Year 8 standard elaborations — Australian Curriculum: Mathematics

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.

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.

Source	Australian Curriculum, Assessment and Reporting Authority (ACARA), *Australian Curriculum Version 8 Mathematics for Foundation–10*, www.australiancurriculum.edu.au/Mathematics/Curriculum/F-10

Year 8 Mathematics standard elaborations

		A	B	C	D	E
		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

		A	B	C	D	E
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

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.

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) 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

Term	Description
	• 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* and *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

Term	Description
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 mm^2, cm^2, m^2, hectares, km^2, and units for volume including mm^3, cm^3, m^3 • square metres (m^2) and square centimetres (cm^2) (not meters squared and centimetres squared) • cubic metres (m^3) and cubic centimetres (cm^3) (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

Term	Description
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* and *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* and *mathematical modelling*

Term	Description
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* and *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