Year 10 Level 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

CURRICULUM	SEMESTER 1		SEMESTER 2	
	Term 1	**Term 2**	**Term 3**	**Term 4**
Unit description	**Patterns and algebra** • Simplify algebraic products and quotients using index laws (ACMNA231) • Apply the four operations to simple algebraic fractions with numerical denominators (ACMNA232) • Substitute values into formulas to determine an unknown (ACMNA234) **Linear and non-linear equations** • Solve linear equations involving simple algebraic fractions(ACMNA240) • Solve problems involving linear equations, including those derived from formulas (ACMNA235) **Pythagoras and Trigonometry** • Solve right-angled triangle problems including those involving direction and angles of elevation and depression (ACMMG245)	**Linear and non-linear equations** • Solve linear inequalities and graph their solutions on a number line (ACMNA236) • Solve linear simultaneous equations, using algebraic and graphical techniques, including using digital technology (ACMNA237) PSMT • Solve problems involving parallel and perpendicular lines (ACMNA238) **Using units of measurement** • Solve problems involving surface area and volume for a range of prisms, cylinders and composite solids (ACMMG242) **Money and financial mathematics** • Connect the compound interest formula to repeated applications of simple interest using appropriate digital technologies (ACMNA229)	**Data representation and interpretation** • Determine quartiles and interquartile range (ACMSP248) PSMT • Construct and interpret box plots and use them to compare data sets (ACMSP249) PSMT • Compare shapes of box plots to corresponding histograms and dot plots (ACMSP250) PSMT • Use scatter plots to investigate and comment on relationships between two numerical variables (ACMSP251) PSMT • 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) PSMT **Patterns and algebra** • Factorise algebraic expressions by taking out a common algebraic factor (ACMNA230) • Expand binomial products and factorise monic quadratic expressions using a variety of strategies (ACMNA233) **Linear and non-linear equations**	**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) **Chance** • Describe the results of two- and three-step chance experiments, both with and without replacements (ACMSP246) • Use the language of 'if…then, 'given', 'of', 'knowing that' to investigate conditional statements and identify common mistakes in interpreting such language (ACMSP247)

			Explore the connection between algebraic and graphical representations of relations such as simple quadratics, circles and exponentials using digital technology as appropriate (ACMNA239) • Solve simple quadratic equations using a range of strategies (ACMNA241)	

ASSESSMENT		SEMESTER 1			SEMESTER 2		
		Term 1	Term 2		Term 3		Term 4
		Index laws, algebraic fractions, solving linear equations & trigonometry- AT1	Money, linear relationships, volume & surface area - AT2	Modelling motion with linear equations -AT3	Algebra, quadratics & statistics - AT4	Comparing body measurements -AT5	Geometric reasoning & probability- AT6
Range and balance of summative assessment conventions	Technique	Exam	Exam	Assignment	Exam	Assignment	Exam
	Type of text	Short response	Short response	Report	Short response	Report	Short response
	Mode	Written	Written	Written	Written	Written	Written
	Conditions	• Individual • Exam conditions • 2 lessons • Calculator allowed • Formula sheet provided	• Individual • Exam conditions • 2 lessons • Calculator allowed • Formula sheet provided	• 4 lessons of class time • Feedback and adjustments provided on Draft •	• Individual • Exam conditions • 2 lessons • Calculator allowed • Formula sheet provided	• 4 lessons of class time • Feedback and adjustments provided on Draft •	• Individual • Exam conditions • 2 lessons • Calculator allowed • Formula sheet provided

Aspects of the achievement standard							
recognise the connection between simple and compound interest			✓				
solve problems involving linear equations and inequalities		✓	✓	✓			
make the connections between algebraic and graphical representations of relations					✓		
solve surface area and volume problems relating to composite solids			✓				
recognise the relationships between parallel and perpendicular lines			✓				
apply deductive reasoning to proofs and numerical exercises involving plane shapes							✓
compare data sets by referring to the shapes of the various data displays					✓	✓	
describe bivariate data where the independent variable is time						✓	

Content description						
describe statistical relationships between two continuous variables					✓	
evaluate statistical reports					✓	
expand binomial expressions and factorise monic quadratic expressions				✓		
find unknown values after substitution into formulas	✓					
perform the four operations with simple algebraic fractions	✓					
solve simple quadratic equations and pairs of simultaneous equations		✓	✓	✓		
use triangle and angle properties to prove congruence and similarity						✓
use trigonometry to calculate unknown angles in right-angled triangles	✓					
list outcomes for multi-step chance experiments and assign probabilities for these experiments						✓
calculate quartiles and inter-quartile ranges				✓	✓	

PROFICIENCIES

The Australian Curriculum: Mathematics proficiency strands are understanding, fluency, problem-solving and reasoning. They describe how content is explored or developed; that is, the thinking and doing of mathematics.
The inclusion of the proficiencies in the curriculum is to ensure that student learning and student independence are at the centre of the curriculum. The curriculum focuses on developing increasingly sophisticated and refined mathematical proficiency skills. They enable students to respond to familiar and unfamiliar situations by employing mathematical strategies to make informed decisions and solve problems efficiently.

Understanding

Students build a robust knowledge of adaptable and transferable mathematical concepts. They make connections between related concepts and progressively apply the familiar to develop new ideas. They develop an understanding of the relationship between the 'why' and the 'how' of mathematics. Students build understanding when they connect related ideas, when they represent concepts in different ways, when they identify commonalities and differences between aspects of content, when they describe their thinking mathematically and when they interpret mathematical information.

Fluency

Students develop skills in choosing appropriate procedures; carrying out procedures flexibly, accurately, efficiently and appropriately; and recalling factual knowledge and concepts readily. Students are fluent when they calculate answers efficiently, when they recognise robust ways of answering questions, when they choose appropriate methods and approximations, when they recall definitions and regularly use facts, and when they can manipulate expressions and equations to find solutions.

Problem-solving

Students develop the ability to make choices, interpret, formulate, model and investigate problem situations, and communicate solutions effectively. Students formulate and solve problems when they use mathematics to represent unfamiliar or meaningful situations, when they design investigations and plan their approaches, when they apply their existing strategies to seek solutions, and when they verify that their answers are reasonable.

Reasoning

Students develop an increasingly sophisticated capacity for logical thought and actions, such as analysing, proving, evaluating, explaining, inferring, justifying and generalising. Students are reasoning mathematically when they explain their thinking, when they deduce and justify strategies used and conclusions reached, when they adapt the known to the unknown, when they transfer learning from one context to another, when they prove that something is true or false, and when they compare and contrast related ideas and explain their choices.