# Year 5 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 5 Australian Curriculum: Science achievement standard |
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| By the end of Year 5, students classify substances according to their observable properties and behaviours. They explain everyday phenomena associated with the transfer of light. They describe the key features of our solar system. They analyse how the form of living things enables them to function in their environments. Students discuss how scientific developments have affected people's lives, help us solve problems and how science knowledge develops from many people's contributions.<br><br>Students follow instructions to pose questions for investigation and predict the effect of changing variables when planning an investigation. They use equipment in ways that are safe and improve the accuracy of their observations. Students construct tables and graphs to organise data and identify patterns in the data. They compare patterns in their data with predictions when suggesting explanations. They describe ways to improve the fairness of their investigations, and communicate their ideas and findings using multimodal texts. |
| 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 5 Science standard elaborations

|  |  | A | B | C | D | E |
|---|---|---|---|---|---|---|
| | | **The folio of student work has the following characteristics:** | | | | |
| **Science understanding** | **Chemical sciences** | reasoned classification of substances according to their observable properties and behaviours | informed classification of substances according to their observable properties and behaviours | classification of substances according to their observable properties and behaviours | • partial classification of substances <br> • observations about the properties of substances | statements about the properties of substances |
| | **Physical sciences** | reasoned explanation of everyday phenomena associated with the transfer of light | informed explanation of everyday phenomena associated with the transfer of light | explanation of everyday phenomena associated with the transfer of light | description of everyday phenomena associated with the transfer of light | statements about light |
| | **Earth and space sciences** | thorough description of the key features of our solar system | informed description of the key features of our solar system | description of the key features of our solar system | identification of the key features of our solar system | statements about the solar system |
| | **Biological sciences** | reasoned analysis of how the form of living things enables them to function in their environments | informed analysis of how the form of living things enables them to function in their environments | analysis of how the form of living things enables them to function in their environments | description of how the form of living things enables them to function in their environments | statements about living things in their environments |

| | | A | B | C | D | E |
|---|---|---|---|---|---|---|
| | | **The folio of student work has the following characteristics:** | | | | |
| **Science as a human endeavour** | **Use and influence of science** | <u>reasoned</u> discussion of how scientific developments:<br>• have affected people's lives<br>• help solve problems | <u>informed</u> discussion of how scientific developments:<br>• have affected people's lives<br>• help solve problems | discussion of how scientific developments:<br>• have affected people's lives<br>• help solve problems | • <u>description</u> of how scientific developments:<br>• have affected people's lives<br>• help solve problems | <u>statements about</u> the scientific developments |
| | **Nature and development of science** | <u>reasoned</u> discussion of how science knowledge develops from many people's contributions | <u>informed</u> discussion of how science knowledge develops from many people's contributions | discussion of how science knowledge develops from many people's contributions | <u>identification</u> of contributions made to science knowledge | <u>statements about</u> science knowledge |

| | | **A** | **B** | **C** | **D** | **E** |
|---|---|---|---|---|---|---|
| | | The folio of student work has the following characteristics: | | | | |
| **Science inquiry skills** | **Questioning and predicting** | following instructions to pose questions for investigation and making reasoned predictions about the effect of changing variables | following instructions to pose questions for investigation and making plausible predictions about the effect of changing variables | following instructions to pose questions for investigation and predict the effect of changing variables | guided posing of questions related to the investigation and guided making of predictions | directed posing of questions and directed making of predictions |
| | **Planning and conducting** | • planning of fair tests that manage the implications of potential risks<br>• systematic use of equipment in ways that are safe and improve the accuracy and reliability of observations | • planning investigations that:<br> – take into consideration elements of fair testing<br> – describe implications of potential safety risks<br>• use of equipment in ways that are safe and improve the accuracy and reliability of observations | • planning investigations<br>• use of equipment in ways that are safe and improve the accuracy of observations | • partial planning of investigations<br>• safe use of equipment | • statements about investigation methods<br>• safe use of equipment |
| | **Processing and analysing data and information** | • following of conventions to construct tables and graphs to systematically organise data<br>• explanation of patterns in the data<br>• comparison of patterns in their data with predictions when suggesting reasoned explanations | • following of conventions to construct tables and graphs to organise data<br>• description of patterns in the data<br>• comparison of patterns in their data with predictions when suggesting informed explanations | • construction of tables and graphs to organise data<br>• identification of patterns in data<br>• comparison of patterns in their data with predictions when suggesting explanations | • partial construction of tables and graphs to organise data<br>• guided identification of patterns in the data<br>• comparison of patterns in their data with predictions | • use of provided tables to organise data<br>• statements about patterns in their data |

| | | A | B | C | D | E |
|---|---|---|---|---|---|---|
| | | The folio of student work has the following characteristics: | | | | |
| Science inquiry skills | Evaluating | thorough description of effective ways to improve the fairness of investigations | informed description of effective ways to improve the fairness of investigations | description of ways to improve the fairness of investigations | identification of ways to improve the fairness of investigations | statements about improvements to methods |
| | Communicating | coherent communication of ideas and findings using relevant scientific terminology and multimodal texts | communication of ideas and findings using relevant scientific terminology and multimodal texts | communication of ideas and findings using multimodal texts | communication of ideas and findings using everyday language | fragmented communication of ideas and findings |

| Key | shading emphasises the qualities that discriminate between the A–E descriptors |
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# 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 5 Science SEs

These terms clarify the descriptors in the Year 5 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 |
|---|---|
| **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 |
| **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 |
| **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: <br> **tables** — any table used in an investigation should include: <br> • the independent variable goes in the left hand column, the dependent variables in the column/s to the right <br> • column headings that have all the information needed to define the table's meaning and should identify units (if applicable) <br> • a title that summarises what the table is showing <br> **graphs** — any graph used to report findings should include: <br> • labelling the dependent variable on the horizontal (x) axis and the independent on the vertical (y) axis, accompanied by the units of measurement <br> • an appropriate scale in ascending amounts with equal intervals (if applicable) <br> • a title that summarises what the graph is showing |

| Term | Description |
|---|---|
| **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 |
| **effectively; effective** | meeting the assigned purpose; in a way that produces a desired or intended result |
| **evaluating (sub-strand)** | examining and judging the merit or significance of something; considering the quality of available evidence and the merit or significance of a claim, proposition or conclusion with reference to that evidence; in Year 5, *evaluating* includes reflecting on and suggesting improvements to scientific investigations |
| **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 |
| **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 |
| **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 5, this includes: <br> • identifying, planning and applying the elements of scientific investigations <br> • deciding variables to be changed and measured <br> • identifying potential risks <br> • accurately observing, measuring and recording data <br> • using equipment and materials safely |
| **plausibility; plausible** | credible and possible; in the context of Science, a *plausible* prediction is based on scientific knowledge |

| Term | Description |
|---|---|
| **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;<br>in Year 5, this includes:<br>• constructing and using a range of representations to represent observations<br>• describing observations, patterns or relationships in data<br>• comparing data with predictions<br>• developing explanations |
| **questioning and predicting (sub-strand)** | identifying and constructing questions, proposing hypotheses and suggesting possible outcomes<br>in Year 5, this includes:<br>• posing clarifying questions<br>• 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:<br>1. **descriptive questions**: produce a qualitative or quantitative description of an object, material, organism or event<br>2. **relational questions:** identify associations between the characteristics of different phenomena<br>3. **cause–effect questions**: determine whether one or more variables cause or affect one or more outcome variables<br>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;<br>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 |
| **reliability; reliable** | constant and dependable or consistent and repeatable;<br>in Science, in the context of collecting data from:<br>• first-hand investigations, *reliability* refers to the consistency of the data collected, i.e. a consistent pattern of results is established through repetition<br>• secondary sources, *reliability* refers to information and data from secondary sources that is consistent with information and data from a number of reputable sources;<br>Note: *reliability* and *validity* are terms that can easily be confused by students; in the context of collecting data from:<br>• 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<br>• secondary sources, *validity* refers to the degree to which evidence supports the assertion or claim being evaluated;<br>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;<br>in the context of Years 3 to 6, students develop their understanding of a range of systems operating at different time and geographic scales |

| Term | Description |
|---|---|
| **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 |