

Year level plan	Mathematics	Year level	Year 10
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Curriculum intent	Year level description	<p>The proficiency strands <i>Understanding, Fluency, Problem Solving and Reasoning</i> 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.</p> <p>At this year level:</p> <p>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.</p> <p>Fluency includes factorising and expanding algebraic expressions, using a range of strategies to solve equations and using calculations to investigating the shape of data sets.</p> <p>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.</p> <p>Reasoning includes formulating geometric proofs involving congruence and similarity, interpreting and evaluating media statements and interpreting and comparing data sets.</p>
	Achievement standard	<p>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.</p> <p>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.</p>

Unit Overview		SEMESTER 1		SEMESTER 2	
Sequencing teaching and learning		Unit 1	Unit 2	Unit 3	Unit 4
		<p>Students develop understandings of:</p> <ul style="list-style-type: none"> Pythagoras and trigonometry — revise Pythagoras' Theorem and solve contextualised problems, apply the trigonometric ratios to solve problems, by substituting into formulas, in two and three dimensions and solve contextualised trigonometric problems including surveying and orienteering. Chance — describe the results of two- and three-step chance experiments, assign and determine probabilities including conditional probability and investigate the concepts of dependence and independence. <p><i>10A students may also be taught to:</i></p> <ul style="list-style-type: none"> <i>Pythagoras and trigonometry — perform operations with surds, apply Pythagoras' theorem and trigonometry to three dimensional problems, establish and apply the sine and cosine rules and solve related problems, define and graph trigonometric functions and solve simple trigonometric equations.</i> <i>Chance — evaluate media statements and statistical reports.</i> 	<p>Students develop understandings of:</p> <ul style="list-style-type: none"> Patterns and algebra — apply the four operations to algebraic fractions, manipulate expressions and equations to solve problems involving algebraic fractions, expand and factorise quadratics. Linear and non-linear relationships — explore connections between algebraic and graphical representations, make generalisations in relation to parallel and perpendicular lines, identify the solution to two intersecting linear equations, apply graphical and substitution methods to find solutions and solve contextualised problems, formulate & solve real life problems involving monic quadratic expressions and equations, adapt graphing techniques to solve problems involving monic quadratics, make connections between functions and their graphical representations, extend application of graphing techniques from linear functions to parabolas, circles & exponential functions. <p><i>10A students may also be taught to:</i></p> <ul style="list-style-type: none"> <i>Patterns and algebra — choose appropriate methods to factorise monic and non-monic quadratic expressions.</i> 	<p>Students develop understandings of:</p> <ul style="list-style-type: none"> Using units of measurement — recall formulas to calculate area and volume, calculate the surface area and volume of prisms and cylinders, solve problems involving calculating surface area and volume of composite solids Geometric reasoning — recall angle relationships for straight lines, triangles and quadrilaterals, prove angle relationships using formal proofs, develop proofs for congruency and similarity rules and apply understanding of plane shapes to prove geometric properties. Data representation and interpretation — develop an understanding of statistical measures of centre and spread to describe data sets, analyse data displays (box plots, histograms and scatter plots) to make generalisations, calculate statistical measures of data sets, graphically represent relationships, draw a line of best fit, apply known strategies to compare data, manipulate reports and data displays to identify trends, use statistical measures to analyse data and reports. <p><i>10A students may also be taught to:</i></p> <ul style="list-style-type: none"> <i>Using units of measurement — solve problems involving the calculation of volume and surface area of pyramids, cones and spheres.</i> 	<p>Students develop understandings of:</p> <ul style="list-style-type: none"> Money and financial mathematics — recall simple and compound interest formulas, calculate simple and compound interest, connect simple and compound interest, substitute into a formula, connect graphical and algebraic representations of functions, solve financial problems involving compound interest and loans. Linear and non-linear relationships — represent and solve problems involving simple linear equations, represent and solve problems involving simple linear inequalities and solve simultaneous equations graphically. <p><i>10A students may also be taught to:</i></p> <ul style="list-style-type: none"> <i>Real numbers — define a logarithm, make connections between exponential and logarithmic expressions, establish and apply the laws of logarithms, simplify expressions using logarithmic laws and solve financial problems involving the use of logarithms.</i> <i>Linear and non-linear relationships — identify the features of a polynomial, connect a written division algorithm and the factor and remainder theorems and sketch polynomials.</i>

			<p><i>Linear and non-linear relationships — apply the elimination method to find solutions and solve contextualised problems, formulate and solve real life problems involving monic and non-monic quadratic equations, transform relations and functions & simplify expressions involving irrational numbers.</i></p>	<ul style="list-style-type: none"> • <i>Geometric reasoning — develop generalisations about angle relationships in a circle, apply knowledge of proof to circle-geometry theorem relationships, use the properties of circles to determine and justify unknown quantities relating to circle geometry.</i> • <i>Data representation and interpretation — find and use an equation for the line of best fit to describe the relationship between two variables, calculate and use standard deviation to describe the spread of a data set, compare data sets using the mean and standard deviation.</i> 	
	<p>General capabilities and cross-curriculum priorities</p>	<p>Opportunities to engage with:</p>	<p>Opportunities to engage with:</p>	<p>Opportunities to engage with:</p>	<p>Opportunities to engage with:</p>
	<p>Key</p>	<p><i>General capabilities</i></p> <ul style="list-style-type: none"> Literacy Numeracy Information and Communication Technology (ICT) Capability 	<ul style="list-style-type: none"> Personal and Social Capability Ethical Understanding Intercultural Understanding Critical and Creative thinking 	<p><i>Cross-curriculum priorities</i></p> <ul style="list-style-type: none"> Aboriginal and Torres Strait Islander Histories and Cultures Asia and Australia's Engagement with Asia Sustainability 	

Assessment	Assessment	Student responses to summative assessment tasks contribute to their assessment folio. It provides evidence of their learning and represents their achievements over reporting period. The assessment folio should include a range and balance of assessments to make valid judgments about whether the student has met the achievement standard.			
	Semester 1		Semester 2		
	Year 10 Unit 1: Using trigonometry to calculate unknown angles and distances <i>Short answer questions</i> Students use trigonometry to calculate unknown angles and distances.	Year 10: Unit 2: Applying algebraic concepts to relationships <i>Short answer questions</i> Students use algebraic and graphical methods to solve problems involving linear and non-linear relationships.	Year 10: Unit 3: Evaluating media reports <i>Supervised assessment</i> Students evaluate statements made in reports with regard to supporting data. To demonstrate understanding of parallel box plots and other data displays.	Year 10: Unit 4: Determining compound interest and inequalities <i>Short answer questions</i> Solve problems involving simple interest, compound interest and inequalities.	
	Year 10A: Unit 1: Using Pythagoras' theorem and trigonometry to calculate unknown angles and distances <i>Short answer questions</i> Students use Pythagoras' theorem, trigonometry ratios and trigonometry rules to calculate unknown angles and distances.	Year 10A: Unit 2: Applying algebraic and transformation concepts to relationships <i>Short answer questions</i> Students solve problems involving linear and non-linear relationships, using algebraic and graphical representations.	Year 10A: Unit 3: Evaluating media reports <i>Supervised assessment</i> Students evaluate statements made in reports with regard to supporting data. To demonstrate understanding of parallel box plots and other data displays.	Year 10A: Unit 4: Determining compound interest, logarithms, inequalities and polynomials. <i>Short answer questions</i> Students solve problems involving simple interest, compound interest, logarithms, inequalities and polynomials.	
	Year 10: Unit 1: Investigating probability in a design situation <i>Assignment/Project</i> Students investigate the use of probability in playing and designing target games.		Year 10: Unit 3: Applying volume, surface area and geometric reasoning <i>Short answer questions</i> Students solve problems involving surface area and volume of composite solids and apply logical reasoning and formulate proofs.		
	Year 10A: Unit 1: Investigating probability in a design situation <i>Assignment/Project</i> Students investigate the use of probability in playing and designing target games.		Year 10A: Unit 3: Applying measurement and geometric proofs <i>Short answer questions</i> Students solve problems involving surface area and volume of composite solids and apply logical reasoning and formulate proofs.		

Moderation	Consistency of teacher judgments	Teachers use moderation to support consistency of teacher judgments and comparability of reported results against the relevant achievement standards.
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Content descriptions for Year 10 Mathematics

Review for balance and coverage of content descriptions

Number and Algebra	Semester 1		Semester 2	
	Unit 1	Unit 2	Unit 3	Unit 4
Money and financial mathematics				
Connect the compound interest formula to repeated applications of simple interest using appropriate digital technologies (ACMNA229)				✓
Real numbers (10A)				
Define rational and irrational numbers and perform operations with surds and fractional indices (ACMNA264)	✓	✓		
Use the definition of a logarithm to establish and apply the laws of logarithms (ACMNA265)				✓
Patterns and algebra				
Factorise algebraic expressions by taking out a common algebraic factor (ACMNA230)		✓		
Simplify algebraic products and quotients using index laws (ACMNA231)		✓		
Apply the four operations to simple algebraic fractions with numerical denominators (ACMNA232)		✓		
Expand binomial products and factorise monic quadratic expressions using a variety of strategies (ACMNA233)		✓		
Substitute values into formulas to determine an unknown (ACMNA234)	✓	✓		✓
Patterns and algebra (10A)				
Investigate the concept of a polynomial and apply the factor and remainder theorems to solve problems (ACMNA266)				✓
Linear and non-linear relationships				
Solve problems involving linear equations, including those derived from formulas (ACMNA235)		✓		✓
Solve linear inequalities and graph their solutions on a number line (ACMNA236)				✓
Solve linear simultaneous equations, using algebraic and graphical techniques including digital technology (ACMNA237)		✓		✓
Solve problems involving parallel and perpendicular lines (ACMNA238)		✓		
Explore the connection between algebraic and graphical representations of relations such as simple quadratics, circles and exponentials using digital technology as appropriate (ACMNA239)		✓		✓
Solve linear equations involving simple algebraic fractions (ACMNA240)		✓		
Solve simple quadratic equations using a range of strategies (ACMNA241)		✓		
Linear and non-linear relationships (10A)				
Describe, interpret and sketch parabolas, hyperbolas, circles and exponential functions and their transformations (ACMNA267)		✓		
Apply understanding of polynomials to sketch a range of curves and describe the features of these curves from their equation (ACMNA268)				✓
Factorise monic and non-monic quadratic expressions and solve a wide range of quadratic equations derived from a variety of contexts (ACMNA269)		✓		
Solve simple exponential equations (ACMNA270)				✓
Measurement and Geometry	Semester 1		Semester 2	
	Unit 1	Unit 2	Unit 3	Unit 4
Using units of measurement				

Solve problems involving surface area and volume for a range of prisms, cylinders and composite solids (ACMMG242)			✓	
Using units of measurement (10A)				
Solve problems involving surface area and volume of right pyramids, right cones, spheres and related composite solids (ACMMG271)			✓	
Geometric reasoning				
Formulate proofs involving congruent triangles and angle properties (ACMMG243)			✓	
Apply logical reasoning, including the use of congruence and similarity, to proofs and numerical exercises involving plane shapes (ACMMG244)			✓	
Geometric reasoning (10A)				
Prove and apply angle and chord properties of circles (ACMMG272)			✓	
Pythagoras and trigonometry				
Solve right-angled triangle problems including those involving direction and angles of elevation and depression (ACMMG245)	✓			
Pythagoras and trigonometry (10A)				
Establish the sine, cosine and area rules for any triangle and solve related problems (ACMMG273)	✓			
Use the unit circle to define trigonometric functions, and graph them with and without the use of digital technologies (ACMMG274)	✓			
Solve simple trigonometric equations (ACMMG275)	✓			
Apply Pythagoras' theorem and trigonometry to solving three-dimensional problems in right-angled triangles (ACMMG276)	✓			
Statistics and Probability	Semester 1		Semester 2	
	Unit 1	Unit 2	Unit 3	Unit 4
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 (ACMSP246)	✓	✓	✓	✓
Use the language of 'if ... then', 'given', 'of', 'knowing that' to investigate conditional statements and identify common mistakes in interpreting such language (ACMSP247)				
Chance (10A)				
Investigate reports of studies in digital media and elsewhere for information on their planning and implementation (ACMSP277)	✓			
Data representation and interpretation				
Determine quartiles and interquartile range (ACMSP248)			✓	
Construct and interpret box plots and use them to compare data sets (ACMSP249)			✓	
Compare shapes of box plots to corresponding histograms and dot plots (ACMSP250)			✓	
Use scatter plots to investigate and comment on relationships between two continuous variables (ACMSP251)			✓	
Investigate and describe bivariate numerical data where the independent variable is time (ACMSP252)			✓	
Evaluate statistical reports in the media and other places by linking claims to displays, statistics and representative data (ACMSP253)			✓	
Data representation and interpretation (10A)				
Calculate and interpret the mean and standard deviation of data and use these to compare data sets (ACMSP278)			✓	

<p><i>Use information technologies to investigate bivariate numerical data sets. Where appropriate use a straight line to describe the relationship, allowing for variation (ACMSP279)</i></p>			✓	
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