Year 6 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 6 Australian Curriculum: Science achievement standard
By the end of Year 6, students compare and classify different types of observable changes to materials. They analyse requirements for the transfer of electricity and describe how energy can be transformed from one form to another when generating electricity. They explain how natural events cause rapid change to Earth's surface. They describe and predict the effect of environmental changes on individual living things. Students explain how scientific knowledge helps us to solve problems and inform decisions and identify historical and cultural contributions. Students follow procedures to develop investigable questions and design investigations into simple cause-and-effect relationships. They identify variables to be changed and measured and describe potential safety risks when planning methods. They collect, organise and interpret their data, identifying where improvements to their methods or research could improve the data. They describe and analyse relationships in data using appropriate representations and construct multimodal texts to communicate ideas, methods 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 6 Science standard elaborations

		A	B	C	D	E
		The folio of student work has the following characteristics:				
Science understanding	**Chemical sciences**	reasoned comparisons and classifications of different types of observable changes to materials	informed comparisons and classifications of different types of observable changes to materials	comparisons and classifications of different types of observable changes to materials	identification of different types of observable changes to materials	statements about types of observable changes to materials
	Physical sciences	• reasoned analysis of the requirements for the transfer of electricity • thorough description of how energy can be transformed from one form to another when generating electricity	• informed analysis of the requirements for the transfer of electricity • informed description of how energy can be transformed from one form to another when generating electricity	• analysis of requirements for the transfer of electricity • description of how energy can be transformed from one form to another when generating electricity	• description of requirements for the transfer of electricity • identification of energy transformations when generating electricity	• statements about the transfer of electricity • statements about energy transformations
	Earth and space sciences	reasoned explanation of how natural events cause rapid change to Earth's surface	informed explanation of how natural events cause rapid change to Earth's surface	explanation of how natural events cause rapid change to Earth's surface	description of natural events causing rapid change to the Earth's surface	statements about natural events causing change to the Earth's surface
	Biological sciences	thorough description and reasoned prediction of the effect of environmental changes on individual living things	informed description and plausible prediction of the effect of environmental changes on individual living things	description and prediction of the effect of environmental changes on individual living things	identification of effects of environmental changes on living things	statements about the environment and living things

		A	B	C	D	E
		The folio of student work has the following characteristics:				
Science as a human endeavour	**Use and influence of science**	reasoned explanation of how scientific knowledge helps to solve problems and inform decisions	informed explanation of how scientific knowledge helps to solve problems and inform decisions	explanation of how scientific knowledge helps to solve problems and inform decisions	description of where scientific knowledge helps to solve problems and inform decisions	statements about the use of scientific knowledge
	Nature and development of science	identification and thorough description of historical and cultural contributions to scientific knowledge	identification and description of historical and cultural contributions to scientific knowledge	identification of historical and cultural contributions to scientific knowledge	identification of contributions to scientific knowledge	statements about contributions to scientific knowledge
Science inquiry skills	**Questioning and predicting**	following of procedures to develop investigable questions and make reasoned predictions	following of procedures to develop investigable questions and make plausible predictions	following of procedures to develop investigable questions	guided development of investigable questions	directed development of investigable questions

		A	B	C	D	E
		The folio of student work has the following characteristics:				
Science inquiry skills	**Planning and conducting**	• designing of investigations into simple cause-and-effect relationships and planning of methods that: – identify and describe how variables are changed, measured and controlled – describe how to manage implications of potential safety risks • accurate collection and systematic organisation of reliable data using appropriate representations that follow conventions	• designing of investigations into simple cause-and-effect relationships and planning of methods that: – identify variables to be changed and measured and controlled – describe implications of potential safety risks • collection and systematic organisation of data using appropriate representations that follow conventions	• designing of investigations into simple cause-and-effect relationships and planning of methods that: – identify variables to be changed and measured – describe potential safety risks • collection and organisation of data using appropriate representations	• partial design and partial planning of investigations and methods that: – identify variables which will be changed and measured – identify potential safety risks • partial collection and partial organisation of data	• use of provided investigation methods • identification of potential safety risks • directed collection of data
	Processing and analysing data and information	interpretation and analysis of data to explain the relationships in the data when explaining findings	interpretation and analysis of data to describe the relationships in the data to inform explanations for findings	interpretation and analysis of data to describe the relationships in the data	description of patterns in the data	statements about patterns in data

		A	B	C	D	E
		The folio of student work has the following characteristics:				
Science inquiry skills	**Evaluating**	identification and description of where effective improvements to methods or research could improve the data	identification of where effective improvements to methods or research could improve the data	identification of where improvements to methods or research could improve the data	identification of improvements to methods	statements about improvements to methods
	Communicating	construction of multi-modal texts and use of relevant scientific terminology to coherently communicate ideas, methods and findings	construction of multimodal texts and use of relevant scientific terminology to communicate ideas, methods and findings	construction of multimodal texts to communicate ideas, methods and findings	communication of ideas, methods and findings using everyday language	fragmented communication of ideas, methods 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 6 Science SEs

These terms clarify the descriptors in the Year 6 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
accuracy; accurate	consistent with a standard, rule, convention or known fact; in the context of Science: • *accurate* measurements are close to the accepted value • *accurate* representations are a true representation of observations or collected data
analysis; analyse	consider in detail for the purpose of finding meaning or relationships, and identifying patterns, similarities and differences in order to explain and interpret it
appropriate	fitting, suitable to the context
classification; classify	arrange into named categories in order to sort, group or identify
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

Term	Description
conventions (tables and graphs)	agreed methods of representing concepts, information and behaviours; in the context of constructing tables and graphs in science, the following conventions apply: **tables** — any table used in an investigation should include: • the independent variable goes in the left hand column, the dependent variables in the column/s to the right • column headings that have all the information needed to define the table's meaning and should identify units (if applicable) • a title that summarises what the table is showing **graphs** — any graph used to report findings should include: • labelling the dependent variable on the horizontal (x) axis and the independent on the vertical (y) axis, accompanied by the units of measurement • an appropriate scale in ascending amounts with equal intervals (if applicable) • a title that summarises what the graph is showing
description; descriptive; describe	give an account of characteristics or features
design	plan and evaluate the construction of a product or process
direction; directed	following the instructions of the facilitator
effectively; effective	meeting the assigned purpose; in a way that produces a desired or intended result
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 6, *evaluating* includes reflecting on and suggesting improvements to scientific investigations
explanation; explanatory; explain	provide additional information that demonstrates understanding of reasoning and/or application
fragmented	disjointed, incomplete or isolated
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
interpretation; interpret	explaining the meaning of information or actions; in the context of Science, this involves giving meaning to information presented in various forms — words, symbols, diagrams, graphs etc.
partial	incomplete, half-done, unfinished

Term	Description
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 6, this includes: • identifying, planning and applying the elements of scientific investigations • deciding variables to be changed and measured • identifying potential risks • accurately observing, measuring and recording data • using equipment and materials safely
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 6, this includes: • constructing and using a range of representations to represent observations • describing observations, patterns or relationships in data • comparing data with predictions • developing explanations
questioning and predicting (sub-strand)	identifying and constructing questions, proposing hypotheses and suggesting possible outcomes in Year 6, this includes: • posing clarifying questions • making predictions about scientific investigations
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
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
representation	use words, images, symbols or signs to convey meaning; in the context of Science, *representation* is an important learning and presentation tool that contributes strongly to science literacy development; scientists represent ideas in a variety of ways, including models, graphs, charts, drawings, diagrams and written texts; the use of these models and other representations is to help understand or present meaning about an idea, an object, a process or a system, or even something that cannot be directly observed, e.g. an atom or inside our body
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
statement; state	a sentence or assertion
systematic	methodical, organised and logical
thorough	demonstrating depth and breadth, inclusive of relevant detail