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|  | Year 8 standard elaborations — Australian Curriculum: Mathematics |

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| Purpose | The standard elaborations (SEs) provide additional clarity when using the Australian Curriculum achievement standard to make judgments on a five‑point scale. They promote and support:   * aligning curriculum, assessment and reporting, connecting curriculum and evidence in assessment, so that what is assessed relates directly to what students have had the opportunity to learn * continuing skill development from one year of schooling to another * making judgments on a five-point scale based on evidence of learning in a folio of student work * developing task-specific standards and grading guides. |
| Structure | The SEs are developed using the **Australian Curriculum achievement standard**. In Years 7 to 10, the Mathematics SEs have been organised using the **proficiency strands**. Performance is frequently represented in terms of complexity and familiarity of the standard being assessed. Across the elaborations this is described according to:  A — unfamiliar, B — complex familiar, C — simple familiar, D — some simple familiar, E — partial, isolated and obvious.  The Mathematics achievement standard 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 8 Australian Curriculum: Mathematics achievement standard | |
| By the end of Year 8, students solve everyday problems involving rates, ratios and percentages. They describe index laws and apply them to whole numbers. They describe rational and irrational numbers. Students solve problems involving profit and loss. They make connections between expanding and factorising algebraic expressions. Students solve problems relating to the volume of prisms. They make sense of time duration in real applications. They identify conditions for the congruence of triangles and deduce the properties of quadrilaterals. Students model authentic situations with two-way tables and Venn diagrams. They choose appropriate language to describe events and experiments. They explain issues related to the collection of data and the effect of outliers on means and medians in that data.  Students use efficient mental and written strategies to carry out the four operations with integers. They simplify a variety of algebraic expressions. They solve linear equations and graph linear relationships on the Cartesian plane. Students convert between units of measurement for area and volume. They perform calculations to determine perimeter and area of parallelograms, rhombuses and kites. They name the features of circles and calculate the areas and circumferences of circles. Students determine the probabilities of complementary events and calculate the sum of probabilities. | |
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| **Source** | Australian Curriculum, Assessment and Reporting Authority (ACARA), Australian Curriculum Version 8 Mathematics for Foundation–10, [www.australiancurriculum.edu.au/Mathematics/Curriculum/F-10](http://www.australiancurriculum.edu.au/Mathematics/Curriculum/F-10) |

## Year 8 Mathematics standard elaborations

|  | | A | B | C | D | E |
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|  | | The folio of a student’s work has the following characteristics: | | | | |
| Understanding and fluency | Conceptual understanding | connection and description of mathematical concepts and relationships in unfamiliar situations | connection and description of mathematical concepts and relationships in complex familiar situations | recognition and identification of mathematical concepts and relationships in simple familiar situations | some identification of simple mathematical concepts | statements about obvious mathematical concepts |
| Procedural fluency | recall and use of facts, definitions, technologies and procedures to find solutions in unfamiliar situations | recall and use of facts, definitions, technologies and procedures to find solutions in complex familiar situations | recall and use of facts, definitions, technologies and procedures to find solutions in simple familiar situations | some recall and use of facts, definitions, technologies and simple procedures | partial recall of facts, definitions or simple procedures |
| Mathematical language and symbols | effective and clear use of appropriate mathematical terminology, diagrams, conventions and symbols | consistent use of appropriate mathematical terminology, diagrams, conventions and symbols | use of appropriate mathematical terminology, diagrams, conventions and symbols | use of aspects of mathematical terminology, diagrams and symbols | use of everyday language |
| Problem-solving and reasoning | Problem‑solving approaches | systematic application of relevant problem-solving approaches to investigate unfamiliar situations | application of relevant problem-solving approaches to investigate complex familiar situations | application of problem‑solving approaches to investigate simple familiar situations | some selection and application of problem‑solving approaches in simple familiar situations. | partial selection of problem-solving approaches |
| Mathematical modelling | development of mathematical models and representations in unfamiliar situations | development of mathematical models and representations in complex familiar situations | development of mathematical models and representations in simple familiar situations | statements about simple mathematical models and representations | isolated statements about given mathematical models and representations |
| Reasoning and justification | clear explanation of mathematical thinking and reasoning, including justification of choices made, evaluation of strategies used and conclusions reached | explanation of mathematical thinking and reasoning, including reasons for choices made, strategies used and conclusions reached | description of mathematical thinking and reasoning, including discussion of choices made, strategies used and conclusions reached | statements about choices made, strategies used and conclusions reached | isolated statements about given strategies or conclusions |

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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 and 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 8 Mathematics SEs

The following terms are used in the Year 8 Mathematics SEs. Definitions are drawn from the ACARA Australian Curriculum Mathematics glossary ([www.australiancurriculum.edu.au/f-10-curriculum/mathematics/glossary](https://www.australiancurriculum.edu.au/f-10-curriculum/mathematics/glossary)) and from other sources to ensure consistent understanding.

| Term | Description |
| --- | --- |
| accuracy; accurate | consistent with a standard, rule, convention or known fact |
| application; apply | use or employ in a particular situation |
| appropriate | fitting, suitable to the context |
| aspects | particular parts or features |
| clarity; clear | easy to perceive, understand or interpret, without ambiguity |
| comparison; compare | estimate, measure or note how things are similar or dissimilar |
| complex familiar | students are required to choose and apply procedures in a situation involving a number of elements, components or steps in a context that has been a focus of prior learning |
| conceptual understanding | connection, description, recognition and identification of mathematical concepts and relationships;  in Year 8, examples include:  Number and algebra   * describing patterns involving indices and recurring decimals * identifying commonalities between operations with algebra and arithmetic * connecting rules for linear relations their graphs * understanding that the real number system includes irrational numbers * recognising the relationship between factorising and expanding   Measurement and geometry   * explaining measurements of perimeter and area * recognising that the conversion factors for area units are the squares of those for the corresponding linear units * recognising that the conversion factors for volume units are the cubes of those for the corresponding linear units * understanding the properties that determine congruence of triangles and recognising which transformations create congruent figures * identifying properties related to side lengths, parallel sides, angles, diagonals and symmetry   Statistics and probability   * understanding that probabilities range between 0 to 1 * identifying situations where data can be collected by census and those where a sample is appropriate * explaining the purpose of statistical measures * describing real-life examples and contexts of the use of mean, median and/or mode |
| connection; connect | establish a link |
| consistent | regular in occurrence; in agreement and not self-contradictory |
| description; descriptive; describe | give an account of characteristics or features |
| discussion; discuss | talk or write about a topic, taking in to account different issues or ideas |
| effective | meeting the assigned purpose in a considered and/or efficient manner to produce a desired or intended |
| evaluation; evaluate | examine and judge the merit or significance of something |
| explanation; explanatory; explain | provide additional information that demonstrates understanding of reasoning and/or application; in mathematics this could include showing working to justify a response |
| fluency | students develop skills in choosing appropriate procedures; carrying out procedures flexibly, accurately, efficiently and appropriately; and recalling factual knowledge and concepts readily;  students are fluent when they calculate answers efficiently, when they recognise robust ways of answering questions, when they choose appropriate methods and approximations, when they recall definitions and regularly use facts, and when they can manipulate expressions and equations to find solutions;  in Year 8, fluency is represented in the valued features of [*procedural fluency*](#procedural_fluency)and[*mathematical language and symbols*](#mathematical_language_and_symbols) |
| given | known or provided |
| identification; identify | establish or indicate who or what someone or something is |
| investigate | plan, collect and interpret data/information and draw conclusions about |
| isolation; isolated | unconnected; set apart |
| justification; justify | show how an argument or conclusion is right or reasonable |
| mathematical language and symbols | use of appropriate mathematical terminology, diagrams, conventions and symbols;  in Year 8, examples include:  Number and algebra   * terminating, recurring and non-terminating decimals, real numbers, irrational numbers, * mark-up, discount, GST, percentage increase and decrease, profit, loss * expand, factorise, product, divisible, common factor, highest common factor / greatest common divisor * power, to the power of, prime, base, index, square, cube * rate, ratio, * linear relationship, Cartesian plane, gradient, slope, intercept * pronumeral, expression, unknown, equation, pattern, relationship, substitution * equivalent, equal, sum, difference, product, quotient   Measurement and geometry   * length, breadth, width, height, perpendicular height, perimeter, area * pi (π), arc, tangent, chord, segment * choosing units for area including mm2, cm2, m2, hectares, km2, and units for volume including mm3, cm3, m3 * square metres (m2) and square centimetres (cm2) (not meters squared and centimetres squared) * cubic metres (m3) and cubic centimetres (cm3) (not meters cubed and centimetres cubed) * vertical, horizontal, inclined, diagonal, bisect, complementary and supplementary angles * transformation, translation, reflection, rotation, congruent, quadrilateral * exact vs approximate   Statistics and probability   * simple event, complementary events, compound event * describe events using language of 'at least', exclusive 'or' (a or b but not both), inclusive 'or' (a or b or both) and 'and' * census, sampling, random, variation, mean, median |
| mathematical modelling | depicting a situation that expresses relationships using mathematical concepts and language;  in Year 8, examples include:   * formulating, and modelling practical situations involving ratios, profit and loss, areas and perimeters of common shapes * using pronumerals (letters as algebraic symbols) to represent one or more numerical values * representing relationships between variables using letters * representing population growth rates graphically * determining if a relationship is linear * representing events in two-way tables and Venn diagrams |
| obvious | evident; apparent |
| partial | incomplete, half-done, unfinished |
| problem-solving | students develop the ability to make choices, interpret, formulate, model and investigate problem situations, and communicate solutions effectively;  students formulate and solve problems when they use mathematics to represent unfamiliar or meaningful situations, when they design investigations and plan their approaches, when they apply their existing strategies to seek solutions, and when they verify that their answers are reasonable;  in Year 8, problem-solving is represented in the valued features of  [*problem-solving approaches*](#problem_solving_approaches) and[*mathematical modelling*](#mathematical_modelling) |
| problem-solving approaches | use of problem-solving approaches to investigate situations;  in Year 8, examples include:   * posing a question * making choices when designing investigations * interpreting mathematical or real-life situations * determining the evidence needed to support a conclusion or hypothesis * formulating a plan * using the number line to develop strategies for adding and subtracting rational numbers * investigating the circumference and area of circles with materials or by measuring * investigating the area of circles using a square grid or by rearranging a circle divided into sectors * using two-way tables and Venn diagrams to calculate probabilities * collecting data by census or a sample * verifying that answers are reasonable |
| procedural fluency | recall and use of facts, definitions, technologies and procedures to find solutions  in Year 8, examples include:  Number and algebra   * calculating accurately with simple decimals, indices and integers * writing fractions in their simplest forms * adding, subtracting, multiplying and dividing fractions with and without technology * converting fractions to decimals and percentages (and vice versa) * factorising and simplifying basic algebraic expressions * using patterns to assist in finding rules for the multiplication and division of integers * using percentages to calculate population increases and decreases * expressing profit and loss as a percentage of cost or selling price * completing a table of values and plotting the resulting points |
| range | covers the scope of relevant situations or elements;  in Year 8, the range of situations and problems included simple familiar, simple unfamiliar, complex familiar and unfamiliar |
| reasoning | students develop an increasingly sophisticated capacity for logical thought and actions, such as analysing, proving, evaluating, explaining, inferring, justifying and generalising;  students are reasoning mathematically when they explain their thinking, when they deduce and justify strategies used and conclusions reached, when they adapt the known to the unknown, when they transfer learning from one context to another, when they prove that something is true or false and when they compare and contrast related ideas and explain their choices;  in Year 8, reasoning is represented in the valued features of [*reasoning and justification*](#reasoning_and_justification) and[*mathematical modelling*](#mathematical_modelling) |
| reasoning and justification | description and explanation of mathematical thinking and reasoning, including discussion, justification and evaluation of choices made, strategies used, proofs formulated and conclusions reached;  in Year 8, examples include:   * justifying the result of a calculation or estimation as reasonable * using congruence to deduce properties of triangles * establishing the properties of squares, rectangles, parallelograms, rhombuses, trapeziums and kites * using sample properties to predict characteristics of the population * suggesting reasons why different random samples drawn from the same population might provide means * drawing conclusions based on the analysis of data displays * explaining the effect of individual data values, including outliers, on the mean and median |
| reasons; reasoned | logical and sound; presented with justification |
| recall | remember information, ideas or experiences |
| recognition; recognise | to be aware of, or acknowledge |
| relevant | connected to the matter in hand |
| represent | use words, images, symbols or signs to convey meaning |
| satisfactory | meets the expectation or expected standard; sufficient and competent |
| simple familiar | students are required to choose and apply procedures in a situation involving few elements, components or steps, and in a context that has been a focus of prior learning |
| statement; state | a sentence or assertion |
| systematic | methodical, organised and logical |
| understanding | students build a robust knowledge of adaptable and transferable mathematical concepts; they make connections between related concepts and progressively apply the familiar to develop new ideas; they develop an understanding of the relationship between the ‘why’ and the ‘how’ of mathematics;  students build understanding when they connect related ideas, when they represent concepts in different ways, when they identify commonalities and differences between aspects of content, when they describe their thinking mathematically and when they interpret mathematical information;  in Year 8, understanding is represented in the valued features of [*conceptual understanding*](#conceptual_understanding)and[*mathematical language and symbols*](#mathematical_language_and_symbols) |
| unfamiliar | students are required to choose and apply procedures in a situation involving a number of elements, components or steps in a context in which students have had limited prior experience |
| use; use of | to operate or put into effect |