Year 4 standard elaborations — Australian Curriculum: Science

Purpose

The standard elaborations (SEs) provide additional clarity when using the Australian Curriculum achievement standard to make judgments on a five-point scale. They can be used as a tool for:

- making consistent and comparable judgments about the evidence of learning in a folio of student work
- developing task-specific standards for individual assessment tasks.

Structure

The SEs are developed using the **Australian Curriculum achievement standard**. The achievement standard for Science describes the learning expected of students at each year level. Teachers use the achievement standard during and at the end of a period of teaching to make on-balance judgments about the quality of learning students demonstrate.

In Queensland the achievement standard represents the **C standard** — a sound level of knowledge and understanding of the content, and application of skills. The SEs are presented in a matrix. The discernible differences or degrees of quality associated with the five-point scale are highlighted to identify the characteristics of student work on which teacher judgments are made. Terms are described in the Notes section following the matrix.

Year 4 Australian Curriculum: Science achievement standard
By the end of Year 4, students apply the observable properties of materials to explain how objects and materials can be used. They describe how contact and non-contact forces affect interactions between objects. They discuss how natural processes and human activity cause changes to Earth's surface. They describe relationships that assist the survival of living things and sequence key stages in the life cycle of a plant or animal. They identify when science is used to understand the effect of their actions. Students follow instructions to identify investigable questions about familiar contexts and make predictions based on prior knowledge. They describe ways to conduct investigations and safely use equipment to make and record observations with accuracy. They use provided tables and column graphs to organise data and identify patterns. Students suggest explanations for observations and compare their findings with their predictions. They suggest reasons why a test was fair or not. They use formal and informal ways to communicate their observations and findings.
Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), *Australian Curriculum Version 8 Science for Foundation–10*, www.australiancurriculum.edu.au/Science/Curriculum/F-10

Year 4 Science standard elaborations

		A	B	C	D	E
		The folio of student work has the following characteristics:				
Science understanding	**Chemical sciences**	application of the observable properties of materials to provide a reasoned explanation of how objects and materials can be used	application of the observable properties of materials to provide an informed explanation of how objects and materials can be used	application of the observable properties of materials to explain how objects and materials can be used	application of the observable properties of materials to describe how objects and materials can be used	statements about the use of materials
	Physical sciences	thorough description of how contact and non-contact forces affect interactions between objects	informed description of how contact and non-contact forces affect interactions between objects	description of how contact and non-contact forces affect interactions between objects	identification of contact and non-contact forces between objects	statements about forces
	Earth and space sciences	reasoned discussion of how natural processes and human activity cause changes to Earth's surface	informed discussion of how natural processes and human activity cause changes to Earth's surface	discussion of how natural processes and human activity cause changes to Earth's surface	identification of natural processes and human activity that cause changes to Earth's surface	statements about changes to the Earth's surface
	Biological sciences	• thorough description of how relationships assist the survival of living things • sequencing and thorough description of key stages in the life cycle of a plant or animal	• informed description of relationships that assist the survival of living things • sequencing and description of key stages in the life cycle of a plant or animal	• description of relationships that assist the survival of living things • sequencing of key stages in the life cycle of a plant or animal	• identification of relationships between living things • partial sequencing of the life cycle of a plant or animal	• statements about the survival of living things • fragmented sequencing of life cycle

		A	B	C	D	E
		The folio of student work has the following characteristics:				
Science as a human endeavour	**Use and influence of science**	identification and explanation of when and how science is used to understand the effect of their actions	identification and description of when science is used to understand the effect of their actions	identification of when science is used to understand the effect of their actions	identification of situations where science is used	statements about the use of science
Science inquiry skills	**Questioning and predicting**	following of instructions to identify investigable questions about familiar contexts and make reasoned predictions based on prior knowledge	following of instructions to identify investigable questions about familiar contexts and make plausible predictions based on prior knowledge	following of instructions to identify investigable questions about familiar contexts and making of predictions based on prior knowledge	guided identification of investigable questions about familiar contexts and guided making of predictions based on prior knowledge	directed identification of investigable questions about familiar contexts and directed making of predictions based on prior knowledge
	Planning and conducting	• description of ways to plan and conduct fair investigations • safe use of appropriate equipment to make and record reliable observations with accuracy	• description of ways to plan and conduct investigations that take into consideration elements of fair testing • safe use of appropriate equipment to make and record observations with accuracy	• description of ways to conduct investigations • safe use of equipment to make and record observations with accuracy	• partial description of ways to conduct investigations • safe use equipment to make and partially record observations	• statements about ways to conduct investigations • safe use of equipment

		A	B	C	D	E
		The folio of student work has the following characteristics:				
Science inquiry skills	**Processing and analysing data and information**	• following of conventions to construct tables and graphs to systematically organise data and identify patterns in the data • reasoned explanations for observations explained by patterns in data and comparison of findings with predictions	• following of conventions to construct tables and graphs to organise data and identify patterns in the data • explanations for observations informed by description of patterns in data and comparison of findings with predictions	• use of provided tables and column graphs to organise data and identify patterns • suggestion of explanations for observations and comparison of findings with predictions	• use of provided tables and graphs to partially record data and identify patterns • comparison of findings with predictions	• partial recording of data • statements about patterns
	Evaluating	suggestion of plausible reasons why tests were fair or not and how the investigation could be improved	suggestion of plausible reasons why tests were fair or not	suggestion of reasons why tests were fair or not	identification of whether tests were fair or not	statements about fair testing
	Communicating	use of relevant scientific terminology and formal and informal ways to coherently communicate observations and findings	use of relevant scientific terminology and formal and informal ways to communicate observations and findings	use of formal and informal ways to communicate observations and findings	communication of observations and findings using everyday language	fragmented communication of observations and findings

Key	shading emphasises the qualities that discriminate between the A–E descriptors

Notes

Australian Curriculum common dimensions

The SEs describe the qualities of achievement in the two dimensions common to all Australian Curriculum learning area achievement standards:

- understanding
- skills.

Dimension	Description
understanding	the concepts underpinning and connecting knowledge in a learning area, related to a student's ability to appropriately select and apply knowledge to solve problems in that learning area
skills	the specific techniques, strategies and processes in a learning area

Terms used in Year 4 Science SEs

These terms clarify the descriptors in the Year 4 Science SEs. They help to clarify the descriptors and should be used in conjunction with the ACARA Australian Curriculum Science glossary: www.australiancurriculum.edu.au/f-10-curriculum/science/glossary.

Term	Description
appropriate	fitting, suitable to the context
coherent	rational; well-structured and makes sense
communicating (sub-strand)	conveying information or ideas to others through appropriate representations, text types and modes
comparison; compare	estimate, measure or note how things are similar or dissimilar
description; descriptive; describe	give an account of characteristics or features
direction; directed	following the instructions of the facilitator
discussion; discuss	talk or write about a topic, taking into account different issues and ideas
evaluating (sub-strand)	considering the quality of available evidence and the merit or significance of a claim, proposition or conclusion with reference to that evidence; in Year 4, this includes reflecting on the investigation, including whether it was fair or not
explanation; explanatory; explain	provide additional information that demonstrates understanding of reasoning and/or application
fair test	an investigation where one variable (the independent variable) is changed and all other conditions (controlled variables) are kept the same; what is measured or observed is referred to as the dependent variable

Term	Description
fragmented	disjointed, incomplete or isolated
guidance; guided	visual and/or verbal prompts to facilitate or support independent action
identification; identify	establish or indicate who or what someone or something is
informed	having relevant knowledge; being conversant with the topic; in the context of Science, *informed* means referring to scientific background knowledge and/or empirical observations
partial	incomplete, half-done, unfinished
planning and conducting (sub-strand)	making decisions regarding how to investigate or solve a problem and carrying out an investigation, including the collection of data; in Year 4, this includes: • with guidance, planning and conducting investigations • safely using appropriate materials and equipment • considering the elements of fair tests • making and recording observations using formal measurements
plausibility; plausible	credible and possible; in the context of science, a *plausible* prediction is based on scientific knowledge
processing and analysing data and information (sub-strand)	representing data in meaningful and useful ways; identifying trends, patterns and relationships in data, and using this evidence to justify conclusions; in Year 4, this includes: • using a range of methods to represent data • identifying patterns and trends in data
questioning and predicting (sub-strand)	identifying and constructing questions, proposing hypotheses and suggesting possible outcomes in Year 4, this includes: • identifying questions that can be investigated scientifically • making predictions based on prior knowledge
questions (that can be investigated scientifically)	a *question* that is connected to scientific concepts and methods and is able to be investigated through the systematic observation and interpretation of data; there are three types of investigable questions: 1. **descriptive questions**: produce a qualitative or quantitative description of an object, material, organism or event 2. **relational questions:** identify associations between the characteristics of different phenomena 3. **cause–effect questions**: determine whether one or more variables cause or affect one or more outcome variables Sharkawy, A 2010, 'A Quest to Improve: Helping students learn how to pose investigable questions', *Science and Children*, vol. 48, no. 4, pp. 32–35
reasons; reasoned	logical and sound; presented with justification; in the context of Science, *reasoned* also means that the evidence is provided through reference to scientific background knowledge and/or empirical observations as part of the justification
relevance; relevant	having some logical connection with; applicable and pertinent

Term	Description
reliability; reliable	constant and dependable or consistent and repeatable; in Science, in the context of collecting data from: • first-hand investigations, *reliability* refers to the consistency of the data collected, i.e. a consistent pattern of results is established through repetition • secondary sources, *reliability* refers to information and data from secondary sources that is consistent with information and data from a number of reputable sources; Note: *reliability* and *validity* are terms that can easily be confused by students; in the context of collecting data from: • first-hand investigations, *validity* refers to whether the measurements collected are caused by the phenomena being tested, i.e. if the procedure is testing the hypothesis • secondary sources, *validity* refers to the degree to which evidence supports the assertion or claim being evaluated; McCloughan, G 2001, 'Reliability and validity — what do they mean?', *Curriculum Support for Teaching in Science in 7–12*, vol. 6, no. 3, pp. 14–15
science knowledge	*science knowledge* refers to facts, concepts, principles, laws, theories and models that have been established by scientists over time; in the context of Years 3 to 6, students develop their understanding of a range of systems operating at different time and geographic scales
science understanding	*science understanding* is evident when a person selects and integrates appropriate science knowledge to explain and predict phenomena, and applies that knowledge to new situations
sequence	to arrange in order
statement; state	a sentence or assertion
systematic	methodical, organised and logical
thorough	demonstrating depth and breadth, inclusive of relevant detail