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| Year 10 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 applying the four operations to algebraic fractions, finding unknowns in formulas after substitution, making the connection between equations of relations and their graphs, comparing simple and compound interest in financial contexts and determining probabilities of two- and three-step experiments
* **fluency** includes factorising and expanding algebraic expressions, using a range of strategies to solve equations and using calculations to investigate the shape of data sets
* **problem-solving** includes calculating the surface area and volume of a diverse range of prisms to solve practical problems, finding unknown lengths and angles using applications of trigonometry, using algebraic and graphical techniques to find solutions to simultaneous equations and inequalities and investigating independence of events
* **reasoning** includes formulating geometric proofs involving congruence and similarity, interpreting and evaluating media statements and interpreting and comparing data sets.
 | 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.

Year 10A is optional and intended to enrich and extend students' mathematical knowledge while completing the common Year 10 curriculum. The 10A content provides foundational knowledge for students who intend to study Mathematical Methods or Specialist Mathematics in the senior secondary years. Each unit includes content descriptions from the 10A curriculum and can be completed according to the needs and interests of students.**Senior pathways**Senior Mathematics pathways are diverse. Consideration of these pathways is necessary when designing a course of work — opportunities to develop the knowledge and skills necessary to succeed in these pathways should be evident across a course of study.Senior pathways include: Essential Mathematics, General Mathematics, Mathematical Methods, Numeracy and Specialist Mathematics. |

# 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 from the Year 9 curriculum of indices and linear relationships and will extend their knowledge of the basic algebraic foundation of ‘reducing’ and ‘balancing’ equations to make them simpler and easier to use and apply in real-world contexts. Using collaborative inquiry opportunities, students will use formulas to find unknowns and engage with digital technologies to solve problems involving linear relationships in a variety of settings. These concepts, skills and processes are used in many contexts and industries to solve complex problems. **10A:** Students will have the opportunity to extend their knowledge of index laws to include surds and fractional indices and be introduced to logarithmic expressions and laws of logarithms. | This unit will extend students’ knowledge from the Year 9 curriculum to find unknown lengths and angles using trigonometry. They will apply geometric reasoning to prove similarity and congruence of shapes and apply deductive reasoning to proofs.Using mathematical modelling and problem-solving opportunities, students will engage with digital technologies to explore and use trigonometry. They will be encouraged to be critical and creative thinkers to apply geometric and deductive reasoning to plane shapes. The concepts, skills and processes explored in this unit are used in many contexts and industries to solve complex problems.**10A:** Students will have the opportunity to extend their knowledge of trigonometry to unit circles and geometric reasoning to include chord properties of circles.  | This unit will extend students’ knowledge from the Year 9 curriculum to solve problems involving the surface area and volume of prisms. This unit also relies on the knowledge and skills developed in solving linear equations and inequations in Unit 1. Students will extend their knowledge and understanding by using digital technologies to explore the connection between algebraic and graphical representations and solve equations. These concepts, skills and processes are used in many contexts and industries, and encourage students to be critical and creative thinkers and problem solvers. **10A:** Students will have the opportunity to extend their knowledge of volume and area to pyramids, cones and spheres. They will factorise monic and non-monic quadratic expressions to solve problems. They will apply transformations to describe, interpret and sketch parabolas, hyperbolas, circles and exponential functions. The 10A students will have the opportunity to investigate polynomials and apply their understanding to sketching and describing curves.  | This unit will extend students’ knowledge from the Year 9 curriculum to recognise the connection between simple and compound interest in financial contexts.Using digital technologies to generate simulations, students will conduct chance experiments to determine the probability of events and interpret and compare data sets. Students will also apply critical thinking skills when looking at the ethical issues and responsibilities that need to be considered when borrowing money. They will also engage in statistical investigations about the biodiversity changes in Australia over time, and about teenage health risks.**10A:** Students will have the opportunity to extend their knowledge of using the mean and standard deviation to interpret data and investigate different techniques for finding the ‘line of best fit’ in bivariate numerical data sets. |

# 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: ExaminationIn this examination, students will answer short response questions that focus on the mathematical concepts of algebra and linear relationships.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: ProjectIn this problem-solving and modelling task, students will use trigonometry and geometric reasoning to determine the length of the proposed pedestrian bridge between two school buildings.Format: WrittenConditions:* 4 weeks
* 600–800 words, excluding appendixes
 | 9 | Technique: ExaminationIn this examination, students will answer short response questions that focus on the mathematical concepts of algebra, non‑linear relationships, volume and area. Format: Written* Part A — 60% simple familiar questions
* Part B — 20% complex familiar and 20% unfamiliar questions

Conditions: 70 minutes including 10 minutes perusal | 9 | Technique: ExaminationIn this examination, students will answer short response questions that focus on the mathematical concepts of financial mathematics, chance, data representation and interpretation. Format: Written* Part A — 60% simple familiar questions
* Part B — 20% complex familiar and 20% unfamiliar questions

Conditions:* Time: 70 minutes including 10 minutes perusal
* Use of technology is required
* Formula sheet is provided
* Notes are not permitted
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| Achievement standard | By the end of Year 10, students recognise the connection between simple and compound interest. They solve problems involving linear equations and inequalities. They make the connections between algebraic and graphical representations of relations. Students solve surface area and volume problems relating to composite solids. They recognise the relationships between parallel and perpendicular lines. Students apply deductive reasoning to proofs and numerical exercises involving plane shapes. They compare data sets by referring to the shapes of the various data displays. They describe bivariate data where the independent variable is time. Students describe statistical relationships between two continuous variables. They evaluate statistical reports. |  | By the end of Year 10, students recognise the connection between simple and compound interest. They solve problems involving linear equations and inequalities. They make the connections between algebraic and graphical representations of relations. Students solve surface area and volume problems relating to composite solids. They recognise the relationships between parallel and perpendicular lines. Students apply deductive reasoning to proofs and numerical exercises involving plane shapes. They compare data sets by referring to the shapes of the various data displays. They describe bivariate data where the independent variable is time. Students describe statistical relationships between two continuous variables. They evaluate statistical reports. |  | By the end of Year 10, students recognise the connection between simple and compound interest. They solve problems involving linear equations and inequalities. They make the connections between algebraic and graphical representations of relations. Students solve surface area and volume problems relating to composite solids. They recognise the relationships between parallel and perpendicular lines. Students apply deductive reasoning to proofs and numerical exercises involving plane shapes. They compare data sets by referring to the shapes of the various data displays. They describe bivariate data where the independent variable is time. Students describe statistical relationships between two continuous variables. They evaluate statistical reports. |  | By the end of Year 10, students recognise the connection between simple and compound interest. They solve problems involving linear equations and inequalities. They make the connections between algebraic and graphical representations of relations. Students solve surface area and volume problems relating to composite solids. They recognise the relationships between parallel and perpendicular lines. Students apply deductive reasoning to proofs and numerical exercises involving plane shapes. They compare data sets by referring to the shapes of the various data displays. They describe bivariate data where the independent variable is time. Students describe statistical relationships between two continuous variables. They evaluate statistical reports. |  |
|  | Students expand binomial expressions and factorise monic quadratic expressions. They find unknown values after substitution into formulas. They perform the four operations with simple algebraic fractions. Students solve simple quadratic equations and pairs of simultaneous equations. They use triangle and angle properties to prove congruence and similarity. Students use trigonometry to calculate unknown angles in right-angled triangles. Students list outcomes for multi-step chance experiments and assign probabilities for these experiments. They calculate quartiles and inter-quartile ranges |  | Students expand binomial expressions and factorise monic quadratic expressions. They find unknown values after substitution into formulas. They perform the four operations with simple algebraic fractions. Students solve simple quadratic equations and pairs of simultaneous equations. They use triangle and angle properties to prove congruence and similarity. Students use trigonometry to calculate unknown angles in right-angled triangles. Students list outcomes for multi-step chance experiments and assign probabilities for these experiments. They calculate quartiles and inter-quartile ranges. |  | Students expand binomial expressions and factorise monic quadratic expressions. They find unknown values after substitution into formulas. They perform the four operations with simple algebraic fractions. Students solve simple quadratic equations and pairs of simultaneous equations. They use triangle and angle properties to prove congruence and similarity. Students use trigonometry to calculate unknown angles in right-angled triangles. Students list outcomes for multi-step chance experiments and assign probabilities for these experiments. They calculate quartiles and inter-quartile ranges. |  | Students expand binomial expressions and factorise monic quadratic expressions. They find unknown values after substitution into formulas. They perform the four operations with simple algebraic fractions. Students solve simple quadratic equations and pairs of simultaneous equations. They use triangle and angle properties to prove congruence and similarity. Students use trigonometry to calculate unknown angles in right-angled triangles. Students list outcomes for multi-step chance experiments and assign probabilities for these experiments. They calculate quartiles and inter-quartile ranges. |  |
| 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.  | 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. | 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. |

# Teaching and learning focus

**Key:** 10A content descriptions

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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 |
| Money and financial mathematicsConnect the compound interest formula to repeated applications of simple interest using appropriate digital technologies  |  |  |  | ✓ | Using units of measure Solve problems involving surface area and volume for a range of prisms, cylinders and composite solids |  |  | ✓ |  | Chance Describe the results of two- and three-step chance experiments, both with and without replacements, assign probabilities to outcomes and determine probabilities of events. Investigate the concept of independence |  |  |  | ✓ |
| Real numbers Define rational and irrational numbers and perform operations with surds and fractional indices  | ✓ |  |  |  | Solve problems involving surface area and volume of right pyramids, right cones, spheres and related composite solids  |  |  | ✓ |  | Use the language of ‘if ...then, ‘given’, ‘of’, ‘knowing that’ to investigate conditional statements and identify common mistakes in interpreting such language  |  |  |  | ✓ |
| Use the definition of a logarithm to establish and apply the laws of logarithms | ✓ |  |  |  | Geometric reasoningFormulate proofs involving congruent triangles and angle properties  |  | ✓ |  |  | Investigate reports of studies in digital media and elsewhere for information on their planning and implementation  |  |  |  | ✓ |
| Patterns and algebra Factorise algebraic expressions by taking out a common algebraic factor | ✓ |  |  |  | Apply logical reasoning, including the use of congruence and similarity, to proofs and numerical exercises involving plane shapes |  | ✓ |  |  | Data representations and interpretationDetermine quartiles and interquartile range  |  |  |  | ✓ |
| Simplify algebraic products and quotients using index laws  | ✓ |  |  |  | Prove and apply angle and chord properties of circles |  | ✓ |  |  | Construct and interpret box plots and use them to compare data sets   |  |  |  | ✓ |
| Apply the four operations to simple algebraic fractions with numerical denominators   | ✓ |  |  |  | Pythagoras and trigonometry Solve right-angled triangle problems including those involving direction and angles of elevation and depression  |  | ✓ |  |  | Compare shapes of box plots to corresponding histograms and dot plots  |  |  |  | ✓ |
| Expand binomial products and factorise monic quadratic expressions using a variety of strategies |  |  | ✓ |  | Establish the sine, cosine and area rules for any triangle and solve related problems  |  | ✓ |  |  | Use scatter plots to investigate and comment on relationships between two numerical variables  |  |  |  | ✓ |
| Substitute values into formulas to determine an unknown  | ✓ |  |  |  | Use the unit circle to define trigonometric functions, and graph them with and without the use of digital technologies  |  | ✓ |  |  | Investigate and describe bivariate numerical data where the independent variable is time  |  |  |  | ✓ |
| Investigate the concept of a polynomial and apply the factor and remainder theorems to solve problems  |  |  | ✓ |  | Solve simple trigonometric equations   |  | ✓ |  |  | Evaluate statistical reports in the media and other places by linking claims to displays, statistics and representative data  |  |  |  | ✓ |
| Linear and non-linear relationships Solve problems involving linear equations, including those derived from formulas   | ✓ |  |  |  | Apply Pythagoras’ theorem and trigonometry to solving three-dimensional problems in right-angled triangles  |  | ✓ |  |  | Calculate and interpret the mean and standard deviation of data and use these to compare data sets  |  |  |  | ✓ |
| Solve linear inequalities and graph their solutions on a number line  | ✓ |  |  |  | Use information technologies to investigate bivariate numerical data sets. Where appropriate use a straight line to describe the relationship allowing for variation  |  |  |  | ✓ |
| Solve linear simultaneous equations, using algebraic and graphical techniques including using digital technology  | ✓ |  |  |  |
| Solve problems involving parallel and perpendicular lines  | ✓ |  |  |  |
| Explore the connection between algebraic and graphical representations of relations such as simple quadratics, circles and exponentials using digital technology as appropriate  |  |  | ✓ |  |
| Solve linear equations involving simple algebraic fractions  | ✓ |  |  |  |
| Solve simple quadratic equations using a range of strategies  |  |  | ✓ |  |
| Solve simple exponential equations |  |  | ✓ |  |
| Describe, interpret and sketch parabolas, hyperbolas, circles and exponential functions and their transformations  |  |  | ✓ |  |
| Apply understanding of polynomials to sketch a range of curves and describe the features of these curves from their equation |  |  | ✓ |  |
| Factorise monic and non-monic quadratic expressions and solve a wide range of quadratic equations derived from a variety of contexts  |  |  | ✓ |  |

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| **General capabilities** | **Year 10** |  | **Cross-curriculum priorities** | **Year 10** |
| **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?
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| Following implementation, the teaching team will consider question 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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