of recording and sharing information through class discussion<br>• jointly constructing simple column graphs and picture graphs to represent class investigations | | |
| Through discussion, compare observations with predictions | • discussing original predictions and, with guidance, comparing these to their observations | | |
| **EVALUATING** | | | |
| Compare observations with those of others | • discussing observations as a whole class to identify similarities and differences in their observations | | |
| **COMMUNICATING** | | | |
| Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play | • discussing or representing what was discovered in an investigation<br>• engaging in whole class or guided small group discussions to share observations and ideas | | |

** Content Descriptions remain the same from Level 1 to Level 2.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 1.5** | **Achievement Standard 2.0** |
|---|---|---|---|
| **QUESTIONING AND PREDICTING** | | No progression point examples are provided at this level. | By the end of Level 2, students:<br><br>Pose questions about everyday phenomena.<br><br>Predict outcomes of investigations.<br><br>Use informal measurements to make and compare observations.<br><br>Follow instructions to record, sort and represent their observations.<br><br>Communicate their ideas to others. |
| Respond to and pose questions, and make predictions about familiar objects and events | • using the senses to explore the local environment to pose interesting questions, make inferences and predictions<br>• thinking about 'What will happen if...?' type questions about everyday objects and events | | |
| **PLANNING AND CONDUCTING** | | | |
| Participate in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources | • manipulating objects and materials and making observations of the results<br>• researching with the use of simple information sources<br>• sorting objects and events based on easily identified characteristics | | |
| Use informal measurements in the collection and recording of observations, with the assistance of digital technologies as appropriate | • using units that are familiar to students from home and school, such as cups (cooking), hand spans (length) and walking paces (distance) to make and compare observations | | |
| **PROCESSING AND ANALYSING DATA AND INFORMATION** | | | |
| Use a range of methods to sort information, including drawings and provided tables | • constructing column and picture graphs with teacher guidance to record gathered information<br>• sorting information in provided tables or graphic organisers | | |
| Through discussion, compare observations with predictions | • comparing and discussing, with guidance, whether observations were expected | | |
| **EVALUATING** | | | |
| Compare observations with those of others | • discussing observations with other students to see similarities and differences in results | | |
| **COMMUNICATING** | | | |
| Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play | • presenting ideas to other students, both one-to-one and in small groups<br>• discussing with others what was discovered from an investigation | | |

** Content Descriptions remain the same from Level 1 to Level 2.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 2.5** *A student progressing towards Level 4 may, for example:* | **Progression Point 3.0** *A student progressing towards Level 4 may, for example:* |
|---|---|---|---|
| **QUESTIONING AND PREDICTING** | | | |
| With guidance, identify questions in familiar contexts that can be investigated scientifically and predict what might happen based on prior knowledge | • choosing questions to investigate from a list of possibilities<br>• jointly constructing questions that may form the basis for investigation<br>• listing shared experiences as a whole class and identifying possible investigations<br>• working in groups to discuss things that might happen during an investigation | Make predictions about possible or likely outcomes related to teacher-directed experiments involving measurement and the collection and recording of data.<br><br>Record their own and others' observations, including informal measurements, in provided tables using some science-specific language representations and conventions and account for any differences.<br><br>Explain what went well in investigations, where difficulties were encountered and whether their predictions were correct.<br><br>Identify simple patterns evident in collected data.<br><br>Identify safety procedures undertaken during experiments. | At Level 3, the student is working towards the Level 4 standard.<br><br>Describe possible inquiry methods and make predictions about possible or likely outcomes related to teacher-guided investigations.<br><br>Record observations, including some formal measurements, and the results of their investigations in provided tables and charts using some science-specific language, representations and conventions.<br><br>Compare their own results with their predictions and the predictions of others, and suggest possible reasons for differences.<br><br>Identify trends evident in collected data.<br><br>Describe the specific safety procedures followed during experiments. |
| **PLANNING AND CONDUCTING** | | | |
| Suggest ways to plan and conduct investigations to find answers to questions | • working with teacher guidance to plan investigations to test simple cause-and-effect relationships<br>• discussing as a whole class ways to investigate questions and evaluating which ways might be most successful | | |
| Safely use appropriate materials, tools or equipment to make and record observations, using formal measurements and digital technologies as appropriate | • recording measurements using familiar formal units and appropriate abbreviations, such as seconds (s), grams (g), centimetres (cm)<br>• using a variety of tools to make observations, such as digital cameras, thermometers, rulers and scales<br>• discussing safety rules for equipment and procedures | | |
| **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 | • using provided tables to organise materials and objects based on observable properties<br>• discussing how to graph data presented in a table<br>• identifying and discussing numerical and visual patterns in data collected from students' own investigations and from secondary sources | | |
| Compare results with predictions, suggesting possible reasons for findings | • discussing how well predictions matched results from an investigation and sharing ideas about what was learnt | | |
| **EVALUATING** | | | |
| Reflect on the investigation; including whether a test was fair or not | • describing experiences of carrying out investigations to the teacher, small group or whole class<br>• discussing as a whole class the idea of fairness in testing | | |
| **COMMUNICATING** | | | |
| Represent and communicate ideas and findings in a variety of ways such as diagrams, physical representations and simple reports | • communicating with other students carrying out similar investigations to share experiences and improve investigation skill<br>• exploring different ways to show processes and relationships through diagrams, models and role play<br>• using simple explanations and arguments, reports or graphical representations to communicate ideas to other students | | |

** Content Descriptions remain the same from Level 3 to Level 4.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 3.5** *A student progressing towards Level 4 may, for example:* | **Achievement Standard 4.0** |
|---|---|---|---|
| **QUESTIONING AND PREDICTING** | | Generate questions and make predictions about possible or likely outcomes related to familiar situations and phenomena, and collaboratively plan, design and conduct investigations.<br><br>Record observations, including formal measurements, and the results of their investigations in provided tables and charts using mostly science-specific language, representations and conventions, and identify where improvements to their investigation methods could be made.<br><br>Identify some variables and characteristics of a fair test in experiments, and evaluate the fairness of their own methods.<br><br>Explain the specific safety procedures followed during experiments. | By the end of Level 4, students:<br><br>Follow instructions to identify questions that they can investigate about familiar contexts and predict likely outcomes from these investigations.<br><br>Discuss ways to conduct investigations and suggest why their methods were fair or not.<br><br>Safely use equipment to make and record formal measurements and observations.<br><br>Use provided tables and simple column graphs to organise and identify patterns in data.<br><br>Suggest explanations for observations and compare their findings with their predictions.<br><br>Use diagrams and complete simple reports to communicate their methods and findings. |
| With guidance, identify questions in familiar contexts that can be investigated scientifically and predict what might happen based on prior knowledge | • considering familiar situations in order to think about possible areas for investigation<br>• reflecting on familiar situations to make predictions with teacher guidance<br>• choosing questions to investigate from a list of possibilities | | |
| **PLANNING AND CONDUCTING** | | | |
| Suggest ways to plan and conduct investigations to find answers to questions | • exploring different ways to conduct investigations and connecting these to the types of questions asked with teacher guidance<br>• working in groups, with teacher guidance, to plan ways to investigate questions | | |
| Safely use appropriate materials, tools or equipment to make and record observations, using formal measurements and digital technologies as appropriate | • discussing and recording safety rules for equipment as a whole class<br>• making and recording measurements using familiar formal units and appropriate abbreviations, such as seconds (s), grams (g), centimetres (cm) and millilitres (mL) | | |
| **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 | • identifying and discussing numerical and visual patterns in data collected from students' investigations and from other sources<br>• using provided graphic organisers to sort and represent information<br>• discussing with teacher guidance which graphic organisers will be most useful in sorting or organising data arising from investigations | | |
| Compare results with predictions, suggesting possible reasons for findings | • discussing how well predictions matched results from an investigation and proposing reasons for findings<br>• comparing, in small groups, proposed reasons for findings and explaining their reasoning | | |
| **EVALUATING** | | | |
| Reflect on the investigation; including whether a test was fair or not | • reflecting on investigations, identifying what went well, what was difficult or didn't work so well, and how well the investigation helped answer the question<br>• discussing which aspects of the investigation helped improve fairness, and any aspects that weren't fair | | |
| **COMMUNICATING** | | | |
| Represent and communicate ideas and findings in a variety of ways such as diagrams, physical representations and simple reports | • communicating with other students carrying out similar investigations to share experiences and improve investigation skills<br>• using simple explanations and arguments, reports or graphical representations to communicate ideas to other students | | |

** Content Descriptions remain the same from Level 3 to Level 4.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 4.5** *A student progressing towards Level 6 may, for example:* | **Progression Point 5.0** *A student progressing towards Level 6 may, for example:* |
|---|---|---|---|
| **QUESTIONING AND PREDICTING** | | | At Level 5, the student is working towards the Level 6 standard. |
| With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be | • exploring the range of questions that can be asked about a problem or phenomena and with guidance, identifying those questions that could be investigated<br>• applying experience from similar situations in the past to predict what might happen in a new situation | | |
| **PLANNING AND CONDUCTING** | | Plan and report on investigations involving given variables, including statement of purpose, lists of materials and equipment, and labelled diagrams or flowcharts that explain procedures.<br><br>Collect data systematically.<br><br>Apply safe and ethical procedures when performing experiments, including responsible handling of standard equipment and materials.<br><br>Work in a group to design and construct a simple model or device, with teacher guidance, that illustrates a scientific concept related to a system. | Design and report on investigations, including statement of purpose, identification of variables, labelled diagrams, flowcharts and symbols that explain procedures, and justification for equipment used.<br><br>Collect data systematically and begin to draw reasonable conclusions from the data.<br><br>Apply safe and ethical procedures when performing experiments, including responsible handling of specialised equipment and materials.<br><br>Work in a group to design and construct a simple model, including annotations, that illustrates a scientific concept or identifies the components of a system. |
| With guidance, plan appropriate investigation methods to answer questions or solve problems | • experiencing a range of ways of investigating questions, including experimental testing, internet research, field observations and exploring simulations<br>• discussing the advantages of certain types of investigation for answering certain types of questions<br>• considering different ways to approach problem solving, including researching, using trial and error, experimental testing and creating models | | |
| Decide which variable should be changed and measured in fair tests and accurately observe, measure and record data, using digital technologies as appropriate | • discussing in groups how investigations can be made as fair as possible<br>• using tools to accurately measure objects and events in investigation and exploring which tools provide the most accurate measurements<br>• using familiar units such as grams, seconds and meters and developing the use of standard multipliers such as kilometres and millimetres<br>• recording data in tables and diagrams or electronically as digital images and spreadsheets | | |
| Use equipment and materials safely, identifying potential risks | • explaining rules for safe processes and use of equipment | | |
| **PROCESSING AND ANALYSING DATA AND INFORMATION** | | | |
| 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 | • constructing tables, graphs and other graphic organisers to show trends in data<br>• identifying patterns in data and developing explanations that fit these patterns<br>• identifying similarities and differences in qualitative data in order to group items or materials | | |
| Compare data with predictions and use as evidence in developing explanations | • sharing ideas as to whether observations match predictions, and discussing possible reasons for predictions being incorrect | | |
| **EVALUATING** | | | |
| Suggest improvements to the methods used to investigate a question or solve a problem | • working collaboratively to identify where methods could be improved, including where testing was not fair and practices could be improved | | |
| **COMMUNICATING** | | | |
| Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts | • discussing how models represent scientific ideas and constructing physical models to demonstrate an aspect of scientific understanding<br>• constructing multi-modal texts to communicate science ideas<br>• using labelled diagrams, including cross-sectional representations, to communicate ideas | | |

** Content Descriptions remain the same from Level 5 to Level 6.*

| **Content Descriptions** *(what to teach/learn)* | **Elaborations** *(examples to illustrate the content)* | **Progression Point 5.5** *A student progressing towards Level 6 may, for example:* | **Achievement Standard 6.0** |
|---|---|---|---|
| **QUESTIONING AND PREDICTING** | | Design and report on investigations, including statement and justification of purpose, labelled diagrams, description of how variables will be changed, flowcharts and symbols that explain procedures, and justification for the type of data collected and equipment used.<br><br>Collect data systematically and analyse data to identify some relationships between variables and to draw reasonable conclusions.<br><br>Apply safe and ethical procedures when performing experiments, including risk management plans for handling of equipment and materials.<br><br>Work in a group to design and construct a model or simple device, including annotations, that illustrates the relationships between components within a system. | By the end of Level 6, students:<br><br>Follow procedures to develop questions that they can investigate.<br><br>Design investigations into simple cause-and-effect relationships.<br><br>When planning experimental methods, identify variables to be changed and measured in fair tests.<br><br>Make predictions based on general rules or previous experiences.<br><br>Identify and manage potential safety risks.<br><br>Make and record accurate observations as tables, diagrams or descriptions.<br><br>Organise data into tables and graphs to identify and analyse patterns and relationships.<br><br>Suggest where improvements to their experimental methods or research could improve the quality of their data.<br><br>Refer to data when they report findings.<br><br>Communicate their ideas, methods and findings using a range of text types. |
| With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be | • refining questions to enable scientific investigation<br>• asking questions to understand the scope or nature of a problem<br>• applying experience from previous investigations to predict the outcomes of investigations in new contexts | | |
| **PLANNING AND CONDUCTING** | | | |
| With guidance, plan appropriate investigation methods to answer questions or solve problems | • following a procedure to design an experimental or field investigation<br>• discussing methods chosen with other students, and refining methods accordingly<br>• considering which investigation methods are most suited to answer a particular question or solve a problem | | |
| Decide which variable should be changed and measured in fair tests and accurately observe, measure and record data, using digital technologies as appropriate | • using familiar units such as grams, seconds and metres and developing the use of standard multipliers such as kilometres and millimetres<br>• using the idea of an independent variable (note: this terminology does not need to be used at this stage) as something that is being investigated by changing it and measuring the effect of this change<br>• using digital technologies to make accurate measurements and to record data | | |
| Use equipment and materials safely, identifying potential risks | • discussing possible hazards involved in conducting investigations, and how these risks can be reduced | | |
| **PROCESSING AND ANALYSING DATA AND INFORMATION** | | | |
| 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 | • exploring how different representations can be used to show different aspects of relationships, processes or trends<br>• using digital technologies to construct representations, including dynamic representations | | |
| Compare data with predictions and use as evidence in developing explanations | • sharing ideas as to whether observations match predictions, and discussing possible reasons for predictions being incorrect<br>• discussing the difference between data and evidence<br>• referring to evidence when explaining the outcomes of an investigation | | |
| **EVALUATING** | | | |
| Suggest improvements to the methods used to investigate a question or solve a problem | • discussing improvements to the methods used, and how these methods would improve the quality of the data obtained | | |
| **COMMUNICATING** | | | |
| Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts | • discussing the best way to communicate science ideas and what should be considered when planning a text<br>• using a variety of communication modes, such as reports, explanations, arguments, debates and procedural accounts, to communicate science ideas<br>• using labelled diagrams, including cross-sectional representations, to communicate ideas and processes within multi-modal texts | | |

** Content Descriptions remain the same from Level 5 to Level 6.*