Year 6 standard elaborations — Australian Curriculum v9.0: Mathematics

ACiQ | v9.0

Purpose

The standards elaborations (SEs) have been designed to support teachers to connect curriculum to evidence in assessment so that students are assessed on what they have had the opportunity to learn. The SEs can be used to:

- make consistent and comparable judgments, on a five-point scale, about the evidence of learning in a folio of student work across a year/band
- develop task-specific standards (or marking guides) for individual assessment tasks
- quality assure planning documents to ensure coverage of the achievement standard across a year/band.

Structure

The SEs have been developed using the Australian Curriculum achievement standard. The achievement standard for Mathematics describes what students are expected to know and be able to do at the end of each year. Teachers use the SEs to inform the development of assessment tasks and to make on-balance judgments about the qualities in student work that demonstrate the depth and breadth of their learning.

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 where the discernible differences and/or degrees of quality between each performance level are highlighted. Teachers match these discernible differences and/or degrees of quality to characteristics of student work to make judgments across a five-point scale. Terms are described in the Notes section following the matrix.

Year 6 Australian Curriculum: Mathematics achievement standard

By the end of Year 6, students use integers to represent points on a number line and in the Cartesian plane. They solve problems using the properties of prime, composite and square numbers. Students order common fractions, giving reasons, and add and subtract fractions with related denominators. They use all 4 operations with decimals and connect decimal representations of measurements to the metric system. Students solve problems involving finding a fraction, decimal or percentage of a quantity and use estimation to find approximate solutions to problems involving rational numbers and percentages. They use mathematical modelling to solve financial and other practical problems involving percentages and rational numbers, formulating and solving the problem, and justifying choices. Students find unknown values in numerical equations involving combinations of arithmetic operations. They identify and explain rules used to create growing patterns. Students create and use algorithms to generate sets of numbers, using a rule.

They interpret and use timetables. Students convert between common units of length, mass and capacity. They use the formula for the area of a rectangle and angle properties to solve problems. Students identify the parallel cross-section for right prisms. They create tessellating patterns using combinations of transformations. Students locate an ordered pair in any one of the 4 quadrants on the Cartesian plane.

They compare distributions of discrete and continuous numerical and ordinal categorical data sets as part of their statistical investigations, using digital tools. Students critique arguments presented in the media based on statistics. They assign probabilities using common fractions, decimal and percentages. Students conduct simulations using digital tools, to generate and record the outcomes from many trials of a chance experiment. They compare observed frequencies to the expected frequencies of the outcomes of chance experiments.

Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), *Australian Curriculum Version 9.0 Mathematics for Foundation–10*
https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-6?view=quick&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0

Year 6 Mathematics standard elaborations

		A	B	C	D	E
		The folio of student work contains evidence of the following:				
Mathematical proficiencies	**Understanding**	• accurate and consistent identification, representation, description and connection of mathematical concepts and relationships • in complex unfamiliar, complex familiar, and simple familiar situations, identification, representation, description and connection of mathematical concepts and relationships	• accurate identification, representation, description and connection of mathematical concepts and relationships • in complex familiar and simple familiar situations, identification, representation, description and connection of mathematical concepts and relationships	• identification, representation, description and connection of mathematical concepts and relationships • in simple familiar situations, identification, representation, description and connection of mathematical concepts and relationships	• partial identification, representation and description of mathematical concepts and relationships • in some simple familiar situations, identification, representation, description and connection of mathematical concepts and relationships	• fragmented identification, representation and description of mathematical concepts and relationships • in isolated and obvious situations, identification, representation, description and connection of mathematical concepts and relationships
	Fluency	• choice, use and application of comprehensive facts, definitions, and procedures to find solutions • in complex unfamiliar, complex familiar, and simple familiar situations, choice, use and application of facts, definitions, and procedures to find solutions	• choice, use and application of effective facts, definitions, and procedures to find solutions • in complex familiar and simple familiar situations, choice, use and application of facts, definitions, and procedures to find solutions	• choice, use and application of facts, definitions, and procedures to find solutions • in simple familiar situations, choice, use and application of facts, definitions, and procedures to find solutions	• choice and use of partial facts, definitions, and procedures to find solutions • in some simple familiar situations, choice, use and application of facts, definitions, and procedures to find solutions	• choice and use of fragmented facts, definitions and procedures to find solutions • in isolated and obvious situations, choice, use and application of facts, definitions, and procedures to find solutions

		A	B	C	D	E
		The folio of student work contains evidence of the following:				
	Reasoning	• comprehensive explanation of mathematical thinking, strategies used, and conclusions reached • in complex unfamiliar, complex familiar, and simple familiar situations, explanation of mathematical thinking, strategies used, and conclusions reached	• detailed explanation of mathematical thinking, strategies used, and conclusions reached • in complex familiar and simple familiar situations, explanation of mathematical thinking, strategies used, and conclusions reached	• explanation of mathematical thinking, strategies used, and conclusions reached • in simple familiar situations, explanation of mathematical thinking, strategies used, and conclusions reached	• partial explanation of mathematical thinking, strategies used, and conclusions reached • in some simple familiar situations, explanation of mathematical thinking, strategies used, and conclusions reached	• fragmented explanation of mathematical thinking, strategies used, and conclusions reached • in isolated and obvious situations, explanation of mathematical thinking, strategies used, and conclusions reached
	Problem-solving	• purposeful use of problem-solving approaches to find solutions to problems.	• effective use of problem-solving approaches to find solutions to problems.	• use of problem-solving approaches to find solutions to problems.	• partial use of problem-solving approaches to make progress towards finding solutions to problems.	• fragmented use of problem-solving approaches to make progress towards finding solutions to problems.

Key	shading emphasises the qualities that discriminate between the A–E descriptors

Notes

The SEs for Mathematics are organised using the four Mathematical proficiencies, Understanding, Fluency, Reasoning and Problem-solving. The proficiencies represent the actions students demonstrate when working mathematically. The proficiencies are embedded as verbs in the achievement standard and related content descriptions.

Table 1 shows how aspects of the Australian Curriculum achievement standard can be demonstrated as evidence (at the C standard) and related to the proficiencies.

In the Mathematics SEs, there are two types of qualifiers to describe performance across the five-point scale: those describing degrees of quality, and those describing degrees of difficulty. Table 2 describes degrees of difficulty, in terms of the complexity and familiarity of situations.

Tables 1 and 2 should be used in conjunction with the ACARA Australian Curriculum Mathematics glossary: https://v9.australiancurriculum.edu.au/content/dam/en/curriculum/ac-version-9/downloads/mathematics/mathematics-glossary-v9.docx

Table 1: Relationship between Australian Curriculum achievement standard and Mathematical proficiencies

Aspect of the achievement standard	Related content description/s	Examples of evidence	Mathematical proficiencies
Students use integers to represent points on a number line and in the Cartesian plane.	**Number** • recognise situations, including financial contexts, that use integers; locate and represent integers on a number line and as coordinates on the Cartesian plane AC9M6N01	• using integers to represent points on – a number line – the Cartesian plane	Understanding
They solve problems using the properties of prime, composite and square numbers.	**Number** • identify and describe the properties of prime, composite and square numbers and use these properties to solve problems and simplify calculations AC9M6N02	• using the properties of prime, composite and square numbers to solve problems	Fluency
Students order common fractions, giving reasons, and add and subtract fractions with related denominators.	**Number** • apply knowledge of equivalence to compare, order and represent common fractions including halves, thirds and quarters on the same number line and justify their order AC9M6N03 • solve problems involving addition and subtraction of fractions using knowledge of equivalent fractions AC9M6N05	• ordering common fractions • adding and subtracting fractions with related denominators	Fluency
		• giving reasons for the order of common fractions	Reasoning

Aspect of the achievement standard	Related content description/s	Examples of evidence	Mathematical proficiencies
They use all 4 operations with decimals and connect decimal representations of measurements to the metric system.	**Number** • apply knowledge of place value to add and subtract decimals, using digital tools where appropriate; use estimation and rounding to check the reasonableness of answers AC9M6N04 • multiply and divide decimals by multiples of powers of 10 without a calculator, applying knowledge of place value and proficiency with multiplication facts; using estimation and rounding to check the reasonableness of answers AC9M6N06 **Measurement** • convert between common metric units of length, mass and capacity; choose and use decimal representations of metric measurements relevant to the context of a problem AC9M6M01	• connecting decimal representations of measurements to the metric system	Understanding
		• using all 4 operations with decimals	Fluency
Students solve problems involving finding a fraction, decimal or percentage of a quantity and use estimation to find approximate solutions to problems involving rational numbers and percentages.	**Number** • apply knowledge of place value to add and subtract decimals, using digital tools where appropriate; use estimation and rounding to check the reasonableness of answers AC9M6N04 • multiply and divide decimals by multiples of powers of 10 without a calculator, applying knowledge of place value and proficiency with multiplication facts; using estimation and rounding to check the reasonableness of answers AC9M6N06 • solve problems that require finding a familiar fraction, decimal or percentage of a quantity, including percentage discounts, choosing efficient calculation strategies and using digital tools where appropriate AC9M6N07 • approximate numerical solutions to problems involving rational numbers and	• solving problems involving finding a fraction, decimal or percentage of a quantity • using estimation to find approximate solutions to problems involving rational numbers and percentages	Fluency

Aspect of the achievement standard	Related content description/s	Examples of evidence	Mathematical proficiencies
	percentages, including financial contexts, using appropriate estimation strategies AC9M6N08		
They use mathematical modelling to solve financial and other practical problems involving percentages and rational numbers, formulating and solving the problem, and justifying choices.	**Number** • use mathematical modelling to solve practical problems involving natural and rational numbers and percentages, including in financial contexts; formulate the problems, choosing operations and efficient calculation strategies, and using digital tools where appropriate; interpret and communicate solutions in terms of the situation, justifying the choices made AC9M6N09	• formulating financial and other practical problems	Understanding
		• solving financial and other practical problems involving percentages and rational numbers	Fluency
		• justifying choices made related to mathematical modelling problems	Reasoning
		• using mathematical modelling to solve financial and other practical problems	Problem-solving
Students find unknown values in numerical equations involving combinations of arithmetic operations.	**Algebra** • find unknown values in numerical equations involving brackets and combinations of arithmetic operations, using the properties of numbers and operations AC9M6A02	• finding unknown values in numerical equations involving combinations of arithmetic operations	Fluency
They identify and explain rules used to create growing patterns.	**Algebra** • recognise and use rules that generate visually growing patterns and number patterns involving rational numbers AC9M6A01	• identifying rules used to create growing patterns	Understanding
		• explaining rules used to create growing patterns	Reasoning
Students create and use algorithms to generate sets of numbers, using a rule.	**Algebra** • create and use algorithms involving a sequence of steps and decisions that use rules to generate sets of numbers; identify, interpret and explain emerging patterns AC9M6A03	• using algorithms to generate sets of numbers, using a rule	Fluency
		• creating algorithms to generate sets of numbers, using a rule	Problem-solving

Aspect of the achievement standard	Related content description/s	Examples of evidence	Mathematical proficiencies
They interpret and use timetables.	**Measurement** • interpret and use timetables and itineraries to plan activities and determine the duration of events and journeys AC9M6M03	• interpreting timetables	Understanding
		• using timetables	Fluency
Students convert between common units of length, mass and capacity.	**Measurement** • convert between common metric units of length, mass and capacity; choose and use decimal representations of metric measurements relevant to the context of a problem AC9M6M01	• converting between common units of – length – mass – capacity	Fluency
They use the formula for the area of a rectangle and angle properties to solve problems.	**Measurement** • establish the formula for the area of a rectangle and use it to solve practical problems AC9M6M02 • identify the relationships between angles on a straight line, angles at a point and vertically opposite angles; use these to determine unknown angles, communicating reasoning AC9M6M04	• using the formula for the area of a rectangle to solve problems • using angle properties to solve problems	Fluency
Students identify the parallel cross-section for right prisms.	**Space** • compare the parallel cross-sections of objects and recognise their relationships to right prisms AC9M6SP01	• identifying the parallel cross-section for right prisms	Understanding
They create tessellating patterns using combinations of transformations.	**Space** • recognise and use combinations of transformations to create tessellations and other geometric patterns, using dynamic geometric software where appropriate AC9M6SP03	• creating tessellating patterns using combinations of transformations	Understanding
Students locate an ordered pair in any one of the 4 quadrants on the Cartesian plane.	**Space** • locate points in the 4 quadrants of a Cartesian plane; describe changes to the coordinates when a point is moved to a different position in the plane AC9M6SP02	• locating an ordered pair in any one of the 4 quadrants on the Cartesian plane	Fluency

Aspect of the achievement standard	Related content description/s	Examples of evidence	Mathematical proficiencies
They compare distributions of discrete and continuous numerical and ordinal categorical data sets as part of their statistical investigations, using digital tools.	**Statistics** • interpret and compare data sets for ordinal and nominal categorical, discrete and continuous numerical variables using comparative displays or visualisations and digital tools; compare distributions in terms of mode, range and shape AC9M6ST01 • plan and conduct statistical investigations by posing and refining questions or identifying a problem and collecting relevant data; analyse and interpret the data and communicate findings within the context of the investigation AC9M6ST03	• comparing distributions of discrete and continuous numerical and ordinal categorical data sets using digital tools	Reasoning
		• (planning and conducting) statistical investigations	Problem-solving
Students critique arguments presented in the media based on statistics.	**Statistics** • identify statistically informed arguments presented in traditional and digital media; discuss and critique methods, data representations and conclusions AC9M6ST02	• critiquing arguments presented in the media based on statistics	Reasoning
They assign probabilities using common fractions, decimal and percentages.	**Probability** • recognise that probabilities lie on numerical scales of 0–1 or 0%–100% and use estimation to assign probabilities that events occur in a given context, using common fractions, percentages and decimals AC9M6P01	• assigning probabilities using common fractions, decimal and percentages	Understanding
Students conduct simulations using digital tools, to generate and record the outcomes from many trials of a chance experiment.	**Probability** • conduct repeated chance experiments and run simulations with an increasing number of trials using digital tools; compare observations with expected results and discuss the effect on variation of increasing the number of trials AC9M6P02	• generating and recording the outcomes from many trials of a chance experiment	Fluency
		• conducting simulations using digital tools	Problem-solving

Aspect of the achievement standard	Related content description/s	Examples of evidence	Mathematical proficiencies
They compare observed frequencies to the expected frequencies of the outcomes of chance experiments.	**Probability** • conduct repeated chance experiments and run simulations with an increasing number of trials using digital tools; compare observations with expected results and discuss the effect on variation of increasing the number of trials AC9M6P02	• comparing observed frequencies to the expected frequencies of the outcomes of chance experiments	Reasoning

Table 2: Key terms used in Mathematics SEs

Term	Description
Simple familiar	In questions of this degree of difficulty, students respond to situations where: • relationships and interactions are obvious and have few elements; and • all of the information to solve the problem is identifiable, that is – the required procedure is clear from the way the problem is posed, or – in a context that has been a focus of prior learning. Students are not required to interpret, clarify and analyse problems to develop responses.
Complex familiar	In questions of this degree of difficulty, students respond to situations where: • relationships and interactions have a number of elements, such that connections are made with subject matter within and/or across the strands of mathematics; and • all of the information to solve the problem is identifiable, that is – the required procedure is clear from the way the problem is posed, or – in a context that has been a focus of prior learning. Some interpretation, clarification and analysis will be required to develop responses. Shifting the level of complexity may include making changes to the: • amount of scaffolding • number of steps required to solve the problem/situation • changes to increments, benchmarks or scales on axes • number of attributes considered.
Complex unfamiliar	In questions of this degree of difficulty, students respond to situations where: • relationships and interactions have a number of elements, such that connections are made with subject matter within and/or across the strands of mathematics; and • all the information to solve the problem is not immediately identifiable, that is – the required procedure is not clear from the way the problem is posed, and – in a context in which students have had limited prior experience. Students interpret, clarify and analyse problems to develop responses. Shifting the level of familiarity may include making changes to the: • context for application, e.g. financial, measurement, spatial or statistical • type of representation, e.g. physical, visual or symbolic • orientation of representation, e.g. horizontal or vertical • merge of subject matter/concepts from across different strands.