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|  | 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.

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| 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](http://www.australiancurriculum.edu.au/Science/Curriculum/F-10) |

## Year 6 Science standard elaborations

|  | | A | B | C | D | E |
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|  | | 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 liv*i*ng things | statements about the environment and living things |
| 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 |
| 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 |
| 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 |

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| 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.

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| 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](http://www.australiancurriculum.edu.au/f-10-curriculum/science/glossary).

| Term | Description |
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| 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 |
| 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 |
| 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 |
| 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 |