BitMaths

New South Wales Syllabus (2024) Alignment Guide

Stage 4

12/24

BitMaths was specifically written for the previous version of the New South Wales Syllabus. This comprehensive junior secondary numeracy program still largely aligns with the requirements of the latest New South Wales Syllabus.

Use this Alignment Guide to see how the Outcomes and Content are covered for Stage 4. The tables include the content descriptions matched against the relevant BitMaths module. Where applicable, we have also identified where you may need to supplement with your own material.

Stage 4 Number and algebra

Mathematical concept	Outcomes	Content	BitMaths Module
Computation with integers	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • compares, orders and calculates with integers to solve problems MA4-INT-C-01	**Compare and order integers**	
		• Recognise and describe the direction and magnitude of integers	**NA403** Adding and Subtracting Integers
		• Identify and represent integers on a number line	**NA403** Adding and Subtracting Integers
		• Compare the relative value of integers using the less than (<) and greater than (>) symbols	**NA403** Adding and Subtracting Integers
		• Order integers	**NA403** Adding and Subtracting Integers
		Add and subtract positive and negative integers	
		• Add and subtract integers with and without the use of digital tools	**NA403** Adding and Subtracting Integers
		• Construct a directed number sentence to model a situation	**NA403** Adding and Subtracting Integers
		• Examine different meanings (position or operation) for the + and − signs, depending on context	**NA403** Adding and Subtracting Integers
		Multiply and divide positive and negative integers	
		• Represent multiples of negative integers as repeated addition	There are no Stage 4 BitMaths modules that directly align to this description. To cover this description, you will need to supplement with your own material.
		• Multiply and divide positive and negative integers with and without the use of digital tools	**NA404** Operations with Integers and Fractions **NA427** Index Notation
		Apply the 4 operations to integers	
		• Apply the 4 operations to integers	**NA404** Operations with Integers and Fractions
		• Solve problems involving grouping symbols with integers	**NA404** Operations with Integers and Fractions
		• Apply the order of operations to evaluate expressions involving integers, with and without the use of digital tools	**NA404** Operations with Integers and Fractions
Fractions, decimals and percentages	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • represents and operates with fractions, decimals and percentages to solve problems MA4-FRC-C-01	**Compare fractions using equivalence**	
		• Determine the highest common factor (HCF) of 2 whole numbers	**NA428** Prime Factorisation
		• Examine methods of generating equivalent fractions	**NA405** Equivalent Fractions
		• Simplify fractions by using methods, including determining the HCF of the numerator and denominator or repeated simplification using common factors	**NA405** Equivalent Fractions
		• Create fractions with the same denominator to compare their sizes	**NA405** Equivalent Fractions
		• Compare and order fractions with different denominators	**NA405** Equivalent Fractions
		Round decimals to a specified degree of accuracy using approximations	
		• Round decimals to a given number of decimal places	**NA409** Rounding Decimals
		• Apply the notation ≈ as a symbol of numerical approximation	**NA409** Rounding Decimals

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Mathematical concept	Outcomes	Content	BitMaths Module
Fractions, decimals and percentages (continued)	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • represents and operates with fractions, decimals and percentages to solve problems MA4-FRC-C-01 (continued)	• Reason why an approximation may be more appropriate than an exact answer and vice versa	**NA409** Rounding Decimals In addition, students will have opportunities throughout BitMaths to reason why an approximation may be more appropriate than an exact answer and vice versa.
		Identify terminating and recurring decimals	
		• Use either dot or vinculum notation for recurring (repeating) decimals	**NA410** Terminating and Recurring Decimals
		• Classify decimals as recurring or terminating	**NA410** Terminating and Recurring Decimals
		Identify and make use of the relationship between fractions, decimals and percentages to carry out simple conversions	
		• Define rational numbers as numbers that can be written in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$	**NA411** Converting Between Fractions, Decimals and Percentages
		• Classify fractions and percentages as rational numbers	**NA411** Converting Between Fractions, Decimals and Percentages
		• Recognise and explain that numbers with terminating or recurring decimals are rational	**NA412** Rational and Irrational Numbers
		• Represent fractions as decimals (terminating and recurring) and percentages	**NA411** Converting Between Fractions, Decimals and Percentages
		• Represent terminating decimals as fractions and percentages	**NA411** Converting Between Fractions, Decimals and Percentages **NA410** Terminating and Recurring Decimals
		• Represent improper fractions as mixed numbers and decimals, and vice versa	**NA411** Converting Between Fractions, Decimals and Percentages **NA405** Equivalent Fractions
		• Represent percentages as fractions and decimals	**NA411** Converting Between Fractions, Decimals and Percentages
		Examine the concept of irrational numbers	
		• Identify and define irrational numbers as numbers that cannot be written in the form $\frac{a}{b}$ where a and b are integers and $b \neq 0$	**NA412** Rational and Irrational Numbers
		• Find approximations of irrational numbers using digital tools	**NA412** Rational and Irrational Numbers
		• Locate the approximate position of irrational numbers on a number line	There are no Stage 4 BitMaths modules that directly align to this description. To cover this description, you will need to supplement with your own material.
		Order and compare the value of fractions, decimals and percentages	
		• Locate positive and negative fractions, decimals and mixed numbers on a number line to compare their relative values	This description is partially covered in: **NA405** Equivalent Fractions To cover this description fully, you will need to supplement with your own material to locate decimals on a number line to compare their relative values.
		• Compare and order fractions, mixed numbers, decimals (terminating and recurring) and percentages	**NA411** Converting Between Fractions, Decimals and Percentages
		Solve problems that involve the addition and subtraction of fractions	
		• Represent addition and subtraction of fractions with the same or unrelated denominators	**NA406** Adding and Subtracting Fractions

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Mathematical concept	Outcomes	Content	BitMaths Module
Fractions, decimals and percentages (continued)	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • represents and operates with fractions, decimals and percentages to solve problems MA4-FRC-C-01 (continued)	• Solve problems involving adding and subtracting fractions and mixed numbers, including finding a common denominator	**NA406** Adding and Subtracting Fractions
		• Solve problems that involve subtracting a fraction from a whole number, with and without the use of digital tools	**NA406** Adding and Subtracting Fractions
		Solve problems that involve the multiplication and division of fractions and decimals	
		• Compare and generalise the effect of multiplying or dividing by a number with magnitude between zero and one	This description is partially covered in: **NA407** Multiplying and Dividing Fractions and Decimals To cover this description fully, you will need to supplement with your own material to compare and generalise the effect of multiplying or dividing by a number with magnitude between zero and one.
		• Represent multiplication and division of decimals	**NA407** Multiplying and Dividing Fractions and Decimals
		• Represent multiplication and division of fractions, including mixed numbers	**NA407** Multiplying and Dividing Fractions and Decimals
		• Multiply and divide decimals, using digital tools to solve problems	**NA407** Multiplying and Dividing Fractions and Decimals
		• Multiply and divide fractions and mixed numbers, with and without using digital tools to solve problems	**NA407** Multiplying and Dividing Fractions and Decimals
		• Compare initial estimates with the results of calculations	Students will have opportunities throughout BitMaths to compare initial estimates with the results of calculations
		• Apply knowledge of fractions and decimals of quantities to solve problems	**NA408** Expressing Quantities as Fractions **NA407** Multiplying and Dividing Fractions and Decimals
		• Apply knowledge of multiplication and division of fractions and decimals to solve problems	**NA407** Multiplying and Dividing Fractions and Decimals
		Represent one quantity as a fraction, decimal or percentage of another, with and without the use of digital tools	
		• Represent one quantity as a fraction, decimal or percentage of another by considering appropriate units	**NA411** Converting Between Fractions, Decimals and Percentages **NA413** Finding Percentages **NA408** Expressing Quantities as Fractions
		• Calculate percentage increases and decreases in various contexts	**NA414** Using Percentages **NA415** GST **NA416** Discounts **NA417** Profit and Loss
		• Examine the financial applications of percentage increase and decrease, including profit and/or loss as a percentage of cost price or selling price	**NA416** Discounts **NA417** Profit and Loss
		Solve problems that involve the use of percentages	
		• Apply knowledge of percentages to calculate quantities in various contexts	**NA413** Finding Percentages
		• Apply knowledge of percentage increases and decreases to solve problems in various contexts	**NA414** Using Percentages
		• Solve real-life problems involving percentages using the unitary method or other techniques	**NA414** Using Percentages
		• Solve financial problems involving percentages, specifically considering GST, profit and loss	**NA415** GST **NA417** Profit and Loss

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Mathematical concept	Outcomes	Content	BitMaths Module
Ratios and Rates	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • solves problems involving ratios and rates, and analyses distance–time graphs MA4-RAT-C-01	**Recognise and simplify ratios**	
		• Use ratios to compare 2 or more quantities measured in the same units	**NA418** Ratios
		• Identify and express one part of a ratio as a fraction of the whole	There are no Stage 4 BitMaths modules that directly align to this description. To cover this description, you will need to supplement with your own material.
		• Simplify ratios	**NA418** Ratios
		Solve problems involving ratios	
		• Apply the unitary method to solve ratio problems	**NA418** Ratios
		• Divide a quantity in a given ratio	**NA418** Ratios
		• Solve real-life problems involving ratios	**NA418** Ratios **NA419** Ratios and Rates
		Recognise and simplify rates	
		• Explain the differences between ratios and rates	**NA419** Ratios and Rates
		• Represent given information as a simplified rate	**NA419** Ratios and Rates
		• Convert between units for rates	This description is partially covered in Problem-solving extension tasks in: **NA419** Ratios and Rates **NA420** Travel Graphs You will need to supplement with your own material to fully cover how to convert between units for rates.
		Solve problems involving rates	
		• Solve a variety of real-life problems involving rates	**NA419** Ratios and Rates
		• Examine financial applications of rates, such as best buys	**NA416** Discounts
		Interpret and construct distance–time graphs from authentic data	
		• Interpret distance–time graphs made up of straight-line segments with a negative, zero or positive slope	**NA420** Travel Graphs
		• Calculate speeds for straight-line segments of given distance–time graphs	**NA420** Travel Graphs
		• Create distance–time graphs made up of straight-line segments	**NA420** Travel Graphs
Algebraic techniques	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • generalises number properties to operate with algebraic expressions including expansion and factorisation MA4-ALG-C-01	**Examine the concept of pronumerals as a way of representing numbers**	
		• Examine and recognise that pronumerals can be used to represent one or more numerical values and when pronumerals have more than one numerical value, they may then be referred to as variables	**NA421** Variables in Algebra **NA431** Solving Simple Linear Equations
		• Identify and define an algebraic expression as an expression formed by combining numbers and algebraic symbols using arithmetic operations	**NA421** Variables in Algebra **NA431** Solving Simple Linear Equations
		• Use concise algebraic notation and conventions for multiplication, division and powers, and explain the meanings for each convention	**NA421** Variables in Algebra **NA422** Applying Laws of Arithmetic to Algebra
		Create algebraic expressions and evaluate them by substitution	
		• Generate algebraic expressions by translating descriptions and vice versa	**NA421** Variables in Algebra **NA431** Solving Simple Linear Equations
		• Substitute numbers into algebraic expressions and evaluate the result	**NA424** Substitution in Algebra
		• Generate a number pattern from an algebraic expression	**NA434** Linear Relationships

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Mathematical concept	Outcomes	Content	BitMaths Module
Algebraic techniques (continued)	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • generalises number properties to operate with algebraic expressions including expansion and factorisation MA4-ALG-C-01 (continued)	**Extend and apply the laws and properties of arithmetic to algebraic terms and expressions**	
		• Generalise the associative property of addition and multiplication to algebraic expressions	**NA422** Applying Laws of Arithmetic to Algebra
		• Generalise the commutative property to algebraic expressions	**NA422** Applying Laws of Arithmetic to Algebra
		• Identify like terms, and add and subtract them to simplify algebraic expressions	**NA421** Variables in Algebra **NA423** Simplifying Algebraic Expressions
		• Simplify algebraic expressions that involve multiplication and division, including simple algebraic fractions	**NA423** Simplifying Algebraic Expressions
		• Simplify algebraic expressions involving mixed operations	**NA423** Simplifying Algebraic Expressions
		Extend and apply the distributive law to the expansion of algebraic expressions	
		• Explain the role and meaning of grouping symbols in algebraic expressions	**NA402** Laws of Arithmetic **NA425** Expanding Algebraic Expressions
		• Apply the distributive law to expand and simplify algebraic expressions by removing grouping symbols	**NA425** Expanding Algebraic Expressions
		Factorise algebraic expressions by identifying numerical and algebraic factors	
		• Identify and list factors of a single term	This description is partially covered in: **NA426** Factorising Algebraic Expressions To cover this description fully, you will need to supplement with your own material to identify and list factors of a single term.
		• Factorise algebraic expressions using knowledge of factors and finding the highest common numerical factor (HCF)	**NA426** Factorising Algebraic Expressions
		• Factorise algebraic expressions using knowledge of factors by finding a common algebraic factor, including expressions involving more than 2 terms, and verify the result by expansion	**NA426** Factorising Algebraic Expressions
Indices	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • operates with primes and roots, positive-integer and zero indices involving numerical bases and establishes the relevant index laws MA4-IND-C-01	**Apply index notation to represent whole numbers as products of powers of prime numbers**	
		• Describe numbers written in index form using terms such as base, power, index and exponent	**NA427** Index Notation
		• Represent numbers in index notation limited to positive powers	**NA427** Index Notation
		• Represent in expanded form and evaluate numbers expressed in index notation, including powers of 10	**NA427** Index Notation
		• Apply the order of operations to evaluate expressions involving indices	**NA427** Index Notation
		• Determine and apply tests for divisibility for 2, 3, 4, 5, 6 and 10	**NA428** Prime Factorisation
		• Represent a whole number greater than one as a product of its prime factors, using index notation where appropriate	**NA428** Prime Factorisation
		Examine cube roots and square roots	
		• Use the notations for square root $\sqrt{}$ and cube root $\sqrt[3]{}$	**NA429** Square and Cube Numbers
		• Recognise and describe the relationship between squares and square roots, and cubes and cube roots for positive numbers	**NA429** Square and Cube Numbers
		• Verify, through numerical examples, that $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$	**NA429** Square and Cube Numbers

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Mathematical concept	Outcomes	Content	BitMaths Module
Indices (continued)	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • operates with primes and roots, positive-integer and zero indices involving numerical bases and establishes the relevant index laws MA4-IND-C-01 (continued)	• Estimate the square root of any non-square whole number and the cube root of any non-cube whole number, then check using a calculator	NA429 Square and Cube Numbers
		• Identify and describe exact and approximate solutions in the context of square roots and cube roots	NA429 Square and Cube Numbers NA412 Rational and Irrational Numbers MG412 Pythagoras' Theorem
		• Apply the order of operations to evaluate expressions involving square roots, cube roots, square numbers and cube numbers	NA429 Square and Cube Numbers
		Use index notation to establish the index laws with positive-integer indices and the zero index • Establish the multiplication, division and the power of a power index laws, by expressing each number in expanded form with numerical bases and positive-integer indices	NA430 Index Laws
		• Verify through numerical examples that $(ab)^2 = a^2b^2$	There are no Stage 4 BitMaths modules that directly align to this description. To cover this description, you will need to supplement with your own material.
		• Establish the meaning of the zero index	NA430 Index Laws
		• Apply index laws to simplify and evaluate expressions with numerical bases	NA430 Index Laws
Equations	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • solves linear equations of up to 2 steps and quadratic equations of the form $ax^2 = c$ MA4-EQU-C-01	**Solve linear equations up to 2 steps** • Represent number sentences involving unknown quantities using pronumerals	NA421 Variables in Algebra NA431 Solving Simple Linear Equations
		• Describe number sentences as equations	NA421 Variables in Algebra NA431 Solving Simple Linear Equations
		• Distinguish between and compare algebraic expressions and equations	NA421 Variables in Algebra NA431 Solving Simple Linear Equations
		• Solve linear equations with integer and non-integer solutions using algebraic techniques that involve up to 2 steps, including equations with pronumerals on both sides	NA431 Solving Simple Linear Equations NA435 Solving Linear Equations
		• Model and solve word problems using equations of up to 2 steps	NA431 Solving Simple Linear Equations
		Solve and verify linear equations by substitution • Verify solutions to equations by substitution	NA431 Solving Simple Linear Equations NA435 Solving Linear Equations
		• Solve problems involving linear equations, including those arising from substituting given values into formulas	NA424 Substitution in Algebra NA431 Solving Simple Linear Equations NA435 Solving Linear Equations
		Solve quadratic equations • Reason why there are 2 values of x that satisfy a quadratic equation of the form $x^2 = c$ if $c>0$	NA432 Solving Simple Quadratic Equations
		• Solve problems involving quadratic equations of the form $ax^2 = c$, giving answers in exact form and as decimal approximations	NA432 Solving Simple Quadratic Equations
		• Solve quadratic equations arising from substitution into a formula	NA432 Solving Simple Quadratic Equations

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Mathematical concept	Outcomes	Content	BitMaths Module
Linear Relationships	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • creates and displays number patterns and finds graphical solutions to problems involving linear relationships MA4-LIN-C-01	**Plot and identify points on the Cartesian plane**	
		• Plot and label points on the Cartesian plane of given coordinates, including those with coordinates that are not whole numbers	NA433 The Cartesian Plane
		• Identify and record the coordinates of given points on the Cartesian plane, including those with coordinates that are not whole numbers	NA433 The Cartesian Plane
		Plot linear relationships on the Cartesian plane	
		• Construct a geometric pattern and record the results in a table of values	NA434 Linear Relationships
		• Represent a given number pattern (including decreasing patterns) using a table of values	NA434 Linear Relationships
		• Describe a number pattern in words and generate an equation using algebraic symbols	NA434 Linear Relationships
		• Apply an equation generated from a pattern to calculate the corresponding value for a smaller or larger number	NA434 Linear Relationships
		• Recognise that a linear relationship can be represented by a number pattern, an equation (or a rule using algebraic symbols), a table of values, a set of pairs of coordinates and a line graphed on a Cartesian plane, and move flexibly between these representations	NA434 Linear Relationships NA435 Solving Linear Equations
		• Explain that there are an infinite number of ordered pairs that satisfy a given linear relationship by extending a line joining a set of points on the Cartesian plane	NA434 Linear Relationships NA435 Solving Linear Equations
		• Compare similarities and differences of multiple straight-line graphs on the same set of axes using graphing applications	NA434 Linear Relationships
		• Describe linear relationships in real-life contexts and solve related problems	NA434 Linear Relationships NA435 Solving Linear Equations
		Solve linear equations using graphical techniques	
		• Recognise that each point on the graph of a linear relationship satisfies the equation of a line	NA434 Linear Relationships NA435 Solving Linear Equations
		• Apply graphs of linear relationships to solve a corresponding linear equation using graphing applications	NA434 Linear Relationships NA435 Solving Linear Equations
		• Graph 2 intersecting lines on the same set of axes and identify the point of intersection using either graphing applications or a table of values	NA435 Solving Linear Equations
		• Verify that the point of intersection satisfies the equations of both lines	NA435 Solving Linear Equations

Note: Module NA401 The Four Operations is revision content from Stage 3 New South Wales Syllabus

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Stage 4 Measurement and space

Mathematical concept	Outcomes	Content	BitMaths Module
Length	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • applies knowledge of the perimeter of plane shapes and the circumference of circles to solve problems MA4-LEN-C-01	**Solve problems involving the perimeter of various quadrilaterals and simple composite figures**	
		• Solve problems involving the perimeter of plane shapes, including parallelograms, trapeziums, rhombuses and kites	**MG401** Perimeter of Quadrilaterals
		• Solve problems relating to the perimeter of simple composite figures	**MG401** Perimeter of Quadrilaterals
		• Compare methods of solution for finding perimeter and evaluate the efficiency of those methods	This description is partially covered in: **MG401** Perimeter of Quadrilaterals To cover this description fully, you will need to supplement with your own materials to evaluate the efficiency of methods used to find perimeter.
		Describe the relationships between the features of circles	
		• Identify and describe the relationship between circle features, including the radius, diameter, arc, chord, sector and segment of a circle, and a tangent to a circle	**MG402** Circumference of Circles
		• Define π as the ratio of the circumference to the diameter of any circle	**MG402** Circumference of Circles
		• Verify that the number π is a constant and develop the formula for the circumference of a circle	**MG402** Circumference of Circles
		• Apply the formula for the circumference of a circle in terms of the diameter d or radius r (circumference of a circle = πd or $2 \pi r$) to solve related problems to solve related problems	**MG402** Circumference of Circles
		• Establish the arc length formula ($l = \frac{\theta}{360} \times 2 \pi r$) where l is the arc length and θ is the angle subtended at the centre by the arc	**MG402** Circumference of Circles
		• Solve problems by finding arc lengths and the perimeter of sectors, giving an exact answer in terms of π or an approximate answer	**MG402** Circumference of Circles
		• Find the perimeter of quadrants, semicircles and simple composite figures consisting of 2 shapes in a variety of contexts, including using digital tools	**MG402** Circumference of Circles
Right-angled triangles (Pythagoras' theorem)	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • applies Pythagoras' theorem to solve problems in various contexts MA4-PYT-C-01	**Identify and define Pythagoras' theorem**	
		• Identify and describe the hypotenuse as the side opposite the right angle and the longest side in any right-angled triangle	**MG412** Pythagoras' Theorem
		• Establish the relationship between the lengths of the sides of a right-angled triangle	**MG412** Pythagoras' Theorem
		• Use the relationship to record and define Pythagoras' theorem both algebraically and in words	**MG412** Pythagoras' Theorem
		Examine problems involving Pythagoras' theorem	
		• Apply Pythagoras' theorem to find the unknown length of a side in a right-angled triangle, giving answers in an exact form or as decimal approximations	**MG412** Pythagoras' Theorem
		• Apply the converse of Pythagoras' theorem to establish whether a triangle is right angled	**MG412** Pythagoras' Theorem
		• Solve practical problems involving Pythagoras' theorem before exploring a variety of related problems	**MG412** Pythagoras' Theorem
		• Justify whether a set of 3 integers is a Pythagorean triad	**MG412** Pythagoras' Theorem

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Stage 4 Measurement and space

Mathematical concept	Outcomes	Content	BitMaths Module
Area	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • applies knowledge of area and composite area involving triangles, quadrilaterals and circles to solve problems MA4-ARE-C-01	**Develop and use formulas to find the area of rectangles, triangles and parallelograms to solve problems**	
		• Apply the formula to find the area of a rectangle or square: $A = lb$, where l is the length and b is the breadth (or width) of the rectangle or square	**MG403** Formulas for Areas
		• Develop and apply the formula to find the area of a triangle: $A = \frac{1}{2}bh$, where b is the base length and h is the perpendicular height	**MG403** Formulas for Areas
		• Develop and apply the formula to find the area of a parallelogram: $A = bh$ where b is the base length and h is the perpendicular height	**MG403** Formulas for Areas
		• Calculate the area of composite figures that can be dissected into rectangles, squares, parallelograms or triangles to solve problems	**MG403** Formulas for Areas
		Develop and use the formula to find the area of circles and sectors to solve problems	
		• Develop and apply the formula to find the area of a circle: $A = \pi r^2$ where r is the length of the radius	**MG405** Area of Circles
		• Explain how the area of a sector can be developed from the area of a circle ($A = \frac{\theta}{360} \times \pi r^2$)	**MG405** Area of Circles
		• Find the area of quadrants, semicircles and sectors, and apply these formulas in the context of real-life problems	**MG405** Area of Circles
		• Calculate the areas of composite shapes involving quadrants, semicircles and sectors to solve problems	There are no Stage 4 BitMaths modules that directly align to this description. To cover this description, you will need to supplement with your own material.
		Develop and use the formulas to find the area of trapeziums, rhombuses and kites to solve problems	
		• Develop and apply the formula to find the area of a kite or rhombus: $A = \frac{1}{2}xy$, where x and y are the lengths of the diagonals	**MG404** Area of Quadrilaterals
		• Develop and apply the formula to find the area of a trapezium: $A = \frac{h}{2}(a + b)$, where h is the perpendicular height and a and b are the lengths of parallel sides	**MG404** Area of Quadrilaterals
		• Calculate the area of composite shapes involving trapeziums, kites and rhombuses to solve problems	There are no Stage 4 BitMaths modules that directly align to this description. To cover this description, you will need to supplement with your own material.
		Choose appropriate units of measurement for area and convert between units	
		• Choose an appropriate unit to measure the area of different shapes and surfaces, and justify the choice	**MG407** Units of Area and Volume
		• Convert between metric units of area using 1 cm^2 = 100 mm^2, 1 m^2 = 10 000 cm^2, 1 ha = 10 000 m^2 and 1 km^2 = 1 000 000 m^2 = 100 ha	**MG407** Units of Area and Volume

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Stage 4 Measurement and space

Mathematical concept	Outcomes	Content	BitMaths Module
Volume	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • applies knowledge of volume and capacity to solve problems involving right prisms and cylinders MA4-VOL-C-01	**Describe the different views of prisms and solids that have been formed from prism combinations**	
		• Represent prisms from different views in 2 dimensions, including top, side, front and back views	**MG406** Views of Prisms and Solids
		• Describe and illustrate solids formed from prism combinations from different views in 2 dimensions, including top, side, front and back views	**MG406** Views of Prisms and Solids
		• Identify and illustrate the cross-sections of different prisms	**MG406** Views of Prisms and Solids
		• Examine the idea that prisms have a uniform cross-section that is equal to the base area	**MG406** Views of Prisms and Solids
		• Determine if a particular solid has a uniform cross-section	**MG406** Views of Prisms and Solids
		Develop and apply the formula to find the volume of a prism to solve problems	
		• Develop the formula for the volume of a prism: $V = base\ area \times height$, leading to $V = A\,h$	**MG408** Volume of Prisms
		• Apply the formula for the volume of a prism to prisms with uniform cross-sections to solve problems	**MG408** Volume of Prisms
		Develop the formula for finding the volume of a cylinder and apply the formula to solve problems	
		• Develop and apply the formula to solve problems involving the volume of cylinders: $V = \pi r^2 h$, where r is the length of the radius of the base and h is the perpendicular height	**MG409** Volume of Cylinders
		Choose appropriate units of measurement for volume and capacity and convert between units	
		• Recognise that 1000 L is equal to 1 kilolitre (kL) and use the abbreviation	**MG407** Units of Area and Volume
		• Recognise that 1000 kL is equal to 1 megalitre (ML) and use the abbreviation	**MG407** Units of Area and Volume
		• Choose an appropriate unit to measure the volume or capacity of different objects and justify the choice	**MG407** Units of Area and Volume
		• Convert between metric units of volume and capacity ($1\ cm^3 = 1000\ mm^3$, $1\ cm^3 = 1\ mL$, $1\ m^3 = 1000\ L = 1\ kL$, $1000\ kL = 1\ ML$)	**MG407** Units of Area and Volume
		• Solve practical problems involving the volume and capacity of right prisms and cylinders	**MG408** Volume of Prisms **MG409** Volume of Cylinders
Angle relationships	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • applies angle relationships to solve problems, including those related to transversals on sets of parallel lines MA4-ANG-C-01	**Apply the language, notation and conventions of geometry**	
		• Use appropriate terminology and conventions to define, label and name points, rays, lines and intervals using capital letters	**MG420** Defining and Identifying Angles
		• Identify and label the vertex and arms of an angle with capital letters	**MG420** Defining and Identifying Angles
		• Use appropriate conventions to label and name angles	**MG420** Defining and Identifying Angles **MG413** Classifying Triangles and Quadrilaterals
		• Use common conventions to indicate right angles, equal angles and intervals on diagrams	**MG420** Defining and Identifying Angles **MG413** Classifying Triangles and Quadrilaterals
		Identify geometrical properties of angles at a point	
		• Identify right angles, straight angles, angles of complete revolution and vertically opposite angles	**MG420** Defining and Identifying Angles **MG421** Investigating Parallel Lines

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Stage 4 Measurement and space

Mathematical concept	Outcomes	Content	BitMaths Module
Angle relationships (continued)	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • applies angle relationships to solve problems, including those related to transversals on sets of parallel lines MA4-ANG-C-01 (continued)	• Apply the terms *complementary* and *supplementary* to a pair of angles adding to 90° and 180°, respectively	MG420 Defining and Identifying Angles
		• Apply the term *adjacent angles* to a pair of angles with a common arm and common vertex	MG420 Defining and Identifying Angles
		Identify and describe corresponding, alternate and co-interior angles when 2 straight lines are crossed by a transversal, including parallel lines	
		• Identify and describe perpendicular lines using the symbol for *is perpendicular to* (⊥)	MG420 Defining and Identifying Angles
		• Apply common conventions to indicate parallel lines on diagrams	MG420 Defining and Identifying Angles MG421 Investigating Parallel Lines
		• Identify and describe pairs of parallel lines using the symbol for *is parallel to* (∥)	MG420 Defining and Identifying Angles
		• Identify and define transversals, including transversals of parallel lines	MG420 Defining and Identifying Angles MG421 Investigating Parallel Lines
		• Identify, name and measure alternate angle pairs, corresponding angle pairs and co-interior angle pairs for 2 lines cut by a transversal	MG420 Defining and Identifying Angles
		• Verify and identify corresponding angles and alternate angles as equal, and co-interior angles as supplementary, when a pair of parallel lines is cut by a transversal	MG420 Defining and Identifying Angles
		• Justify that 2 lines are parallel by using properties of alternate, corresponding or co-interior angles on parallel lines	MG421 Investigating Parallel Lines
		Solve numerical problems involving angles using reasoning	
		• Apply the knowledge of angle relationships including angles at a point to find the sizes of unknown angles embedded in diagrams and give reasons	MG421 Investigating Parallel Lines
		• Apply the knowledge of angles associated with parallel lines to find the sizes of unknown angles embedded in related diagrams and give reasons	MG420 Defining and Identifying Angles MG421 Investigating Parallel Lines
Properties of geometrical figures	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • identifies and applies the properties of triangles and quadrilaterals to solve problems MA4-GEO-C-01	**Classify triangles according to their side and angle properties**	
		• Label triangles using appropriate text and symbols	MG413 Classifying Triangles and Quadrilaterals
		• Classify and describe types of triangles based on their properties, including acute-angled, right-angled, obtuse-angled, equilateral, isosceles and scalene triangles	MG413 Classifying Triangles and Quadrilaterals
		Classify quadrilaterals and describe their properties	
		• Identify quadrilaterals using naming conventions	MG413 Classifying Triangles and Quadrilaterals
		• Distinguish between convex and non-convex quadrilaterals	MG413 Classifying Triangles and Quadrilaterals
		• Verify and describe the properties of the special quadrilaterals which include parallelograms, rectangles, rhombuses, squares, trapeziums and kites	MG413 Classifying Triangles and Quadrilaterals
		• Identify and label the properties of the special quadrilaterals using appropriate conventions	MG413 Classifying Triangles and Quadrilaterals
		• Classify quadrilaterals based on their properties	MG413 Classifying Triangles and Quadrilaterals

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Stage 4 Measurement and space

Mathematical concept	Outcomes	Content	BitMaths Module
Properties of geometrical figures (continued)	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • identifies and applies the properties of triangles and quadrilaterals to solve problems MA4-GEO-C-01 (continued)	• Justify why some quadrilaterals may be classified as more than one type of quadrilateral	**MG413** Classifying Triangles and Quadrilaterals
		Apply the properties of triangles and quadrilaterals	
		• Prove that the interior angle sum of a triangle is 180° with or without digital tools	**MG416** Angle Sums of Triangles and Quadrilaterals
		• Prove that any exterior angle of a triangle equals the sum of the 2 interior opposite angles	**MG416** Angle Sums of Triangles and Quadrilaterals
		• Apply the angle sum of a triangle to prove that the angle sum of a quadrilateral is 360°	**MG416** Angle Sums of Triangles and Quadrilaterals
		• Apply the properties of triangles and quadrilaterals to determine unknown sides and angles to solve problems, giving reasons	**MG416** Angle Sums of Triangles and Quadrilaterals

Notes:
- Module MG410 Solving Time Problems is considered additional content
- Module MG411 International Time is considered additional content
- Module MG414 Reflections and Translations is considered additional content
- Module MG415 Rotations is considered additional content
- Module MG417 Congruence is content from Stage 5 New South Wales Syllabus
- Module MG418 Congruence of Triangles is content from Stage 5 New South Wales Syllabus
- Module MG419 Congruence of Quadrilaterals is content from Stage 5 New South Wales Syllabus

Stage 4 Statistics and probability

Mathematical concept	Outcomes	Content	BitMaths Module
Data classification and visualisation	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • classifies and displays data using a variety of graphical representations MA4-DAT-C-01	**Classify data as either numerical (discrete or continuous) or categorical (nominal or ordinal) variables**	
		• Define a variable in the context of statistics as any characteristic, number or quantity that can be measured or counted	**SP401** Census and Sampling **SP403** Primary and Secondary Data
		• Classify and describe variables as numerical or categorical	**SP401** Census and Sampling **SP403** Primary and Secondary Data
		• Describe a numerical variable as either discrete or continuous	**SP401** Census and Sampling **SP403** Primary and Secondary Data
		• Describe a categorical variable as nominal or ordinal	There are no Stage 4 BitMaths modules that directly align to this description. To cover this description, you will need to supplement with your own material.
		• Distinguish between and compare numerical (discrete or continuous) and categorical (nominal or ordinal) variables	This description is partially covered in: **SP401** Census and Sampling **SP403** Primary and Secondary Data To cover this description fully, you will need to supplement with your own material to distinguish between categorical (nominal or ordinal) variables.
		Display data using graphical representations relevant to the purpose of the data	
		• Represent single datasets using graphs, including frequency histograms and polygons, dot plots, stem-and-leaf plots, divided bar graphs, column graphs, line graphs, sector graphs and pictograms, with or without digital tools	This description is partially covered in: **SP404** Data Displays **SP405** Divided Bar Graphs and Sector Graphs To cover this description fully, you will need to supplement with your own material to represent single data sets using pictograms.

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Stage 4 Statistics and probability

Mathematical concept	Outcomes	Content	BitMaths Module
Data classification and visualisation (continued)	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • classifies and displays data using a variety of graphical representations MA4-DAT-C-01 (continued)	• Include sources, titles, labels and scales when displaying data in a graph	**SP404** Data Displays **SP405** Divided Bar Graphs and Sector Graphs
		• Select the type of graph best suited to represent various single datasets and justify the choice of graph	**SP404** Data Displays **SP405** Divided Bar Graphs and Sector Graphs
		• Represent a dataset using a statistical infographic and justify the choice of graphical representation used	There are no Stage 4 BitMaths modules that directly align to this description. To cover this description, you will need to supplement with your own material.
		Interpret data in graphical representations	
		• Identify and interpret data displayed on graphs	**SP403** Primary and Secondary Data **SP404** Data Displays **SP405** Divided Bar Graphs and Sector Graphs **SP408** Interpreting Data Displays
		• Identify features of graphical representations to draw conclusions	**SP403** Primary and Secondary Data **SP407** The Effect of Individual Data Values
		• Interpret patterns in graphical representations to make predictions	**SP403** Primary and Secondary Data
		• Explain why a given graphical representation can lead to a misinterpretation of data	**SP403** Primary and Secondary Data
Data analysis	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • analyses simple datasets using measures of centre, range and shape of the data MA4-DAT-C-02	**Calculate and compare the mean, median, mode and range for simple datasets**	
		• Calculate the mean $(\bar{x})$ of a set of data using digital tools	**SP406** Calculating Mean, Median, Mode and Range
		• Calculate and describe the mean, median, mode and range of a dataset	**SP408** Interpreting Data Displays
		• Classify the mean, median and/or mode as measure(s) of centre to represent the average or typical value of a dataset	**SP406** Calculating Mean, Median, Mode and Range
		• Describe and interpret data displays using mean, median and range	**SP406** Calculating Mean, Median, Mode and Range
		• Identify and describe datasets as having no modes (uniform), one mode (unimodal), 2 modes (bimodal) or multiple modes (multimodal)	**SP406** Calculating Mean, Median, Mode and Range
		• Identify the range as a measure of spread to describe variation in a dataset	**SP406** Calculating Mean, Median, Mode and Range
		• Compare simple datasets using the mean, median, mode and range	**SP406** Calculating Mean, Median, Mode and Range
		Interpret the effect individual data points have on measures of centre and range	
		• Informally identify clusters, gaps and outliers in datasets and give reasons for their occurrence in the context of the data	**SP407** The Effect of Individual Data Values
		• Identify and explain the impact of adding or removing data values that are clustered at one end of a dataset on the measures of centre	There are no Stage 4 BitMaths modules that directly align to this description. To cover this description, you will need to supplement with your own material.
		• Identify and explain the impact of outliers on the measures of centre and range	**SP407** The Effect of Individual Data Values
		• Determine and justify the most appropriate measure of centre to summarise the data in its context	**SP406** Calculating Mean, Median, Mode and Range **SP407** The Effect of Individual Data Values

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Stage 4 Statistics and probability

Mathematical concept	Outcomes	Content	BitMaths Module
Data analysis (continued)	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • analyses simple datasets using measures of centre, range and shape of the data MA4-DAT-C-02 (continued)	**Analyse datasets presented in various ways and draw conclusions**	
		• Identify and describe the shape and distribution of a dataset using the terms *symmetrical*, *negatively skewed* and *positively skewed*	There are no Stage 4 BitMaths modules that directly align to this description. To cover this description, you will need to supplement with your own material.
		• Define a census as a study of every unit, everyone or everything in a population	**SP401** Census and Sampling **SP403** Primary and Secondary Data
		• Define a sample as a subset of units in a population selected to represent all units in a population of interest	**SP401** Census and Sampling **SP402** Data and Sampling **SP403** Primary and Secondary Data
		• Draw conclusions and make informed decisions about data gathered using data-collection techniques, including census and sampling, which is then presented in tables, graphs and charts	**SP401** Census and Sampling **SP402** Data and Sampling **SP403** Primary and Secondary Data **SP409** Variation in Data
Probability	A student: • develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly MAO-WM-01 • solves problems involving the probabilities of simple chance experiments MA4-PRO-C-01	**Determine probabilities for chance experiments**	
		• List the sample space for chance experiments	**SP410** Sample Spaces
		• Express the probability of an event, which has a finite number of equally likely outcomes, as $P = \frac{\text{number of favourable outcomes}}{\text{total number of outcomes}}$	**SP411** Assigning Probabilities
		• Recognise that probabilities range from 0 (impossible) to 1 (certain) and that equally likely outcomes have equal probabilities	**SP411** Assigning Probabilities
		• Verify that the total of the probabilities of all possible outcomes of an event is 1	**SP412** Complementary Events
		• Identify and describe theoretical (expected) probabilities as being the likelihood of outcomes occurring under fair or unbiased conditions	This description is partially covered in: **SP411** Assigning Probabilities To cover this description fully, you will need to supplement with your own material to identify and describe theoretical (expected) probability.
		• Explain that observed probability is the relative frequency resulting from repeated trials of a simulation and determine observed probabilities	There are no Stage 4 BitMaths modules that directly align to this description. To cover this description, you will need to supplement with your own material.
		• Explore relative frequencies by using a random number generator to repeat a chance experiment a number of times	There are no Stage 4 BitMaths modules that directly align to this description. To cover this description, you will need to supplement with your own material.
		Determine probabilities for complementary events	
		• Identify and describe the complement of an event	**SP412** Complementary Events
		• Verify that the sum of the probability of an event and its complement is a total of 1	**SP412** Complementary Events
		• Solve problems involving the probability of complementary events	**SP412** Complementary Events
		• Represent the possible outcomes for complementary events in various forms	**SP412** Complementary Events

Notes:
- Module SP413 Probability Events is content from Stage 5 New South Wales Syllabus
- Module SP414 Venn Diagrams and Two-way Tables is content from Stage 5 New South Wales Syllabus

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