

AusVELS: Science^{AC} - Science Inquiry Skills - Strands with Sub-strands with Elaborations

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

BOLDED TEXT DENOTES PROGRESSION



There are no Cross-Curriculum links in the Science Inquiry Skills strand

The Overarching Ideas

There are a number of overarching ideas that represent key aspects of a scientific view of the world and bridge knowledge and understanding across the disciplines of science.

In the Australian Curriculum: Science, six overarching ideas support the coherence and developmental sequence of science knowledge within and across levels. The overarching ideas frame the development of concepts in the Science Understanding strand, support key aspects of the Science Inquiry Skills strand and contribute to developing students' appreciation of the nature of science.

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

Patterns, Order and Organisation Form and Function Stability and Change Scale and Measurement Matter and Energy Systems

The Science Inquiry Skills and Science as a Human Endeavour strands are described across a two-level band. In their planning, schools and teachers refer to the expectations outlined in the Achievement Standard and also to the content of the Science Understanding strand for the relevant level to ensure that these two strands are addressed over the two-level period. 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.

SUB-STRANDS

Year Level Indicators	Questioning and predicting		Planning and Conducting		Processing and Analysing Data and Information		Evaluating		Communicating	
	Content Descriptor	Elaborations	Content Descriptor	Elaborations	Content Descriptor	Elaborations	Content Descriptor	Elaborations	Content Descriptor	Elaborations
Foundation	Respond to questions about familiar objects and events (ACSIS014)	* Considering questions relating to the home and school and objects used in everyday life	Explore and make observations by using the senses (ACSIS011)	* Using sight, hearing, touch, taste and smell so that students can gather information about the world around them	Engage in discussions about observations and use methods such as drawing to represent ideas (ACSIS233)	* Taking part in informal and guided discussions relating to students' observations * Using drawings to represent observations and ideas and discussing their representations with others	N/A	N/A	Share observations and ideas (ACSIS012)	* Working in groups to describe what students have done and what they have found out * Communicating ideas through role play and drawing
Foundation Achievement Standard NOTE: The Standards are not divided into Strands or Sub-strands.	By the end of the Foundation level, students describe the properties and behaviour of familiar objects. They suggest how the environment affects them and other living things. Students share and record observations of familiar objects and events.									

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Level 1	Respond to and pose questions, and make predictions about familiar objects and events (AC SIS024)	<ul style="list-style-type: none"> * Thinking about "What will happen if.....?" type questions about everyday objects and events * Using the senses to explore the local environment to pose interesting questions and making predictions about what will happen 	Participate in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources (AC SIS025)	<ul style="list-style-type: none"> * Manipulating objects and making observations of what happens * Researching ideas collaboratively using big books, web pages and ICT within the classroom * Exploring different ways of solving science questions through guided discussion * Sorting information and classifying objects based on easily observable characteristics with teacher guidance 	Use a range of methods to sort information, including drawings and provided tables (AC SIS027)	<ul style="list-style-type: none"> * Using matching activities, including identifying similar things, odd-one-out and opposites * Exploring ways of recording and sharing information through class discussion * Jointly constructing simple column graphs and picture graphs to represent class investigations 	Compare observations with those of others (AC SIS213)	<ul style="list-style-type: none"> * Discussing observations as a whole class to identify similarities and differences in their observations 	Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play (AC SIS029)	<ul style="list-style-type: none"> * Discussing or representing what was discovered in an investigation * Engaging in whole class or guided small group discussions to share observations and ideas
Level 1 Achievement Standard	NOTE: The Standards are not divided into Strands or Sub-strands.									
Level 2	Respond to and pose questions, and make predictions about familiar objects and events (AC SIS037)	<ul style="list-style-type: none"> * Using the senses to explore the local environment to pose interesting questions, make inferences and predictions * Thinking about "What will happen if...?" type questions about everyday objects and events 	Participate in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources (AC SIS038)	<ul style="list-style-type: none"> * Manipulating objects and materials and making observations of the results * Researching with the use of simple information sources * Sorting objects and events based on easily identified characteristics 	Use a range of methods to sort information, including drawings and provided tables (AC SIS040)	<ul style="list-style-type: none"> * Constructing column and picture graphs with teacher guidance to record gathered information * Sorting information in provided tables or graphic organisers 	Compare observations with those of others (AC SIS041)	<ul style="list-style-type: none"> * Discussing observations with other students to see similarities and differences in results 	Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play (AC SIS042)	<ul style="list-style-type: none"> * Presenting ideas to other students, both one-to-one and in small groups * Discussing with others what was discovered from an investigation
Level 2 Achievement Standard	NOTE: The Standards are not divided into Strands or Sub-strands.									
Students describe the effects of interacting with materials and objects. They identify and describe a range of habitats and the different uses of materials and resources. They describe changes to objects, materials, living things and things in their local environment. They describe examples of how people use science in their daily lives. Students pose questions about everyday phenomena and predict outcomes of investigations. They use informal measurements to make and compare observations. They follow instructions to record, sort and represent their observations and communicate their ideas to others.										

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<p>Level 3</p>	<p>With guidance, identify questions in familiar contexts that can be investigated scientifically and predict what might happen based on prior knowledge</p> <p>(ACIS053)</p>	<ul style="list-style-type: none"> * Choosing questions to investigate from a list of possibilities * Jointly constructing questions that may form the basis for investigation * Listing shared experiences as a whole class and identifying possible investigations * Working in groups to discuss things that might happen during an investigation 	<p>Suggest ways to plan and conduct investigations to find answers to questions</p> <p>(ACIS054)</p>	<ul style="list-style-type: none"> * Working with teacher guidance to plan investigations to test simple cause-and-effect relationships * Discussing as a whole class ways to investigate questions and evaluating which ways might be most successful 	<p>Use a range of methods including tables and simple column graphs to represent data and to identify patterns and trends</p> <p>(ACIS057)</p>	<ul style="list-style-type: none"> * Using provided tables to organise materials and objects based on observable properties * Discussing how to graph data presented in a table * Identifying and discussing numerical and visual patterns in data collected from students' own investigations and from secondary sources 	<p>Reflect on the investigation, including whether a test was fair or not</p> <p>(ACIS058)</p>	<ul style="list-style-type: none"> * Describing experiences of carrying out investigations to the teacher, small group or whole class * Discussing as a whole class the idea of fairness in testing 	<p>Represent and communicate ideas and findings in a variety of ways such as diagrams, physical representations and simple reports</p> <p>(ACIS060)</p>	<ul style="list-style-type: none"> * Communicating with other students carrying out similar investigations to share experiences and improve investigation skill * Exploring different ways to show processes and relationships through diagrams, models and role play * Using simple explanations and arguments, reports or graphical representations to communicate ideas to other students
			<p>Safely use appropriate materials, tools or equipment to make and record observations, using formal measurements and digital technologies as appropriate</p> <p>(ACIS055)</p>	<ul style="list-style-type: none"> * Recording measurements using familiar formal units and appropriate abbreviations, such as seconds (s), grams (g), centimetres (cm) * Using a variety of tools to make observations, such as digital cameras, thermometers, rulers and scales * Discussing safety rules for equipment and procedures 	<p>Compare results with predictions, suggesting possible reasons for findings</p> <p>(ACIS215)</p>	<ul style="list-style-type: none"> * Discussing how well predictions matched results from an investigation and sharing ideas about what was learnt 				
<p>Level 3 Achievement Standard</p> <p>NOTE: The Standards are not divided into Strands or Sub-strands.</p>	<p>At Level 3, the student is working towards the Level 4 standard.</p>									
<p>Level 4</p>	<p>With guidance, identify questions in familiar contexts that can be investigated scientifically and predict what might happen based on prior knowledge</p> <p>(ACIS064)</p>	<ul style="list-style-type: none"> * Considering familiar situations in order to think about possible areas for investigation * Reflecting on familiar situations to make predictions with teacher guidance * Choosing questions to investigate from a list of possibilities 	<p>Suggest ways to plan and conduct investigations to find answers to questions</p> <p>(ACIS065)</p>	<ul style="list-style-type: none"> * Exploring different ways to conduct investigations and connecting these to the types of questions asked with teacher guidance * Working in groups, with teacher guidance, to plan ways to investigate questions 	<p>Use a range of methods including tables and simple column graphs to represent data and to identify patterns and trends</p> <p>(ACIS068)</p>	<ul style="list-style-type: none"> * Identifying and discussing numerical and visual patterns in data collected from students' investigations and from other sources * Using provided graphic organisers to sort and represent information * Discussing with teacher guidance which graphic organisers will be most useful in sorting or organising data arising from investigations 	<p>Reflect on the investigation: including whether a test was fair or not</p> <p>(ACIS069)</p>	<ul style="list-style-type: none"> * 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 * Discussing which aspects of the investigation helped improve fairness, and any aspects that weren't fair 	<p>Represent and communicate ideas and findings in a variety of ways such as diagrams, physical representations and simple reports</p> <p>(ACIS071)</p>	<ul style="list-style-type: none"> * Communicating with other students carrying out similar investigations to share experiences and improve investigation skills * Using simple explanations and arguments, reports or graphical representations to communicate ideas to other students
			<p>Safely use appropriate materials, tools or equipment to make and record observations, using formal measurements and digital technologies as appropriate</p> <p>(ACIS066)</p>	<ul style="list-style-type: none"> * Discussing and recording safety rules for equipment as a whole class * Making and recording measurements using familiar formal units and appropriate abbreviations, such as seconds (s), grams (g), centimetres (cm) and millilitres (mL) 	<p>Compare results with predictions, suggesting possible reasons for findings</p> <p>(ACIS216)</p>	<ul style="list-style-type: none"> * Discussing how well predictions matched results from an investigation and proposing reasons for findings * Comparing, in small groups, proposed reasons for findings and explaining their reasoning 				
<p>Level 4 Achievement Standard</p> <p>NOTE: The Standards are not divided into Strands or Sub-strands.</p>	<p>Students explain the effects of Earth's rotation on its axis. They distinguish between temperature and heat and use examples to illustrate how heat is produced and transferred. They explain how heat is involved in changes of state between solid and liquid. They link the observable properties of materials to their use. They discuss how natural and human processes cause changes to Earth's surface. They use contact and non-contact forces to describe interactions between objects. They describe structural features common to living things and describe relationships that assist the survival of living things. They explain how the key stages in the life cycle of a plant or animal relate to growth and species survival. They describe how they use science investigations to identify patterns and respond to questions. They describe situations where science understanding can influence their own and others' actions.</p> <p>Students follow instructions to identify questions that they can investigate about familiar contexts and predict likely outcomes from these investigations. They discuss ways to conduct investigations and suggest why their methods were fair or not. They safely use equipment to make and record formal measurements and observations. They use provided tables and simple column graphs to organise and identify patterns in data. Students suggest explanations for observations and compare their findings with their predictions. They use diagrams and complete simple reports to communicate their methods and findings.</p>									

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Level 5	With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be (AC SIS231)	Exploring the range of questions that can be asked about a problem or phenomena and with guidance, identifying those questions that could be investigated applying experience from similar situations in the past to predict what might happen in a new situation	With guidance, plan appropriate investigation methods to answer questions or solve problems (AC SIS086)	<ul style="list-style-type: none"> * Experiencing a range of ways of investigating questions, including experimental testing, internet research, field observations and exploring simulations * Discussing the advantages of certain types of investigation for answering certain types of questions * Considering different ways to approach problem solving, including researching, using trial and error, experimental testing and creating models 	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 (AC SIS090)	<ul style="list-style-type: none"> * Constructing tables, graphs and other graphic organisers to show trends in data * Identifying patterns in data and developing explanations that fit these patterns * Identifying similarities and differences in qualitative data in order to group items or materials 	Suggest improvements to the methods used to investigate a question or solve a problem (AC SIS091)	Working collaboratively to identify where methods could be improved, including where testing was not fair and practices could be improved	Communicate ideas, explanations and processes in a variety of ways, including multimodal texts (AC SIS093)	<ul style="list-style-type: none"> * Discussing how models represent scientific ideas and constructing physical models to demonstrate an aspect of scientific understanding * Constructing multimodal texts to communicate science ideas * Using labelled diagrams, including cross-sectional representations, to communicate ideas
			Decide which variable should be changed and measured in fair tests and accurately observe, measure and record data, using digital technologies as appropriate (AC SIS087)	<ul style="list-style-type: none"> * Discussing in groups how investigations can be made as fair as possible * Using tools to accurately measure objects and events in investigation and exploring which tools provide the most accurate measurements * Using familiar units such as grams, seconds and metres and developing the use of standard multipliers such as kilometres and millimetres * Recording data in tables and diagrams or electronically as digital images and spreadsheets 						
			Use equipment and materials safely, identifying potential risks (AC SIS088)	<ul style="list-style-type: none"> * Explaining rules for safe processes and use of equipment 						
Level 5 Achievement Standard NOTE: The Standards are not divided into Strands or Sub-strands.	At Level 5, the student is working towards the Level 6 standard.									
Level 6	With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be (AC SIS232)	<ul style="list-style-type: none"> * Refining questions to enable scientific investigation * Asking questions to understand the scope or nature of a problem * Applying experience from previous investigations to predict the outcomes of investigations in new contexts 	With guidance, plan appropriate investigation methods to answer questions or solve problems (AC SIS103)	<ul style="list-style-type: none"> * Following a procedure to design an experimental or field investigation * Discussing methods chosen with other students, and refining methods accordingly * Considering which investigation methods are most suited to answer a particular question or solve a problem 	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 (AC SIS107)	<ul style="list-style-type: none"> * Exploring how different representations can be used to show different aspects of relationships, processes or trends * Using digital technologies to construct representations, including dynamic representations 	Suggest improvements to the methods used to investigate a question or solve a problem (AC SIS108)	Discussing improvements to the methods used, and how these methods would improve the quality of the data obtained	Communicate ideas, explanations and processes in a variety of ways, including multimodal texts (AC SIS110)	<ul style="list-style-type: none"> * Discussing the best way to communicate science ideas and what should be considered when planning a text * Using a variety of communication modes, such as reports, explanations, arguments, debates and procedural accounts, to communicate science ideas * Using labelled diagrams, including cross-sectional representations, to communicate ideas and processes within multimodal texts
			Decide which variable should be changed and measured in fair tests and accurately observe, measure and record data, using digital technologies as appropriate (AC SIS104)	<ul style="list-style-type: none"> * Using familiar units such as grams, seconds and metres and developing the use of standard multipliers such as kilometres and millimetres * 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 * Using digital technologies to make accurate measurements and to 						
			Use equipment and materials safely, identifying potential risks (AC SIS105)	<ul style="list-style-type: none"> * Discussing possible hazards involved in conducting investigations, and how these risks can be reduced 						

<p>Level 6 Achievement Standard</p> <p>NOTE: The Standards are not divided into Strands or Sub-strands.</p>	<p>Students compare the properties and behaviours of solids, liquids and gases.</p> <p>They compare observable changes to materials and classify these changes as reversible or irreversible.</p> <p>They explain everyday phenomena associated with the absorption, reflection, refraction and dispersion of light.</p> <p>They compare different ways in which energy can be transformed from one form to another to generate electricity and evaluate their suitability for particular purposes.</p> <p>They construct electrical circuits and distinguish between open and closed circuits.</p> <p>They explain how natural events cause rapid change to Earth's surface and describe the key features of our solar system.</p> <p>They analyse how structural and behavioural adaptations of living things enhance their survival, and predict and describe the effect of environmental changes on individual living things.</p> <p>Students explain how scientific knowledge develops from many people's contributions and how scientific understandings, discoveries and inventions affect peoples' lives.</p> <p>Students follow procedures to develop questions that they can investigate and design investigations into simple cause and effect relationships.</p> <p>When planning experimental methods, they identify variables to be changed and measured in fair tests.</p> <p>They make predictions based on general rules or previous experiences.</p> <p>They identify and manage potential safety risks.</p> <p>They make and record accurate observations as tables, diagrams or descriptions.</p> <p>They organise data into tables and graphs to identify and analyse patterns and relationships.</p> <p>They suggest where improvements to their experimental methods or research could improve the quality of their data.</p> <p>They refer to data when they report findings and communicate their ideas, methods and findings using a range of text types.</p>
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Level 7	Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge (AC SIS124)	<ul style="list-style-type: none"> Working collaboratively to identify a problem to investigate Recognising that the solution of some questions and problems requires consideration of social, cultural, economic or moral aspects rather than or as well as scientific investigation Using information and knowledge from previous investigations to predict the expected results from an investigation 	Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (AC SIS125)	<ul style="list-style-type: none"> Working collaboratively to decide how to approach an investigation Learning and applying specific skills and rules relating to the safe use of scientific equipment Identifying whether the use of their own observations and experiments or the use of other research materials is appropriate for their investigation Developing strategies and techniques for effective research using secondary sources, including use of the internet 	Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships, including using digital technologies as appropriate (AC SIS129)	<ul style="list-style-type: none"> Understanding different types of graphical and physical representation and considering their advantages and disadvantages Using spreadsheets to aid the presentation and simple analysis of data Describing the trends shown in collected data 	Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method (AC SIS131)	<ul style="list-style-type: none"> Discussing investigation methods with others to share ideas about the quality of the inquiry process Identifying and considering indicators of the quality of the data when analysing results Suggesting improvements to inquiry methods based on experience 	Communicate ideas, findings and scientific language using representations using digital technologies as appropriate (AC SIS133)	<ul style="list-style-type: none"> Presenting the outcomes of research using effective forms of representation of data or ideas and scientific language that is appropriate for the target audience Using digital technologies to access information and to communicate and collaborate with others on and off site
			In fair tests, measure and control variables, and select equipment to collect data with accuracy appropriate to the task (AC SIS126)	<ul style="list-style-type: none"> Recognising the differences between controlled, dependent and independent variables Using a digital camera to record observations and compare images using information technologies Using specialised equipment to increase the accuracy of measurement within an investigation 	Summarise data, from students' own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions (AC SIS130)	<ul style="list-style-type: none"> Using diagrammatic representations to convey abstract ideas and to simplify complex situations Comparing and contrasting data from a number of sources in order to create a summary of collected data Identifying data which provides evidence to support or negate the hypothesis under investigation Referring to relevant evidence when presenting conclusions drawn from an investigation 	Use scientific knowledge and findings from investigations to evaluate claims (AC SIS132)	<ul style="list-style-type: none"> Using the evidence provided by scientific investigations to evaluate the claims or conclusions of their peers 		
Level 7 Achievement Standard	NOTE: The Standards are not divided into Strands or Sub-strands.									
	At Level 7, the student is working towards the Level 8 standard.									