Year 9 Mathematics Curriculum and assessment plan

Example

Level description	Conte
In Year 9, learning in Mathematics builds on each student's prior learning and experiences. Students engage in a range of approaches to learning and doing mathematics that develop their understanding of and fluency with concepts, procedures, and processes by making connections, reasoning, problem-solving and practice. Proficiency in mathematics enables students to respond to familiar and unfamiliar situations by employing mathematical strategies to make informed decisions and solve problems efficiently. Students further develop proficiency and positive dispositions towards mathematics and its use as they:	The Ye lesson • timin
 apply scientific notation in measurement contexts, routinely consider accuracy in measurement and work with absolute, relative and percentage errors in a range of different measurement contexts 	• sum the r
 work with the real number line as a geometric model for real numbers that provides a continuous measurement scale; locate different fractions exactly on the common scale of the real number line using scale and similarity, and locate some irrational square roots of natural numbers using Pythagoras' theorem 	explo mate
 use linear and quadratic functions to model a broad range of phenomena and contexts, make predictions, and represent these using tables, graphs and algebra, including with the use of digital tools 	dyna whic
 manipulate algebraic expressions involving variables, exponents, and the expansion and factorisation of simple quadratic expressions using a variety of techniques including tables, diagrams, algorithms and digital tools 	math
• formulate and solve related linear and non-linear equations exactly or approximately using numerical, graphical and algebraic approaches	
• solve measurement problems about the surface area and volume of objects and apply formulas to solve problems, calculating these and related dimensions of objects as required	
• use similarity, scale, trigonometry, enlargement transformations, the triangle inequality and Pythagoras' theorem to solve practical problems using given sets of information	
 investigate probabilities of compound events from two-step experiments and solve related problems; use a variety of representations such as Venn diagrams, tree diagrams, two-way tables and grids to assist in determining the probabilities for these events; design experiments to gather empirical data about relative frequencies and use these to check their reasoning 	

• compare multiple numerical data subsets in context and analyse their distributions with consideration of symmetry and skew; justify their choice of data representation with respect to data types and context, and critically review the statistical presentation of data and related arguments of others.



ACiQ v9.0

ext and cohort considerations

Year 9 cohort participates in regular mathematics ns. This plan has considered:

ing of NAPLAN in Term 1

nmative and formative data from Year 8 showing need to support and extend on students' wledge of algebra

bloration and use of digital tools (e.g. virtual terial, electronic devices, simulation programs and namic geometric software) in relevant contexts, ch supports the learning and doing of thematics.



Unit 1 — Possibilities and decisions	Unit 2 — Thinking outside the box	Unit 3 — Shaping up nicely	Unit 4 —
Duration: 10 weeks	Duration: 10 weeks	Duration: 10 weeks	Duration:
When reaching complex financial and practical decisions, it is important to make conceptual connections across different strands of mathematics. In this unit, students compare values, identify and interrogate relationships, solve equations and use mathematical models and simulations to find solutions to problems. In the first phase of this unit, students explore line segments on a Cartesian plane through practical examples (e.g. amap of the school) and make connections between the distance, midpoint and gradient of a line segment with other mathematical concepts including Pythagoras' theorem, means, ratios and rates. In the second part of this phase, students then apply their knowledge of direct proportion, ratio and scale factor to solve practical problems, including problems in financial contexts, e.g. creating a floor plan for a space in a house and calculating the cost of resources to build it. They apply the enlargement transformation to images of shapes and objects, and interpret results. This phase of the unit will be assessed in the end-of-semester examination in Term 2. Students demonstrate their proficiency with mathematical modelling in the extended response part of the examination, where they enlarge a logo and determine the cost to produce it. In the second phase of this unit, students use their critical and creative thinking skills to design and conduct repeated chance experiments and simulations for combined events, using digital tools. They trial various experiments to list outcomes for compound events, with and without replacement, and calculate relative frequencies to estimate probabilities of events involving 'and', inclusive 'or' and exclusive 'or'. They make connections in their mathematical learning through the use of real-world contexts (e.g. planning a weekend outing with several activities) to analyse the probabilities of different combinations of events during the outing. Through their probability experiment and simulations task, they determine the outcomes for compound events and repr	In this unit, students break down information into fundamental parts for analysis in statistics and measurement design. In the first phase of this unit, students build on their knowledge of data collection and representation techniques from Year 8. They use ethical understanding, digital literacy, and critical and creative thinking skills to investigate and analyse a variety of reports (e.g. public opinion surveys and data from the Australian Bureau of Statistics) collected from online databases. Students analyse how sampling methods and representation choices can be used to support a particular point of view. Students then plan and conduct a statistical investigation and use digital tools (e.g. spreadsheets and data analysis software) to represent the distribution of multiple data sets using comparative data displays for analysis. Students report their findings in a statistical investigation report, including consideration of centre, spread and shape, the effect of outliers on these measures, justification of the data display and a discussion of the strength of evidence to support their conclusions. In the second phase of this unit, students use an environmental stimulus (e.g. rainwater tank design) to solve problems involving volume, and surface area of right prisms and cylinders. This builds on students' proficiency with volume and area from Year 8. This unit concludes with an end-of-semester examination, covering topics from Units 1 and 2.	Trigonometry supports the development of creative and critical thinking needed for problem-solving, through the application of theorems and algorithms. Students build their proficiency with trigonometry, enlargement and reduction of objects and shapes and geometric constructions through this unit. In the first phase of this unit, students extend their knowledge of similarity, ratio and Pythagoras' theorem from Year 8 and Unit 1 to develop their understanding of scale factor and trigonometry. Through practical investigations, using hands-on materials (e.g. rope, string and tape measures, and diagrams; architecture designs, house and garden designs), students make conceptual connections between direct proportion, ratio, similarity and scale factor involving the enlargement and reduction of objects and shapes. They apply this knowledge to explain these transformations and solve problems. Students continue to use this knowledge to investigate and understand trigonometric ratios using materials (e.g. handmade clinometers) to solve problems involving right-angled triangles in the school environment, e.g. measuring the height of buildings and sport equipment. In these practical contexts, students calculate and interpret absolute, relative and percentage errors in measurements, recognising that all measurements are estimates. Students connect their understanding of rational and irrational numbers to the theoretical and practical solutions to problems. Student proficiency is assessed in an end-of-semester examination in Term 4.	The use of enhances and structu scenarios. develops a relationshi decisions i In the first knowledge evaluate e variables. notation ar organisms distance b involving v time scales area mode commutati introduced real-world thrown into binomials a Students u interpreting solve mon school env garden bee minimise p In the secco linear or qu solutions. S to create m height of a investment

- Functioning in everyday life

10 weeks

of mathematical expressions and models s problem-solving skills, providing a systematic ctured approach when analysing real-world s. Students' application of mathematical models a deep understanding of quantitative hips, empowering students to make informed s in various aspects of their daily lives.

phase of this unit, students extend their algebraic of exponent laws from Year 8 to simplify and xpressions involving integer exponents and Students connect this knowledge to scientific nd explore real-world contexts (e.g. the size of that cannot be seen with the naked eye, the between planets, speed of light) to solve problems very small and very large measurements, and es. Students use materials (e.g. algebra tiles and els) to build an understanding of associative, ve and distributive properties. They are to the concept of quadratic functions through scenarios, e.g. modelling the path of a ball the air with a quadratic function. They expand and factorise monic quadratic expressions. use digital tools to graph quadratic functions, g features (e.g. symmetry and turning point) and nic quadratic equations with integer roots using vironment scenarios (e.g. expressing the area of ed as a monic quadratic equation to maximise or perimeter).

cond phase of this unit, students demonstrate how quadratic functions can be chosen to model . Students connect their mathematical knowledge models in real-world contexts, e.g. modelling the a projectile over time or comparing two financial ents over time.

concludes with a two-part end-of-semester tion, covering topics from Units 3 and 4.

Where there is an assessment item within a unit, the corresponding achievement standard aspect/s is indicated in blue.

Where there is an assessment item that is assessed across units, e.g. end-of-semester examination, the corresponding achievement standard aspect/s is indicated in orange.

	Unit 1 — Possibilities and decisions		Unit 2 — Thinking outside the box	Unit 3 — Shaping up nicely	Unit 4 — Functioning in everyday life				
	Assessment 1 — Probability experiment and simulations	Term/ week	Assessment 2 — Project: Statistical investigation	Term/ week	Assessment 4 — Project: Computational thinking	Term/ week	Assessment 5 — Examination	Term/ week	
Assessment	 Description: Students explore and simulate the probability rules of a five-gesture expansion of the classic game Rock Paper Scissors to the game Rock, Paper, Scissors, Spock, Lizard. They discuss the fairness of the game and recommend the circumstances in which the game would be best played. Their report includes: listing all outcomes for compound events both with and without replacement, assign probabilities to outcomes calculating relative frequencies from given or collected data to estimate probabilities of events involving 'and', inclusive 'or' and exclusive 'or'. Technique: Project Mode: Multimodal Conditions: issued in Week 7 and completed by end of Week 9 (including 3 hours of class time) multimodal response up to 5 minutes practical as negotiated 	Term 1 Week 5	 Description: In this task, students plan and conduct a statistical investigation to collect data from three samples of text. Sample A and Sample B will have an author identified and Sample C will be anonymous. Using data analysis, they will make an inference about the identity of the author of Sample C. Technique: Project Mode: Written Conditions: issued in Week 3 and completed by the end of Week 5 (including 2 hours of class time) written responses up to 800 words Description: Part A: Short response Students answer short response questions, focusing on: finding the distance between two points on the Cartesian plane, and the gradient and midpoint of a line segment applying formulas to solve problems involving the surface area and volume of right prisms and cylinders. Part B: Extended response Students use mathematical modelling processes to determine the cost to replicate an enlarged version of a given logo. Technique: Examination Mode: Written Conditions: up to 70 minutes, plus 5 minutes perusal supervised conditions calculator allowed 	Term 2 Week 5 Term/ week Term 2 Week 9	 Description: Students investigate Pythagorean triples using computational thinking. Students design an algorithm and test it to ensure the sequence of steps will create a Pythagorean triple and reject a triple that is not Pythagorean. Students present their algorithm and reasoning to the class through a multimodal presentation. Technique: Project Mode: Multimodal Conditions: issued in Week 7 and completed by end of Week 9 (including 3 hours of class time) multimodal response up to 5 minutes 	Term 3 Week 9	 Description: Students undertake a two-part end-of-semester examination covering topics from Units 3 and 4. Part A: Short response Students answer questions focusing on: recognising and using rational and irrational numbers to solve problems applying the exponent laws to numerical expressions with integer exponents and extending this to variables expanding binomial products and factorising monic quadratic expressions, simplifying algebraic expressions identifying and graphing quadratic functions, solving quadratic equations graphically and numerically solving monic quadratic equations with integer roots algebraically expressing small and large numbers in scientific notation solving problems involving ratio, similarity and scale in two-dimensional situations, determining percentage errors in measurements applying Pythagoras' theorem and using trigonometric ratios to solve problems involving right-angled triangles Part B: Extended response Students respond to a mathematical modelling scenario, choosing linear or quadratic functions to model the costs for a school function. Students experiment, graphically and algebraically, with the effect of variations of parameters to evaluate the model and report their findings. Technique: Examination Mode: Written Conditions: Part A and Part B each up to 70 minutes, plus 5 minutes perusal supervised conditions 	Term 4 Week 8	

Achievement standard

Moderation

Unit 1 — Possibilities and decisions

Unit 2 — Thinking outside the box

By the end of Year 9, students recognise and use rational and irrational numbers to solve problems. They extend and apply the exponent laws with positive integers to variables. Students expand binomial products, and factorise monic quadratic expressions. They find the distance between 2 points on the Cartesian plane, and the gradient and midpoint of a line segment. Students use mathematical modelling to solve problems involving change in financial and other applied contexts, choosing to use linear and quadratic functions. They graph guadratic functions and solve monic guadratic equations with integer roots algebraically. Students describe the effects of variation of parameters on functions and relations, using digital tools, and make connections between their graphical and algebraic representations.

They apply formulas to solve problems involving the surface area and volume of right prisms and cylinders. Students solve problems involving ratio, similarity and scale in two-dimensional situations. They determine percentage errors in measurements. Students apply Pythagoras' theorem and use trigonometric ratios to solve problems involving right-angled triangles. They use mathematical modelling to solve practical problems involving direct proportion, ratio and scale, evaluating the model and communicating their methods and findings. Students express small and large numbers in scientific notation. They apply the enlargement transformation to images of shapes and objects, and interpret results. Students design, use and test algorithms based on geometric constructions or theorems.

They compare and analyse the distributions of multiple numerical data sets, choose representations, describe features of these data sets using summary statistics and the shape of distributions, and consider the effect of outliers. Students explain how sampling techniques and representation can be used to support or question conclusions or to promote a point of view. They determine sets of outcomes for compound events and represent these in various ways. Students assign probabilities to the outcomes of compound events. They design and conduct experiments or simulations for combined events using digital tools.

Expert: Refer to QCAA moderation advice on the QCAA website under the Assessment tab in the learning area.

By the end of Year 9, students recognise and use rational and irrational numbers to solve problems. They extend and apply the exponent laws with positive integers to variables. Students expand binomial products, and factorise monic quadratic expressions. They find the distance between 2 points on the Cartesian plane, and the gradient and midpoint of a line segment. Students use mathematical modelling to solve problems involving change in financial and other applied contexts, choosing to use linear and quadratic functions. They graph guadratic functions and solve monic guadratic equations with integer roots algebraically. Students describe the effects of variation of parameters on functions and relations, using digital tools, and make connections between their graphical and algebraic representations.

They apply formulas to solve problems involving the surface area and volume of right prisms and cylinders. Students solve problems involving ratio, similarity and scale in two-dimensional situations. They determine percentage errors in measurements. Students apply Pythagoras' theorem and use trigonometric ratios to solve problems involving right-angled triangles. They use mathematical modelling to solve practical problems involving direct proportion, ratio and scale, evaluating the model and communicating their methods and findings. Students express small and large numbers in scientific notation. They apply the enlargement transformation to images of shapes and objects, and interpret results. Students design, use and test algorithms based on geometric constructions or theorems.

They compare and analyse the distributions of multiple numerical data sets, choose representations, describe features of these data sets using summary statistics and the shape of distributions, and consider the effect of outliers. Students explain how sampling techniques and representation can be used to support or question conclusions or to promote a point of view. They determine sets of outcomes for compound events and represent these in various ways. Students assign probabilities to the outcomes of compound events. They design and conduct experiments or simulations for combined events using digital tools.

Calibration:

Refer to QCAA moderation advice on the QCAA website under the Assessment tab in the learning area.

Unit 3 — Shaping up nicely

By the end of Year 9, students recognise and use rational and irrational numbers to solve problems. They extend and apply the exponent laws with positive integers to variables. Students expand binomial products, and factorise monic quadratic expressions. They find the distance between 2 points on the Cartesian plane, and the gradient and midpoint of a line segment. Students use mathematical modelling to solve problems involving change in financial and other applied contexts, choosing to use linear and quadratic functions. They graph guadratic functions and solve monic guadratic equations with integer roots algebraically. Students describe the effects of variation of parameters on functions and relations, using digital tools, and make connections between their graphical and algebraic representations.

They apply formulas to solve problems involving the surface area and volume of right prisms and cylinders. Students solve problems involving ratio, similarity and scale in two-dimensional situations. They determine percentage errors in measurements. Students apply Pythagoras' theorem and use trigonometric ratios to solve problems involving right-angled triangles. They use mathematical modelling to solve practical problems involving direct proportion, ratio and scale, evaluating the model and communicating their methods and findings. Students express small and large numbers in scientific notation. They apply the enlargement transformation to images of shapes and objects, and interpret results. Students design, use and test algorithms based on geometric constructions or theorems.

They compare and analyse the distributions of multiple numerical data sets, choose representations, describe features of these data sets using summary statistics and the shape of distributions, and consider the effect of outliers. Students explain how sampling techniques and representation can be used to support or question conclusions or to promote a point of view. They determine sets of outcomes for compound events and represent these in various ways. Students assign probabilities to the outcomes of compound events. They design and conduct experiments or simulations for combined events using digital tools.

Calibration:

Refer to QCAA moderation advice on the QCAA website under the Assessment tab in the learning area.

They compare and analyse the distributions of multiple numerical data sets, choose representations, describe features of these data sets using summary statistics and the shape of distributions, and consider the effect of outliers. Students explain how sampling techniques and representation can be used to support or question conclusions or to promote a point of view. They determine sets of outcomes for compound events and represent these in various ways. Students assign probabilities to the outcomes of compound events. They design and conduct experiments or simulations for combined events using digital tools.

Unit 4 — Functioning in everyday life

By the end of Year 9, students recognise and use rational and irrational numbers to solve problems. They extend and apply the exponent laws with positive integers to variables. Students expand binomial products, and factorise monic quadratic expressions. They find the distance between 2 points on the Cartesian plane, and the gradient and midpoint of a line segment. Students use mathematical modelling to solve problems involving change in financial and other applied contexts, choosing to use linear and quadratic functions. They graph quadratic functions and solve monic quadratic equations with integer roots algebraically. Students describe the effects of variation of parameters on functions and relations, using digital tools, and make connections between their graphical and algebraic representations.

They apply formulas to solve problems involving the surface area and volume of right prisms and cylinders. Students solve problems involving ratio, similarity and scale in two-dimensional situations. They determine percentage errors in measurements. Students apply Pythagoras' theorem and use trigonometric ratios to solve problems involving right-angled triangles. They use mathematical modelling to solve practical problems involving direct proportion, ratio and scale, evaluating the model and communicating their methods and findings. Students express small and large numbers in scientific notation. They apply the enlargement transformation to images of shapes and objects, and interpret results. Students design, use and test algorithms based on geometric constructions or theorems.

Consensus:

Refer to QCAA moderation advice on the QCAA website under the Assessment tab in the learning area.

Content descriptions	Units				Content descriptions	Units		Units		Content descriptions		Un	its	
Number	1	2	3	4	Algebra	1	2	3	4	Measurement	1	2	3	4
recognise that the real number system includes the rational numbers and the irrational numbers, and solve problems involving real numbers using digital tools AC9M9N01			V		apply the exponent laws to numerical expressions with integer exponents and extend to variables AC9M9A01					solve problems involving the volume and surface area of right prisms and cylinders using appropriate units AC9M9M01				
					simplify algebraic expressions, expand binomial products and factorise monic quadratic expressions AC9M9A02				V	solve problems involving very small and very large measurements, time scales and intervals expressed in scientific notation AC9M9M02				Ø
					find the gradient of a line segment, the midpoint of the line interval and the distance between 2 distinct points on the Cartesian plane AC9M9A03	V				colve spatial problems, applying angle properties, scale, similarity, Pythagoras' theorem and rigonometry in right-angled triangles AC9M9M03				
					identify and graph quadratic functions, solve quadratic equations graphically and numerically, and solve monic quadratic equations with integer roots algebraically, using graphing software and digital tools as appropriate AC9M9A04				V	calculate and interpret absolute, relative and percentage errors in measurements, recognising that all measurements are estimates AC9M9M04			V	
					use mathematical modelling to solve applied problems involving change including financial contexts; formulate problems, choosing to use either linear or quadratic functions; interpret solutions in terms of the situation; evaluate the model and report methods and findings AC9M9A05				V	use mathematical modelling to solve practical problems involving direct proportion, rates, ratio and scale, including financial contexts; formulate the problems and interpret solutions in terms of the situation; evaluate the model and report methods and findings AC9M9M05	V			
					experiment with the effects of the variation of parameters on graphs of related functions, using digital tools, making connections between graphical and algebraic representations, and generalising emerging patterns AC9M9A06				V					

Content descriptions		Ur	nits		Content descriptions	Units			Units Content descriptions		Units			
Space	1	2	3	4	Statistics	1	2	3	4	Probability		2	3	4
recognise the constancy of the sine, cosine and tangent ratios for a given angle in right-angled triangles using properties of similarity AC9M9SP01			V		analyse reports of surveys in digital media and elsewhere for information on how data was obtained to estimate population means and medians AC9M9ST01		V			list all outcomes for compound events both with and without replacement, using lists, tree diagrams, tables or arrays; assign probabilities to outcomes AC9M9P01	V			
apply the enlargement transformation to shapes and objects using dynamic geometry software as appropriate; identify and explain aspects that remain the same and those that change AC9M9SP02	V				analyse how different sampling methods can affect the results of surveys and how choice of representation can be used to support a particular point of view AC9M9ST02		V			calculate relative frequencies from given or collected data to estimate probabilities of events nvolving "and", inclusive "or" and exclusive "or" AC9M9P02				
design, test and refine algorithms involving a sequence of steps and decisions based on geometric constructions and theorems; discuss and evaluate refinements AC9M9SP03			V		represent the distribution of multiple data sets for numerical variables using comparative representations; compare data distributions with consideration of centre, spread and shape, and the effect of outliers on these measures AC9M9ST03		V			design and conduct repeated chance experiments and simulations, using digital tools to compare probabilities of simple events to related compound events, and describe results AC9M9P03				
					choose appropriate forms of display or visualisation for a given type of data; justify selections and interpret displays for a given context AC9M9ST04		V							
					plan and conduct statistical investigations involving the collection and analysis of different kinds of data; report findings and discuss the strength of evidence to support any conclusions AC9M9ST05		V							

General capabilities	Units						
	1	2	3	4			
Critical and creative thinking	V	V	V	V			
Digital literacy	V	V	V	V			
Ethical understanding		V					
Intercultural understanding							
Literacy							
Numeracy	V	V	V	V			
Personal and social capability							

Cross-curriculum priorities	Units							
	1	2	3	4				
Aboriginal and Torres Strait Islander histories and cultures								
Asia and Australia's engagement with Asia								
Sustainability								

© 🛈 © State of Queensland (QCAA) 2023

Licence: https://creativecommons.org/licenses/by/4.0 | Copyright notice: www.qcaa.qld.edu.au/copyright — lists the full terms and conditions, which specify certain exceptions to the licence. | Attribution (include the link): © State of Queensland (QCAA) 2023 www.qcaa.qld.edu.au/copyright.

Unless otherwise indicated, material from Australian Curriculum is © ACARA 2010-present, licensed CC BY 4.0. For the latest information and additional terms of use, see the Australian Curriculum website and its copyright notice.