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| Year 9 Mathematics curriculum and assessment plan  Example |

# Curriculum overview

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| Year level description | Cohort description |
| The proficiency strands **understanding, fluency, problem-solving** and **reasoning** are an integral part of mathematics content across the three content strands: number and algebra, measurement and geometry, and statistics and probability. The proficiencies reinforce the significance of working mathematically within the content and describe how the content is explored or developed. They provide the language to build in the developmental aspects of the learning of mathematics. The achievement standards reflect the content and encompass the proficiencies.  At this year level:   * **understanding** includes describing the relationship between graphs and equations, simplifying a range of algebraic expressions, and explaining the use of relative frequencies to estimate probabilities and of the trigonometric ratios for right-angle triangles * **fluency** includes applying the index laws to expressions with integer indices, expressing numbers in scientific notation, listing outcomes for experiments, developing familiarity with calculations involving the Cartesian plane and calculating areas of shapes and surface areas of prisms * **problem-solving** includes formulating and modelling practical situations involving surface areas and volumes of right prisms, applying ratio and scale factors to similar figures, solving problems involving right-angle trigonometry and collecting data from secondary sources to investigate an issue * **reasoning** includes following mathematical arguments, evaluating media reports and using statistical knowledge to clarify situations, developing strategies in investigating similarity and sketching linear graphs. | This year level plan has not been developed with a specific cohort in mind. It is provided as an example of the intent of the Australian Curriculum: Mathematics, and reflective of QCAA advice and resources. |
| Course organisation |
| This year level plan is written with the consideration that all school scenarios for delivery of Mathematics are unique. It is written to:   * offer units of work that could be adapted to suit multiple contexts as required by the school, including allocated time and resources * consider different types of assessment that are suitable for the Mathematics learning area * provide examples for schools to adapt to their own contexts. |

# Unit overview

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| Term 1 | Term 2 | Term 3 | Term 4 |
| Unit 1 — Keeping the balance | Unit 2 — Proving that you are right | Unit 3 — Nothing in the world exists without a shape or a pattern | Unit 4 — Be careful making claims |
| This unit will extend students’ knowledge of indices from the Year 8 curriculum and introduce students to scientific notation and expanding binomials.  Using digital technologies, students will be able to explore why extremely large and small numbers and time scales are expressed using scientific notation. Through extending and applying index laws and expanding binomial expressions, students will have the opportunity to become critical and creative thinkers and solve algebraic complex problems. | This unit will extend students’ knowledge of area, volume, and probability from the Year 8 curriculum and introduce students to simple interest.  Using mathematical modelling, students will be encouraged to be critical and creative thinkers and solve problems involving simple interest, surface area and volume of right prisms. Through hands-on two-step chance experiments, students will assign probabilities to outcomes, determine probabilities for events and calculate the relative frequencies. | This unit will extend students’ knowledge on congruency and ratio from the Year 8 curriculum and introduce students to similarity, scale factor, trigonometry and Pythagoras’ theorem.  Using hands-on collaborative inquiry opportunities and digital technologies, students will solve problems using ratio and scale factor in similar figures and explain similarity in triangles. Students will also be encouraged to be critical and creative thinkers as they use similarity to investigate trigonometric ratios and Pythagoras’ theorem, and their application to solving simple problems involving right-angled triangles. | This unit will extend students’ knowledge on plotting and solving linear equations from the Year 8 curriculum to being able to find the distance, gradient and midpoint between two points located on a Cartesian plane. Students will also apply their knowledge on data collection techniques, and further develop their skills in constructing data representations and data interpretation.  Using digital technologies, students will investigate graphical and algebraic techniques for finding the distance, midpoint and gradient of a line and determining the linear rules. They will also sketch linear and simple non-linear relations. Students will be encouraged to be critical thinkers while investigating population as well as environmental issues in the Asia–Pacific region that involve evaluating data collection techniques from a range of primary and secondary sources. They will use digital technologies to construct numerical and categorical data displays for interpretation, description and comparison. |

# Assessment overview

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|  | Term 1 | | Term 2 | | Term 3 | | Term 4 | |
|  | Unit 1 — Keeping the balance | Week/s | Unit 2 — Proving that you are right | Week/s | Unit 3 — Nothing in the world exists without a shape or a pattern | Week/s | Unit 4 — Be careful making claims | Week/s |
| Assessment | Technique: Examination  In this examination, students will answer short response questions that focus on the mathematical concepts of algebra, indices and scientific notation.  Format: Written   * Part A — 60% simple familiar questions * Part B — 20% complex familiar and 20% unfamiliar questions   Conditions: 60 minutes including 10 minutes perusal | 9 | Technique: Project  In this problem-solving and modelling project, students will prepare a report for their parents outlining the full costs of the construction of a pool including a loan to pay for it.  Format: Written  Conditions:   * 3 weeks * Up to 6 pages (including tables, figures and diagrams) * 600–800 words | 9 | Technique: Examination  In this examination, students will answer short response questions that focus on the mathematical concepts of Pythagoras' theorem, trigonometry, similarity, scale factor and chance.  Format: Written   * Part A — 60% simple familiar questions * Part B — 20% complex familiar and 20% unfamiliar questions   Conditions: 60 minutes including 10 minutes perusal | 9 | Technique: Examination  In this examination, students will answer short response questions that focus on the mathematical concepts of linear relationships and statistics.  Format: Written   * Part A — 60% simple familiar questions * Part B — 20% complex familiar and 20% unfamiliar questions   Conditions: 60 minutes including 10 minutes perusal | 8 |
| Achievement standard | By the end of Year 9, students solve problems involving simple interest. They interpret ratio and scale factors in similar figures. Students explain similarity of triangles. They recognise the connections between similarity and the trigonometric ratios. Students compare techniques for collecting data from primary and secondary sources. They make sense of the position of the mean and median in skewed, symmetric and bi-modal displays to describe and interpret data.  Students apply the index laws to numbers and express numbers in scientific notation. They expand binomial expressions. They find the distance between two points on the Cartesian plane and the gradient and midpoint of a line segment. They sketch linear and non-linear relations. Students calculate areas of shapes and the volume and surface area of right prisms and cylinders. They use Pythagoras' Theorem and trigonometry to find unknown sides of right-angled triangles. Students calculate relative frequencies to estimate probabilities, list outcomes for two-step experiments and assign probabilities for those outcomes. They construct histograms and back-to-back stem-and-leaf plots. | | By the end of Year 9, students solve problems involving simple interest. They interpret ratio and scale factors in similar figures. Students explain similarity of triangles. They recognise the connections between similarity and the trigonometric ratios. Students compare techniques for collecting data from primary and secondary sources. They make sense of the position of the mean and median in skewed, symmetric and bi-modal displays to describe and interpret data.  Students apply the index laws to numbers and express numbers in scientific notation. They expand binomial expressions. They find the distance between two points on the Cartesian plane and the gradient and midpoint of a line segment. They sketch linear and non-linear relations. Students calculate areas of shapes and the volume and surface area of right prisms and cylinders. They use Pythagoras' Theorem and trigonometry to find unknown sides of right-angled triangles. Students calculate relative frequencies to estimate probabilities, list outcomes for two-step experiments and assign probabilities for those outcomes. They construct histograms and back-to-back stem-and-leaf plots. | | By the end of Year 9, students solve problems involving simple interest. They interpret ratio and scale factors in similar figures. Students explain similarity of triangles. They recognise the connections between similarity and the trigonometric ratios. Students compare techniques for collecting data from primary and secondary sources. They make sense of the position of the mean and median in skewed, symmetric and bi-modal displays to describe and interpret data.  Students apply the index laws to numbers and express numbers in scientific notation. They expand binomial expressions. They find the distance between two points on the Cartesian plane and the gradient and midpoint of a line segment. They sketch linear and non-linear relations. Students calculate areas of shapes and the volume and surface area of right prisms and cylinders. They use Pythagoras' Theorem and trigonometry to find unknown sides of right-angled triangles. Students calculate relative frequencies to estimate probabilities, list outcomes for two-step experiments and assign probabilities for those outcomes. They construct histograms and back-to-back stem-and-leaf plots. | | By the end of Year 9, students solve problems involving simple interest. They interpret ratio and scale factors in similar figures. Students explain similarity of triangles. They recognise the connections between similarity and the trigonometric ratios. Students compare techniques for collecting data from primary and secondary sources. They make sense of the position of the mean and median in skewed, symmetric and bi-modal displays to describe and interpret data.  Students apply the index laws to numbers and express numbers in scientific notation. They expand binomial expressions. They find the distance between two points on the Cartesian plane and the gradient and midpoint of a line segment. They sketch linear and non-linear relations. Students calculate areas of shapes and the volume and surface area of right prisms and cylinders. They use Pythagoras' Theorem and trigonometry to find unknown sides of right-angled triangles. Students calculate relative frequencies to estimate probabilities, list outcomes for two-step experiments and assign probabilities for those outcomes. They construct histograms and back-to-back stem-and-leaf plots. | |
| Moderation | Calibration: A facilitating teacher will select samples representing each grade on the five-point scale described in the task-specific standards from each class to use in the calibration process.  After the calibration process, the class teacher will grade their students’ responses, applying the shared understanding they have gained. | | Conferencing: The class teacher will grade all student responses using the task-specific standards. They will select samples representing each grade on the five-point scale described in the task-specific standards to use in the conferencing process.  After the conferencing process, the class teacher will apply their shared understanding of the standards to review their students’ responses and grades. | | Expert: The class teacher will select samples representing each grade on the five-point scale described in the task‑specific standards and submit these to the HOD. The HOD will mark the samples using the task-specific standards and compare their judgment with the grade awarded by the class teacher.  The class teacher will use the HOD's advice to review their students’ responses and grades, applying the shared understanding they have gained. | | Calibration: A facilitating teacher will select samples representing each grade on the five-point scale described in the task-specific standards from each class to use in the calibration process.  After the calibration process, the class teacher will grade all their students’ responses, applying the shared understanding they have gained. | |

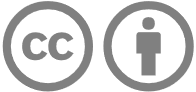
# Teaching and learning focus

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| Content descriptions | | | | | | | | | | | | | | |
| Number and Algebra | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Measurement and Geometry | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Statistics and Probability | Unit 1 | Unit 2 | Unit 3 | Unit 4 |
| Real numbers  Solve problems involving direct proportion. Explore the relationship between graphs and equations corresponding to simple rate problems |  |  |  | ✓ | Using units of measure  Calculate areas of composite shapes |  | ✓ |  |  | Chance  List all outcomes for two-step chance experiments, both with and without replacement using tree diagrams or arrays. Assign probabilities to outcomes and determine probabilities for events |  |  | ✓ |  |
| Apply index laws to numerical expressions with integer indices | ✓ |  |  |  | Calculate the surface area and volume of cylinders and solve related problems |  | ✓ |  |  | Calculate relative frequencies from given or collected data to estimate probabilities of events involving 'and' or 'or' |  |  | ✓ |  |
| Express numbers in scientific notation | ✓ |  |  |  | Solve problems involving the surface area and volume of right prisms |  | ✓ |  |  | Investigate reports of surveys in digital media and elsewhere for information on how data were obtained to estimate population means and medians |  |  |  | ✓ |
| Money and financial mathematics  Solve problems involving simple interest |  | ✓ |  |  | Investigate very small and very large time scales and intervals | ✓ |  |  |  | Data representations and interpretation  Identify everyday questions and issues involving at least one numerical and at least one categorical variable, and collect data directly and from secondary sources |  |  |  | ✓ |
| Patterns and algebra  Extend and apply the index laws to variables, using positive integer indices and the zero index | ✓ |  |  |  | Geometric reasoning  Use the enlargement transformation to explain similarity and develop the conditions for triangles to be similar |  |  | ✓ |  | Construct back-to-back stem-and-leaf plots and histograms and describe data, using terms including 'skewed', 'symmetric' and 'bi modal' |  |  |  | ✓ |
| Apply the distributive law to the expansion of algebraic expressions, including binomials, and collect like terms where appropriate | ✓ |  |  |  | Solve problems using ratio and scale factors in similar figures |  |  | ✓ |  | Compare data displays using mean, median and range to describe and interpret numerical data sets in terms of location (centre) and spread |  |  |  | ✓ |
| Linear and non-linear relationships  Find the distance between two points located on the Cartesian plane using a range of strategies, including graphing software |  |  |  | ✓ | Pythagoras and trigonometry  Investigate Pythagoras' Theorem and its application to solving simple problems involving right angled triangles |  |  | ✓ |  |
| Find the midpoint and gradient of a line segment (interval) on the Cartesian plane using a range of strategies, including graphing software |  |  |  | ✓ | Use similarity to investigate the constancy of the sine, cosine and tangent ratios for a given angle in right-angled triangles |  |  | ✓ |  |
| Sketch linear graphs using the coordinates of two points and solve linear equations |  |  |  | ✓ | Apply trigonometry to solve right-angled triangle problems |  |  | ✓ |  |
| Graph simple non-linear relations with and without the use of digital technologies and solve simple related equations |  |  |  | ✓ |

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| **General capabilities** | **Year 9** | | | |  | **Cross-curriculum priorities** | **Year 9** | | | |
| **Unit** | **1** | **2** | **3** | **4** |  | **Unit** | **1** | **2** | **3** | **4** |
| Literacy | ✓ | ✓ | ✓ | ✓ |  | Aboriginal and Torres Strait Islander histories and culture |  |  |  | ✓ |
| Numeracy | ✓ | ✓ | ✓ | ✓ |  | Asia and Australia’s engagement with Asia |  |  |  | ✓ |
| Information and communication technology | ✓ | ✓ | ✓ | ✓ |  | Sustainability |  |  |  | ✓ |
| Critical and creative thinking | ✓ | ✓ | ✓ | ✓ |  |  |  |  |  |  |
| Personal and social capability | ✓ | ✓ |  | ✓ |  |  |  |  |  |  |
| Intercultural understanding |  |  |  | ✓ |  |  |  |  |  |  |
| Ethical understanding |  |  |  | ✓ |  |  |  |  |  |  |

# Planning considerations

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| Prior to implementation the teaching team will consider questions such as:   * Where has prior and future learning across the year level/band been reflected in the plan? * Are there adequate opportunities for students to develop depth of conceptual understanding and sophistication of skills across the year level/band? * Does the plan ensure adequate opportunities for students to demonstrate the achievement standard/s by the end of the year level/band? * Are the timing and demands of the planned assessment appropriate in relation to assessment of other learning areas and subjects taught in this year? * Are there any Indigenous cultural and intellectual property (ICIP) rights to consider? For guidance, see <https://smartcopying.edu.au/guidelines/copyright-basics/indigenous-cultural-and-intellectual-property-rights>. * Do the assessment techniques and conditions offer a range and balance across the year/band? What strategies for authentication are included? * What moderation processes will be used? When will assessment and moderation occur? * Is the planned teaching, learning and assessment sequence appropriate for reporting purposes? * Do strategies for differentiation and reasonable adjustments complement the teaching, learning and assessment sequence? * How will planned strategies for differentiation and reasonable adjustments impact other year level/band plans? |
| Following implementation, the teaching team will consider questions such as:   * Was the teaching, learning and assessment effective? * Are there opportunities to improve the effectiveness of the teaching, learning and assessment? If so, what? * Were there any common student misconceptions that need, or needed, to be clarified? * How do student outcomes in this year of learning impact on the planning of subsequent year level /band plans? |

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