

Year 7 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 7 Australian Curriculum: Science achievement standard

By the end of Year 7, students describe techniques to separate pure substances from mixtures. They represent and predict the effects of unbalanced forces, including Earth's gravity, on motion. They explain how the relative positions of Earth, the sun and moon affect phenomena on Earth. They analyse how the sustainable use of resources depends on the way they are formed and cycle through Earth systems. They predict the effect of human and environmental changes on interactions between organisms and classify and organise diverse organisms based on observable differences. Students describe situations where scientific knowledge from different science disciplines and diverse cultures has been used to solve a real-world problem. They explain possible implications of the solution for different groups in society.

Students identify questions that can be investigated scientifically. They plan fair experimental methods, identifying variables to be changed and measured. They select equipment that improves fairness and accuracy and describe how they considered safety. Students draw on evidence to support their conclusions. They summarise data from different sources, describe trends and refer to the quality of their data when suggesting improvements to their methods. They communicate their ideas, methods and findings using scientific language and appropriate representations.

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 7 Science standard elaborations

		A	B	C	D	E
The folio of student work has the following characteristics:						
Science understanding	Chemical sciences	<u>thorough</u> description of techniques to separate pure substances from mixtures	<u>informed</u> description of techniques to separate pure substances from mixtures	description of techniques to separate pure substances from mixtures	<u>identification</u> of techniques to separate pure substances from mixtures	<u>statements about</u> the separation of mixtures
	Physical sciences	<u>accurate</u> representation and <u>justified</u> prediction of the effects of unbalanced forces, including Earth's gravity, on motion	<u>detailed</u> representation and <u>plausible</u> prediction of the effects of unbalanced forces, including Earth's gravity, on motion	representation and prediction of the effects of unbalanced forces, including Earth's gravity, on motion	<u>partial</u> representation and <u>description</u> of the effects of unbalanced forces, including Earth's gravity, on motion	<u>statements about</u> the effects of forces on motion
	Earth and space sciences	<ul style="list-style-type: none"> <u>justified</u> explanation of how the relative positions of Earth, the sun and moon affect phenomena on Earth <u>critical</u> analysis of how the sustainable use of resources depends on the way they are formed and cycle through Earth systems 	<ul style="list-style-type: none"> <u>informed</u> explanation of how the relative positions of Earth, the sun and moon affect phenomena on Earth <u>informed</u> analysis of how the sustainable use of resources depends on the way they are formed and cycle through Earth systems 	<ul style="list-style-type: none"> explanation of how the relative positions of Earth, the sun and moon affect phenomena on Earth analysis of how the sustainable use of resources depends on the way they are formed and cycle through Earth systems 	<ul style="list-style-type: none"> <u>description</u> of the relative positions of Earth, the sun and moon <u>description</u> of how the sustainable use of resources depends on the way they are formed and cycle through Earth systems 	<ul style="list-style-type: none"> <u>statements about</u> the positions of Earth, the sun and moon <u>statements about</u> sustainable use of resources
	Biological sciences	<ul style="list-style-type: none"> <u>justified</u> prediction <u>and</u> <u>explanation</u> of the effect of human and environmental changes on interactions between organisms <u>justified</u> classification and <u>justified</u> organisation of diverse organisms based on observable differences 	<ul style="list-style-type: none"> <u>plausible</u> prediction <u>and</u> <u>description</u> of the effect of human and environmental changes on interactions between organisms <u>informed</u> classification and <u>appropriate</u> organisation of diverse organisms based on observable differences 	<ul style="list-style-type: none"> prediction of the effect of human and environmental changes on interactions between organisms classification and organisation of diverse organisms based on observable differences 	<ul style="list-style-type: none"> <u>description</u> of the effect of human and environmental changes on interactions between organisms <u>grouping</u> of diverse organisms based on observable features 	<ul style="list-style-type: none"> <u>statements about</u> the effect of changes on organisms <u>grouping</u> of organisms

		A	B	C	D	E
The folio of student work has the following characteristics:						
Science as a human endeavour	Nature and development of science; Use and influence of science	<ul style="list-style-type: none"> • thorough description of situations where scientific knowledge from different science disciplines and diverse cultures has been used to solve a real-world problem • justified explanation of possible implications of the solution for different groups in society 	<ul style="list-style-type: none"> • informed description of situations where scientific knowledge from different science disciplines and diverse cultures has been used to solve a real-world problem • informed explanation of possible implications of the solution for different groups in society 	<ul style="list-style-type: none"> • description of situations where scientific knowledge from different science disciplines and diverse cultures has been used to solve a real-world problem • explanation of possible implications of the solution for different groups in society 	<ul style="list-style-type: none"> • identification of situations where scientific knowledge from different science disciplines and diverse cultures has been used to solve a real-world problem • description of implications of the solution for different groups in society 	<ul style="list-style-type: none"> • statements about scientific knowledge being used to solve a real world problem • statements about how the solution impacts on different groups
		Science inquiry skills	Questioning and predicting	identification of questions that can be investigated scientifically and the making of justified predictions	identification of questions that can be investigated scientifically and the making of plausible predictions	identification of questions that can be investigated scientifically
	Planning and conducting	<ul style="list-style-type: none"> • planning of fair experimental methods that: <ul style="list-style-type: none"> – identify and describe how variables are changed, measured and controlled – select appropriate equipment that improves fairness and accuracy – describe how to manage safety considerations • accurate collection of reliable data 	<ul style="list-style-type: none"> • planning of fair experimental methods that: <ul style="list-style-type: none"> – identify variables to be changed, measured and controlled – select appropriate equipment that improves fairness and accuracy – describe the implications of safety considerations • accurate collection of data 	<ul style="list-style-type: none"> • planning of fair experimental methods that: <ul style="list-style-type: none"> – identify variables to be changed and measured – select equipment that improves fairness and accuracy – describe how safety is considered 	<ul style="list-style-type: none"> • partial planning of fair experimental methods that: <ul style="list-style-type: none"> – identify variables to be changed and measured – identify equipment to be used – identify safety considerations 	<ul style="list-style-type: none"> • use of provided experimental methods • identification of safety considerations

		A	B	C	D	E
The folio of student work has the following characteristics:						
Science inquiry skills	Processing and analysing data and information	drawing on evidence to <u>justify</u> conclusions through: <ul style="list-style-type: none"> • <u>explanation</u> of <u>relevant</u> trends <u>and relationships</u> in data • <u>accurate</u> summaries of <u>relevant</u> data from different sources 	drawing on evidence to <u>inform</u> conclusions through: <ul style="list-style-type: none"> • <u>informed</u> description of <u>relevant</u> trends <u>and relationships</u> in data • summaries of <u>relevant</u> data from different sources 	drawing on evidence to support conclusions through: <ul style="list-style-type: none"> • description of trends in data • summaries of data from different sources 	<ul style="list-style-type: none"> • drawing of conclusions • <u>identification</u> of trends in data • summarising data 	<u>statements about</u> data
	Evaluating	reference to the quality of data when <u>explaining how effective improvements would enhance</u> methods	reference to the quality of data when suggesting <u>effective</u> improvements to methods	reference to the quality of data when suggesting improvements to methods	<u>suggestion</u> of improvements to methods	<u>statements about</u> methods
	Communicating	<u>concise and coherent</u> communication of ideas, methods and findings using <u>relevant</u> scientific language and appropriate and <u>accurate</u> representations	<u>coherent</u> communication of ideas, methods and findings using <u>relevant</u> scientific language and appropriate and <u>accurate</u> representations	communication of ideas, methods and findings using scientific language and appropriate representations	communication of ideas, methods and findings using <u>everyday</u> language and representations	<u>fragmented</u> communication of ideas, methods and findings
Key <u>shading</u> emphasises the <u>qualities that discriminate between the A–E descriptors</u>						

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 7 Science SEs

These terms clarify the descriptors in the Year 7 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: <ul style="list-style-type: none">• <i>accurate</i> measurements are close to the accepted value• <i>accurate</i> 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
concise	brief and to the point; without repetition of information, loss of clarity or loss of argument, logic or solution
considered; consider	thought about deliberately with a purpose

Term	Description
conventions (tables and graphs)	<p>agreed methods of representing concepts, information and behaviours; in the context of constructing tables and graphs in science, the following conventions apply:</p> <p>tables — any table used in an investigation should include:</p> <ul style="list-style-type: none"> • 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 <p>graphs — any graph used to report findings should include:</p> <ul style="list-style-type: none"> • 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) <p>a title that summarises what the graph is showing</p>
critical	analysis or evaluation of an issue or information in order to form a critical judgment, especially in a detailed way, and involving skilful judgment as to truth or merit and is informed by evidence
description; descriptive; describe	give an account of characteristics or features
detailed	meticulous; including many of the parts
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)	<p>considering the quality of available evidence and the merit or significance of a claim, proposition or conclusion with reference to that evidence;</p> <p>in Year 7, <i>evaluating</i> includes:</p> <ul style="list-style-type: none"> • reflecting on scientific investigations • evaluating the quality of the data collected • identifying improvements to the method • evaluating claims
explanation; explanatory; explain	provide additional information that demonstrates understanding of reasoning and/or application
fair experimental method	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
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

Term	Description
informed	having relevant knowledge; being conversant with the topic; in the context of Science, <i>informed</i> means referring to scientific background knowledge and/or empirical observations
justification; justify	show how an argument or conclusion is right or reasonable; provide sound reasons or evidence; in the context of Science, <i>justified</i> also means that the evidence is provided through reference to scientific background knowledge and/or empirical observations as part of the justification
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 7, this includes: <ul style="list-style-type: none"> • planning and conducting a range of investigation types • ensuring safety and ethical guidelines are followed • measuring and controlling variables • selecting equipment to collect data with accuracy
plausibility; plausible	credible and possible; in the context of Science, a <i>plausible</i> 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 7, this includes: <ul style="list-style-type: none"> • constructing and using a range of representations • analysing patterns or relationships in data • summarising data • identifying relationships • drawing conclusions based on evidence
questioning and predicting (sub-strand)	identifying and constructing questions, proposing hypotheses and suggesting possible outcomes; in Year 7, this includes: <ul style="list-style-type: none"> • identifying questions and problems to be investigated scientifically • making predictions based on scientific knowledge
questions (that can be investigated scientifically)	a <i>question</i> 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: <ol style="list-style-type: none"> 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 <p>Sharkawy, A 2010, 'A Quest to Improve: Helping students learn how to pose investigable questions', <i>Science and Children</i>, vol. 48, no. 4, pp. 32–35</p>
relevant	having some logical connection with; applicable and pertinent

Term	Description
reliability; reliable	<p>constant and dependable or consistent and repeatable; in Science, in the context of collecting data from:</p> <ul style="list-style-type: none"> • first-hand investigations, <i>reliability</i> refers to the consistency of the data collected, i.e. a consistent pattern of results is established through repetition • secondary sources, <i>reliability</i> refers to information and data from secondary sources that is consistent with information and data from a number of reputable sources; <p>Note: <i>reliability</i> and <i>validity</i> are terms that can easily be confused by students; in the context of collecting data from:</p> <ul style="list-style-type: none"> • first-hand investigations, <i>validity</i> refers to whether the measurements collected are caused by the phenomena being tested, i.e. if the procedure is testing the hypothesis • secondary sources, <i>validity</i> refers to the degree to which evidence supports the assertion or claim being evaluated; <p>McCloughan, G 2001, 'Reliability and validity — what do they mean?', <i>Curriculum Support for Teaching in Science in 7–12</i>, vol. 6, no. 3, pp. 14–15</p>
representation	<p>use words, images, symbols or signs to convey meaning; in the context of Science, <i>representation</i> 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</p>
science knowledge	<p><i>science knowledge</i> refers to facts, concepts, principles, laws, theories and models that have been established by scientists over time; in the context of Years 7 to 10, students develop their understanding of microscopic and atomic structures, how systems at a range of scales are shaped by flows of energy and matter and interactions due to forces, and develop the ability to quantify changes and relative amounts</p>
selection; select	<p>choose in preference to another or others</p>
statement; state	<p>a sentence or assertion</p>
thorough	<p>demonstrating depth and breadth, inclusive of relevant detail</p>