Mathletics
NSW Curriculum –AC Aligned v9 2022
Skill Quests & Activities

Stage 5

August, 2023

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Contents

Stage 5 – Core

1 Financial mathematics A

Financial mathematics (A): MA5-FIN-C-01	
Solves financial problems involving simple interest, earning money and spending money	
Skill Quests	**Skills**
Solve problems involving simple interest	Calculating simple interest
Solve problems involving spending money	Understanding hire purchase agreements
Course Topic	**Activities Title**
Income and simple interest	Wages and Salaries
	Commission
	Working Overtime
	Special Allowances
	Bonuses and Leave Loading
	Piecework and Royalties
	Calculating Income Tax
	Deductions and Tax Instalments
	Net Pay
	Simple Interest
Spending money	Purchase Options
	Credit Card Repayments
	Comparing Loans
	Comparing Home Loans

Financial mathematics (B): MA5-FIN-C-02	
Financial mathematics (B): MA5-FIN-C-02	
Skill Quests	**Skills**
Compound & simple interest	Calculating compound interest
	Solving problems with compound interest
	Comparing simple & compound interest
Appreciation & depreciation	Understanding appreciation
	Understanding depreciation
Course Topic	**Activities Title**
Compound interest and depreciation	Compound Interest
	Compound Interest by Formula
	Future Value of Investments 1
	Future Value of Investments 2
	Straight Line Depreciation
	Depreciation
	Declining Balance Depreciation

2 Algebraic techniques A

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Simplifies algebraic fractions with numerical denominators and expands algebraic expressions</td></tr>
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<tr><td>Expanding binomial products using area model</td></tr>
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3 Indices A

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Simplifies algebraic expressions involving positive-integer and zero indices, and establishes the meaning of negative indices for numerical bases</td></tr>
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<tr><td rowspan="2">Simplify expressions using index laws</td><td>Mixed operations with indices including zero</td></tr>
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<tr><td rowspan="2">Apply index laws using negative indices</td><td>Negative index law</td></tr>
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4 Equations A

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Solves linear equations of up to 3 steps, limited to one algebraic fraction</td></tr>
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5 Linear relationships A

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Determines the midpoint, gradient and length of an interval, and graphs linear relationships, with and without digital tools</td></tr>
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6 Linear relationships B

Linear relationships (B): MA5-LIN-C-02	
Graphs and interprets linear relationships using the gradient/slope-intercept form	
Skill Quests	**Skills**
Use the gradient-intercept form	Graphing lines using the gradient-intercept form
Equation of parallel/perpendicular lines	Examining parallel & perpendicular lines
	Calculating the equation of parallel lines
	Calculating the equation of perpendicular lines
Course Topic	**Activities Title**
Equation of a line	Equation of a Line 1
	General Form of a Line
	Which Straight Line?
	Modelling Linear Relationships
	Are they Perpendicular?
	Perpendicular and parallel lines
	Equation of a Line 3

7 Non-linear relationships A

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<tr><td colspan="2">Non-linear relationships (A): MA5-NLI-C-01
Identifies connections between algebraic and graphical representations of quadratic and exponential relationships in various contexts</td></tr>
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<tr><td>Link algebra & the graph of quadratics</td><td>Graphing quadratic relationships</td></tr>
<tr><td>Link algebra & the graph of exponentials</td><td>Graphing exponential relationships</td></tr>
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8 Non-linear relationships B

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Identifies and compares features of parabolas and exponential curves in various contexts</td></tr>
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9 Numbers of any magnitude

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Solves measurement problems by using scientific notation to represent numbers and rounding to a given number of significant figures</td></tr>
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<tr><td rowspan="5">Express numbers in scientific notation</td><td>Introducing scientific notation</td></tr>
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10 Trigonometry A

Trigonometry (A): MA5-TRG-C-01	
Applies trigonometric ratios to solve right-angled triangle problems	
Skill Quests	**Skills**
Understand trigonometric ratios	Introducing trigonometry
	Identifying which trig ratio to use
Apply trigonometry to solve problems	Calculating the unknown side using trig ratios
	Calculating the unknown angle using trig ratios
	Solving 2D problems using trig ratios
Course Topic	**Activities Title**
Trigonometric ratios	Hypotenuse, Adjacent, Opposite
	Sin A
	Cos A
	Tan A
	Find Unknown Sides
	Find Unknown Angles
	Degrees and Minutes
	Trigonometry Problems 1

11 Trigonometry B

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Applies trigonometry to solve problems, including bearings and angles of elevation and depression</td></tr>
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12 Area and surface area A

Area and surface area (A): MA5-ARE-C-01	
Solves problems involving the surface area of right prisms and practical problems involving the area of composite shapes and solids	
Skill Quests	**Skills**
Solve problems involving areas	Calculating area of composite shapes
Solve problems involving surface areas	Connecting surface area of right prism with nets
	Solving problems involving surface areas
	Calculating surface area of cylinders
	Calculating surface area of composite solids
Course Topic	**Activities Title**
Surface area of right prisms and cylinders	Area: Composite Shapes
	Nets
	Surface Area: Rectangular Prisms
	Surface Area: Triangular Prisms
	Surface Area: Cylinders

13 Volume A

Volume (A): MA5-VOL-C-01	
Solves problems involving the volume of composite solids consisting of right prisms and cylinders	
Skill Quests	**Skills**
Volume of composite solids	Solving volume problems involving composite solids
	Solving volume problems involving cylinders
Course Topic	**Activities Title**
Volume of composite figures	Volume: Composite Figures

14 Properties of geometrical figures A

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Identifies and applies the properties of similar figures and scale drawings to solve problems</td></tr>
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<tr><td>Identify properties of similar figures</td><td>Identifying similar figure properties</td></tr>
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15 Data analysis A

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Compares and analyses datasets using summary statistics and graphical representations</td></tr>
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<tr><td>Comparing data using mean & standard deviation</td></tr>
<tr><td>Use quartiles & interquartile range</td><td>Determining quartiles & interquartile range</td></tr>
<tr><td rowspan="2">Represent data using box plots</td><td>Constructing & interpreting box plots</td></tr>
<tr><td>Comparing box plots</td></tr>
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16 Data analysis B

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Displays and interprets datasets involving bivariate data</td></tr>
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<tr><td rowspan="3">Understand bivariate data</td><td>Identifying & describing bivariate data</td></tr>
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17 Probability A

Probability (A): MA5-PRO-C-01	
Solves problems involving probabilities in multistage chance experiments and simulations	
Skill Quests	**Skills**
The fundamental counting principle	Understanding the fundamental counting principle
Independent & dependent events	Understanding independent & dependent events
Solve multistage chance experiments	2-step chance experiments with replacement
	2-step chance experiments without replacement
	3-step chance experiments with replacement
	3-step chance experiments without replacement
Course Topic	**Activities Title**
Chance experiments	Probability With Replacement
	Probability Without Replacement
	Tree Diagrams

Stage 5 – Path

1 Variation and rates of change A (Path)

Variation and rates of change (A): MA5-RAT-P-01	
Identifies and solves problems involving direct and inverse variation and their graphical representations (Path: Stn, Adv)	
Skill Quests	**Skills**
Identify direct & inverse variation	Understand direct & inverse proportion
	Representing the constant of proportionality
	Describing graphs of direct & inverse proportion
	Solving direct/inverse proportion problems
	Interpreting & using conversion graphs
	Graphing equations of direct proportion

2 Variation and rates of change B (Path)

Variation and rates of change (B): MA5-RAT-P-02	
Analyses and constructs graphs relating to rates of change (Path: Adv)	
Skill Quests	**Skills**
Analyse rate of change graphs	Interpreting & sketching travel graphs

3 Algebraic techniques B (Path)

Algebraic techniques (B): MA5-ALG-P-01	
Simplifies algebraic fractions involving indices, and expands and factorises algebraic expressions (Path: Adv)	
Skill Quests	**Skills**
Use 4 operations in algebraic fractions	Algebraic fractions with pronumeral denominators
Factorise by removing the common factor	Factorising by removing the common number
	Factorising by removing common letters (& powers)
	Factorising by removing the HCF (number & letters)
Expand binomial products	Expanding binomial products
Factorise monic quadratic trinomials	Factorising monic quadratic trinomials

4 Algebraic techniques C (Path)

<table>
<tr><th colspan="2">Algebraic techniques (C): MA5-ALG-P-02
Selects and applies appropriate algebraic techniques to operate with algebraic fractions, and expands, factorises and simplifies algebraic expressions (Path: Adv)</th></tr>
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5 Indices B (Path)

Indices (B): MA5-IND-P-01	
Applies the index laws to operate with algebraic expressions involving negative-integer indices (Path: Adv)	
Skill Quests	**Skills**
Index laws with negative-integer indices	Algebraic expressions with negative indices
	Evaluating expressions with negative index

6 Indices C (Path)

Indices (C): MA5-IND-P-02	
Describes and performs operations with surds and fractional indices (Path: Adv)	
Skill Quests	**Skills**
Describe surds	Understanding rational & irrational numbers
	Converting between recurring decimals & fractions
	Introduction to surds
Solve problems using knowledge of surds	Understanding surd rules
	Simplifying surds
	Adding & subtracting surds
	Multiplying & dividing surds
	Expanding brackets with surds
	Rationalising the denominator
	Solving problems involving surds
Describe & use fractional indices	Converting surd to index form

7 Equations B (Path)

Equations (B): MA5-EQU-P-01	
Solves monic quadratic equations, linear inequalities and cubic equations of the form (Path: Adv)	
Skill Quests	**Skills**
Solve monic quadratic equations	Solving monic quadratic equations
Solve cubic equations	Solving cubic equations
Solve linear inequalities	Understanding inequalities
	Solving 1 step linear inequalities
	Solving 2 step linear inequalities
	Solving 3 step linear equalities

8 Equations C (Path)

Equations (C): MA5-EQU-P-02	
Solves linear equations of more than 3 steps, monic and non-monic quadratic equations, and linear simultaneous equations (Path: Adv)	
Skill Quests	**Skills**
Linear equations with algebraic fraction	Solving linear equations with algebraic fractions
Solve quadratic equations	Solving non-monic quadratic equations
	Solving equations by completing the square
	Solving equations with quadratic formula
	Solving a variety of quadratic equations
	Identifying the number of distinct solutions
	Solving quadratic equation word problems
Solve simultaneous equations	Solving simultaneous equations algebraically
	Solve simultaneous equations graphically

9 Linear relationships C (Path)

Linear relationships (C): MA5-LIN-P-01	
Describes and applies transformations, the midpoint, gradient/slope and distance formulas, and equations of lines to solve problems (Path: Adv)	
Skill Quests	**Skills**
Midpoint & gradient using the formula	Calculating midpoint with the formula
	Calculating gradient with the formula
Find distance using the formula	Calculate distance between 2 points with a formula
Find the equation of a straight line	Finding & using x and y-intercepts
	Finding the equation of a line
	Finding equation of parallel/perpendicular lines
Solve problems with coordinate geometry	Solving problems with coordinate geometry formulas
	Identifying line & rotational symmetry
	Describing transformations on the Cartesian plane

10 Non-linear relationships C (Path)

Non-linear relationships (C): MA5-NLI-P-01	
Interprets and compares non-linear relationships and their transformations, both algebraically and graphically (Path: Adv)	
Skill Quests	**Skills**
Graph parabolas & transformations	Graphing parabola & describing features
	Finding x- and y-intercepts of parabolas
	Determining the vertex & axis of symmetry
	Graphing parabolas
	Describing parabolas & their transformations
	Graphing exponentials
	Describing exponentials & their transformations
Graph hyperbolas & transformations	Graphing hyperbolas
	Describing hyperbolas & their transformations
Graph circles & transformations	Graphing circles
	Describing circles & their transformations
Distinguish between different graphs	Distinguishing between different types of graphs
	Sketching different types of graphs

11 Polynomials (Path)

Polynomials: MA5-POL-P-01	
Defines, operates with and graphs polynomials and applies the factor and remainder theorems to solve problems (Path: Adv, Ext)	
Skill Quests	**Skills**
Define & operate with polynomials	Understanding polynomial terms
	Performing operations with polynomials
Divide polynomials	Dividing a polynomial by a linear polynomial
Apply the factor & remainder theorems	Solving problems using factor & remainder theorems
Graph polynomials	Identifying polynomials
	Graphing polynomials

12 Logarithms (Path)

Logarithms: MA5-LOG-P-01	
Establishes and applies the laws of logarithms to solve problems (Path: Adv)	
Skill Quests	**Skills**
Examine logarithms numerically	Defining & evaluating logarithms
Examine logarithms graphically	Log graphs & the relationship with exponentials
Establish & apply the laws of logarithms	Deducing log rule from multiplication of indices
	Deducing log rule from division of indices
	Deducing log rule from power rule of indices
	Applying log rules to evaluate/simplify expressions
	Solving equations with logarithms
	Solving equations with exponentials

13 Functions and other graphs (Path)

Functions and other graphs: MA5-FNC-P-01	
Uses function notation to describe and graph functions of one variable and graphs inequalities in one and 2 variables (Path: Adv)	
Skill Quests	**Skills**
Define relations & functions	Defining relations & functions
Find the domain & range of a function	Describing domain & range of a function
Graph regions to linear inequalities	Graphing linear inequalities

14 Trigonometry C (Path)

Trigonometry (C): MA5-TRG-P-01	
Applies Pythagoras' theorem and trigonometry to solve 3-dimensional problems and applies the sine, cosine and area rules to solve 2-dimensional problems, including bearings (Path: Stn, Adv)	
Skill Quests	**Skills**
Solve 3D right-angled triangle problems	Solving 3D problems with right-angled triangles
Apply sine, cosine & area rules	Using the sine rule to solve problems
	Using the cosine rule to solve problems
	Using the area rule to solve problems
	Solving problems with non-right angled triangles

15 Trigonometry D (Path)

<table>
<tr><td colspan="2">Trigonometry (D): MA5-TRG-P-02
Establishes and applies the properties of trigonometric functions and finds solutions to trigonometric equations (Path: Adv)</td></tr>
<tr><td>Skill Quests</td><td>Skills</td></tr>
<tr><td rowspan="4">Use unit circle to define trig functions</td><td>Using the unit circle to define trig functions</td></tr>
<tr><td>Representing sin, cos, tan functions graphically</td></tr>
<tr><td>Apply relationships using unit circle/trig graphs</td></tr>
<tr><td>Finding the angle of inclination & gradient</td></tr>
<tr><td>Solve trig equations using exact answers</td><td>Solving trig equations using exact answers</td></tr>
</table>

16 Area and surface area B (Path)

Area and surface area (B): MA5-ARE-P-01	
Applies knowledge of the surface area of right pyramids and cones, spheres and composite solids to solve problems (Path: Stn, Adv)	
Skill Quests	**Skills**
Solve problems involving surface area	Surface area of pyramids
	Surface area of cones
	Surface area of spheres
	Finding dimensions, given the surface area
	Surface area of composite solids

17 Volume B (Path)

Volume (B): MA5-VOL-P-01	
Applies knowledge of the volume of right pyramids, cones and spheres to solve problems involving related composite solids (Path: Stn, Adv)	
Skill Quests	**Skills**
Solve problems involving volumes	Volume of pyramids & cones
	Volume of spheres
	Volume of composite solids

18 Properties of geometrical figures B (Path)

Properties of geometrical figures (B): MA5-GEO-P-01	
Establishes conditions for congruent triangles and similar triangles and solves problems relating to properties of similar figures and plane shapes (Path: Ext)	
Skill Quests	**Skills**
Use conditions for congruent triangles	Identifying & explaining congruence
	Identifying congruent triangles
	Determine congruent triangles using tests
Use conditions for similar triangles	Determine similar triangles using 4 tests
	Solving area problems of similar shapes & solids
	Solving volume problems of similar shapes & solids
Solve problems with plane shapes	Applying interior & exterior sum of angles

19 Properties of geometrical figures C (Path)

Properties of geometrical figures (C): MA5-GEO-P-02	
Constructs proofs involving congruent triangles and similar triangles and proves properties of plane shapes (Path: Ext)	
Skill Quests	**Skills**
Construct formal proofs	Formal proofs for congruent & similar triangles

20 Circle geometry (Path)

Circle Geometry: MA5-CIR-P-01	
Applies deductive reasoning to prove circle theorems and solve related problems (Path: Ext)	
Skill Quests	**Skills**
Apply angle & chord properties	Using circle terminology
	Proving & applying chord properties of circles
	Proving & applying angle properties of circles
	Proving & applying angle properties of semicircles
	Solving problems using circle properties
Apply tangent properties of circles	Proving & applying tangent properties of circles

21 Data analysis C (Path)

Data analysis (C): MA5-DAT-P-01	
Plans, conducts and reviews a statistical inquiry into a question of interest (Path: Stn, Adv)	
Skill Quests	**Skills**
Examine reports in digital media	Analysing reports critically in digital media

22 Probability B (Path)

Probability (B): MA5-PRO-P-01	
Solves problems involving Venn diagrams, 2-way tables and conditional probability (Path: Adv)	
Skill Quests	**Skills**
Use language of conditional probability	Understanding conditional probability
Mutually & non-mutually exclusive events	Describing mutually/non-mutually exclusive events
Solve problems involving Venn diagrams	Interpreting & constructing Venn diagrams
	Understanding set theory & Venn diagrams
	Using Venn diagrams for conditional probability
Solve problems involving 2-way tables	Constructing & interpreting 2-way tables
	Converting between Venn diagrams & 2-way tables
	Using 2-way tables to find conditional probability

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