

# Mathletics NSW Curriculum

## Skill Quests

Stage 5

May, 2022

Mathletics

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NSW Curriculum  
Skill Quests  
May 2022

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# Stage 5.1

## 1 Number and Algebra

### 1.1 Financial mathematics

Outcome	Quests	Content
MA5.1-4NA Solves financial problems involving earning, spending and investing money	Solve problems involving simple interest	Simple interest
		Understanding hire purchase agreements
	Compound & simple interest	Compound interest (repetition formula)

### 1.2 Indices

Outcome	Quests	Content
MA5.1-5NA Operates with algebraic expressions involving positive-integer and zero indices, and establishes the meaning of negative indices for numerical bases	Index laws with variables	Applying mixed index laws algebraic expressions
	Index laws with negative integer index	Index laws: positive & negative integer index

### 1.3 Linear relationships

Outcome	Quests	Content
MA5.1-6NA Determines the midpoint, gradient and length of an interval, and graphs linear relationships	Midpoint & gradient of line segments	Finding the midpoint without the formula
		Finding the gradient without the formula
	Find the distance between two points	Distance between two points without the formula
	Linear graphs	Understanding vertical & horizontal lines
		Finding & using x and y-intercepts
		Graphing using a table of values
	Parallel lines	Comparing linear relationships
	Understanding parallel lines	

### 1.4 Non-linear relationships

Outcome	Quests	Content
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MA5.1-7NA Graphs simple non-linear relationships	Graph non-linear relationships	Graphing simple non-linear relations
	Representations of non-linear relations	Graphing non-linear relations

## 2 Measurement and Geometry

### 2.1 Area and surface area

Outcome	Quests	Content
MA5.1-8MG Calculates the areas of composite shapes, and the surface areas of rectangular and triangular prisms	Areas of composite shapes	Exploring the areas of composite shapes
	Surface area of right prisms	Surface area of right prisms with nets
		Finding the surface area problems

### 2.2 Numbers of any magnitude

Outcome	Quests	Content
MA5.1-9MG Interprets very small and very large units of measurement, uses scientific notation, and rounds to significant figures	Large/small amounts time, data, limits	Significant figures
		Amounts of data
		Large & small time intervals
		Representing large & small numbers
	Express numbers in scientific notation	Limits of accuracy
		Introducing scientific notation
		Converting: scientific not. & basic numbers
		Calculating & rounding with scientific notation

### 2.3 Right-angled triangles (trigonometry)

Outcome	Quests	Content
MA5.1-10MG Applies trigonometry, given diagrams, to solve problems, including problems involving angles of elevation and depression	Introduction to trigonometry	Introducing trigonometry
	Angles of elevation/depression & bearings	Calculating trigonometric ratios and angles
		Introducing angles of elevation & depression

### 2.4 Properties of geometrical figures

Outcome	Quests	Content
MA5.1-11MG Describes and applies the properties of similar figures and scale drawings	Similar triangles	Introducing similarity
	Scale factors with similar figures	Using scale factors

### 3 Statistics and Probability

#### 3.1 Single variable data analysis

Outcome	Quests	Content
MA5.1-12SP Uses statistical displays to compare sets of data, and evaluates statistical claims made in the media	Collection of everyday data	Collecting everyday data
	Construct & interpret data displays	Constructing & interpreting data displays
	Comparison of data displays	Comparing data displays
	Evaluate statistical reports	Evaluating statistical reports

#### 3.2 Probability

Outcome	Quests	Content
MA5.1-13SP Calculates relative frequencies to estimate probabilities of simple and compound events	Calculate & use relative frequency	Calculating & using relative frequency



# Stage 5.2

## 1 Number and Algebra

### 1.1 Financial mathematics

Outcome	Quests	Content
MA5.2-4NA Solves financial problems involving compound interest	Compound & simple interest	Compound interest
		Comparing simple & compound interest
		Understanding appreciation & depreciation

### 1.2 Ratio and rates

Outcome	Quests	Content
MA5.2-5NA Recognises direct and indirect proportion, and solves problems involving direct proportion	Proportion, rates, graphs & equations	Understanding unit rates
		Converting rates
		Direct proportion
		Indirect/inverse proportion
		Direct & inversely proportionate graphs
		Interpreting & using conversion graphs
		The constant of proportionality
		Graphing equations of direct proportion

### 1.3 Algebraic techniques

Outcome	Quests	Content
MA5.2-6NA Simplifies algebraic fractions, and expands and factorises quadratic expressions	Algebraic fractions	Algebraic fractions: 4 ops numerical denominators
		Algebraic fractions: Simplifying
	Apply the distributive law	Applying the distributive law
	Factorise algebraic expressions	Factorising algebraic expressions
	Binomial expansions & basic quadratics	Expanding binomial products

### 1.4 Indices

Outcome	Quests	Content
MA5.2-7NA Applies index laws to operate with algebraic expressions involving integer indices	Index laws	Indices: Multiplication
		Indices: Division
		Indices: Power of a power
		Indices: Zero index
		Indices: Mixed basic operations with coefficient =1
		Indices: Mixed basic operations with coefficient >1
		Indices: Negative index with numerical base
		Indices: Negative index, algebraic & numerical base
Indices: Mixed with negative indices		

## 1.5 Equations

Outcome	Quests	Content
MA5.2-8NA Solves linear and simple quadratic equations, linear inequalities and linear simultaneous equations, using analytical and graphical techniques	Solve linear equations	Solving linear equations
	Equations involving algebraic fractions	Solving equations involving algebraic fractions
	Solve simple quadratic equations	Solving simple quadratic equations
	Substitute values into formulas	Using authentic formula
	Problems involving linear equations	Solving linear equation word problems
	Linear inequalities & their graphs	Understanding inequalities
		Solving linear inequalities
	Linear simultaneous equations	Working with simultaneous equations

## 1.6 Linear relationships

Outcome	Quests	Content
MA5.2-9NA uses the gradient-intercept form to interpret and graph linear relationships	Linear graphs & solving linear equations	Graphing using the gradient-intercept method
	Parallel & perpendicular lines	Perpendicular lines

## 1.7 Non-linear relationships

Outcome	Quests	Content
MA5.2-10NA connects algebraic and graphical representations of simple non-linear relationships	Graph & solve non-linear relationships	Solving simple non-linear relationships
		Parabolas

		Exponential graphs
		Circles
	Representations of non-linear relations	Representing non-linear relations

## 2 Measurement and Geometry

### 2.1 Area and surface area

Outcome	Quests	Content
MA5.2-11MG Calculates the surface areas of right prisms, cylinders and related composite solids	Surface area & volume of cylinders	Finding the surface area of cylinders
	Surface area of composite solids	Finding the surface area of composite solids

### 2.2 Volume

Outcome	Quests	Content
MA5.2-12MG Applies formulas to calculate the volumes of composite solids composed of right prisms and cylinders	Surface area & volume of right prisms	Volumes of composite right prisms
	Volume of composite solids	Volume of composite solids

### 2.3 Right-angled triangles (trigonometry)

Outcome	Quests	Content
MA5.2-13MG Applies trigonometry to solve problems, including problems involving bearings	Apply trigonometry	Finding the missing side using trig ratios
		Finding the missing angle using trig ratios
		Solving 2D problems using trig ratios
	Angles of elevation/depression & bearings	Solving angles of elevation & depression
		Working with compass bearings
		Using true bearings

### 2.4 Properties of geometrical figures

Outcome	Quests	Content
MA5.2-14MG Calculates the angle sum of any polygon and uses minimum conditions to prove triangles are congruent or similar	Similar triangles	Similar triangles

## 3 Statistics and Probability

### 3.1 Single variable data analysis

Outcome	Quests	Content
MA5.2-15SP Uses quartiles and box plots to compare sets of data, and evaluates sources of data	Interquartile range	Interquartile range
	Construct & interpret box plots	Constructing & interpreting box plots
	Compare box plots	Comparing box plots
	Make population predictions from data	Using data to make predictions about populations

### 3.2 Bivariate data analysis

Outcome	Quests	Content
MA5.2-16SP Investigates relationships between two statistical variables, including their relationship over time	Bivariate data	Bivariate data
	Scatter plots	Using scatter plots

### 3.3 Probability

Outcome	Quests	Content
MA5.2-17SP Describes and calculates probabilities in multi-step chance experiments	List outcomes & find probabilities	The fundamental counting principle
		Two-step chance experiments with replacement
		Two-step chance experiments without replacement
	Two/three step experiments, independence	Three-step chance experiments with replacement
		Three-step chance experiments without replacement
		Independent events
	Conditional probability	Conditional probability introduction
		Conditional probability & two-way tables
		Conditional probability & tree diagrams
		Conditional probability & arrays
		Conditional probability & Venn diagrams
	Set theory & Venn diagrams	

# Stage 5.3

## 1 Number and Algebra

### 1.1 Ratio and rates

Outcome	Quests	Content
MA5.3-4NA Draws, interprets and analyses graphs of physical phenomena	Travel graphs	Interpreting/sketching travel graphs

### 1.2 Algebraic techniques

Outcome	Quests	Content
MA5.3-5NA Selects and applies appropriate algebraic techniques to operate with algebraic expressions	Binomial expansions & basic quadratics	Binomial product special results
		Factorising monic quadratic trinomials
		Simplifying binomial expansions
	Factorise quadratics	Factorising using difference of 2 squares
		Factorising using grouping
		Factorising using perfect squares
		Factorising quadratic trinomials
		Factorising quadratic trinomials

### 1.3 Surds and indices

Outcome	Quests	Content
MA5.3-6NA Performs operations with surds and indices	Rational & irrational numbers & surds	Understanding rational and irrational numbers
		Introducing surds
		Understanding surd general rules
		Simplifying & adding/subtracting of surds
		Multiplying & dividing surds
		Expanding brackets with surds
		Rationalising the denominator
		Converting recurring decimals to rational numbers

		Solving problems involving surds
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## 1.4 Equations

Outcome	Quests	Content
MA5.3-7NA Solves complex linear, quadratic, simple cubic and simultaneous equations, and rearranges literal equations	Solve quadratics	Solving quadratic equations by factorisation
		Solving quadratic equations: Completing the square
		Solving quadratic equations: Quadratic formula
		Solving a variety of quadratic equations
		The discriminant
		Using quadratic equations in context

## 1.5 Linear relationships

Outcome	Quests	Content
MA5.3-8NA Uses formulas to find midpoint, gradient and distance on the Cartesian plane, and applies standard forms of the equation of a straight line	Midpoint & gradient of line segments	Finding the midpoint using the formula
		Finding the gradient using the formula
	Find the distance between two points	Finding distance between 2 points using formula
	Use x and y intercepts	Graphing a line using x and y intercepts
	Parallel and perpendicular lines	Equations of lines: parallel & perpendicular lines
		Problems involving parallel & perpendicular lines

## 1.6 Non-linear relationships

Outcome	Quests	Content
MA5.3-9NA Sketches and interprets a variety of non-linear relationships	Functions & their transformations	Exploring parabolas
		Parabolas: vertex & axis of symmetry
		Graphing parabolas
		Parabolas & their transformations
		Graphing hyperbolas
		Hyperbolas & their transformations

		Graphing circles
		Circles & their transformations
		Exponential functions & their transformations
		General non linear relationships

## 1.7 Polynomials

Outcome	Quests	Content
MA5.3-10NA Recognises, describes and sketches polynomials, and applies the factor and remainder theorems to solve problems	Introduction to polynomials	Introducing polynomials
		Remainder & factor theorems
	Sketch polynomials	Sketching polynomials

## 1.8 Logarithms

Outcome	Quests	Content
MA5.3-11NA Uses the definition of a logarithm to establish and apply the laws of logarithms	Logarithms & their laws	Introducing logarithms
		Multiplication Log law
		Division Log law 1
		Division Log law 2
		Log results
		Log graphs & relationship with exponentials
		Solving equations with Logarithms
	Solve exponential equations	Solving exponential equations



## 2 Measurement and Geometry

### 2.1 Area and surface area

Outcome	Quests	Content
MA5.3-13MG Applies formulas to find the surface areas of right pyramids, right cones, spheres and related composite solids	Surface area of composite solids	Surface area of pyramids & cones
		Surface area of spheres
		Find dimensions of objects given the surface area
		Surface area of composite solids

### 2.2 Volume

Outcome	Quests	Content
MA5.3-14MG Applies formulas to find the volumes of right pyramids, right cones, spheres and related composite solids	Volume of composite solids	Volume of cones
		Volume of spheres
		Volume of composite solids

### 2.3 Trigonometry and Pythagoras' theorem

Outcome	Quests	Content
MA5.3-15MG Applies Pythagoras' theorem, trigonometric relationships, the sine rule, the cosine rule and the area rule to solve problems, including problems involving three dimensions	Solve problems in three dimensions	Solving problems in three dimensions
	Trigonometry: identities, ratios, angles	Using trigonometric identities
		Investigating trigonometric ratios
		Angles of any magnitude
		Angle of inclination of a line and its gradient
	Solve simple trigonometric equations	Solving simple trigonometric equations
	Trigonometry: non right-angled triangles	Sine rule
		Cosine rule
		Area rule
		Solving problems in non-right angled triangles

### 2.4 Properties of geometrical figures

Outcome	Quests	Content
MA5.3-16MG Proves triangles are similar, and uses formal geometric reasoning to establish properties of triangles and quadrilaterals	Scale factors with similar figures	Area & volume scale factors
	Solve problems using geometric reasoning	Solving problems using geometric reasoning

## 2.5 Circle geometry

Outcome	Quests	Content
MA5.3-17MG Applies deductive reasoning to prove circle theorems and to solve related problems	Properties of circles	Circle terminology
		Circle properties: tangents
		Circle properties: equal radii
		Circle properties: chord properties
		Circle properties: angle in a semicircle property
		Circle properties: angle properties
		Circle properties: solve problems using properties

### 3 Statistics and Probability

#### 3.1 Single variable data analysis

Outcome	Quests	Content
MA5.3-18SP Uses standard deviation to analyse data	Mean & standard deviation	Using the mean & standard deviation of data sets
		Comparing data using mean & standard deviation

#### 3.2 Bivariate data analysis

Outcome	Quests	Content
MA5.3-19SP Investigates the relationship between numerical variables using lines of best fit, and explores how data is used to inform decision-making processes	Bivariate data & lines of best fit	Bivariate data & lines of best fit
	Critical analysis of data in the media	Critical analysis of data in the media

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