

Mathletics

3P Learning Progressions

Skill Quests

Grades 9 – 10
May, 2022

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Skill Quests

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Level 9

1 Number and Algebra

Outcome	Quests	Content
Fractions, decimals and percentages	Scientific notation (UK standard form)	Scientific notation and standard form
		Calculating in scientific notation
Financial maths	Interest	Calculating simple interest
		Calculating compound interest without a formula
		Calculating compound interest
Rates and ratios	Proportion	Understanding direct proportion
		Investigating indirect/inverse proportion
		Creating direct and inversely proportionate graphs
		Determining the constant of proportionality
		Determining the constant of variation
		Graphing equations of direct proportion
Algebra	Index/exponent laws	Applying the distributive law/property
		Distribute law (property): adding like terms
		Indices (exponents): multiplication
		Indices (exponents): division
		Indices (exponents): power of a power
		Indices (exponents): zero index
		Indices (exponents): mixed ops, coefficient = 1
		Indices (exponents): mixed ops, coefficient >1
		Indices (exponents): neg index, numerical base
		Indices (exponents): negative index
		Indices (exponents): mixed with negative indices
		Factorising/factoring
	Algebraic fractions	Algebraic fractions: 4 ops numerical denominators
		Algebraic fractions: Simplifying

	Algebraic formulas	Using formulas
		Solving word problems
	Binomial products	Expanding binomial products
	Solving equations	Solving linear equations involving brackets
		Solving equations involving algebraic fractions
		Solving simple quadratic equations
	Inequalities	Solving linear inequalities with two steps
		Solving linear inequalities with multiple steps
	Simultaneous equations	Simultaneous equations
		Solving simultaneous equations algebraically
Coordinate geometry	Distance between two points	Distance between two points without the formula
		Distance between two points using the formula
	Midpoint	Finding the midpoint without the formula
		Finding the midpoint using the formula
	Gradient	Finding the gradient without the formula
		Finding the gradient using the formula
	Linear relationships	Graphing vertical and horizontal lines
		Writing equations of vertical and horizontal lines
		Finding and using x- and y-intercepts
		Graphing using a table of values
		Graphing using the gradient-intercept method
	Non-linear relationships	Graphing simple non-linear relations
		Solving simple non-linear relationships
		Understanding parabolas and their graphs
		Investigating changes in a parabola equation
		Finding the x- and y-intercepts of a parabola
		Graphing parabolas

2 Measurement

Outcome	Quests	Content
Measurement – area	Area of composite shapes	Areas of composite shapes
		Finding surface area of cylinders
		Finding surface area problems
Measurement – surface area	Surface area	Finding surface area of cylinders
Measurement – volume	Volume	Finding volumes of cylinders
		Finding volumes of composite right prisms

3 Geometry

Outcome	Quests	Content
Geometry	Similarity and scale factors	Introducing similarity
		Identifying and constructing similar triangles
		Understanding enlargement in similarity
		Using the four tests for similar triangles
		Using scale factors to understand similar triangles
		Using scale factors to find missing sides & angles
		Applying scale factors
		Area and volume scale factors
Pythagoras' theorem	Triangles with right angles	Identifying sides of triangles with right angles
	Pythagoras' theorem	Finding a shorter side using Pythagoras' theorem
		Finding the hypotenuse using Pythagoras' theorem
		Solving problems involving Pythagoras' theorem
		Exploring Pythagorean triads
		Using the converse of Pythagoras' theorem
		Solving Pythagoras' theorem problems: Exact values
Trigonometry	Trigonometry	Adding labels to triangles with right angles
		Establishing trigonometric relationships
		Determining trigonometric ratios
		Calculating trigonometric ratios and angles
		Finding the missing side using trig ratios
		Finding the missing angle using trig ratios
		Angles of elevation and depression
		Solving 2D and 3D problems using trig ratios

4 Chance and Probability

Outcome	Quests	Content
Chance	Chance experiments	The fundamental counting principle
		Two-step chance experiments with replacement
		Two-step chance experiments without replacement
	Relative frequency	Calculating and using relative frequency
		Using data to make predictions about populations

5 Data

Outcome	Quests	Content
Data	Collecting data	Collecting everyday data
	Displaying data	Constructing and interpreting data displays
		Comparing data displays

Level 10

1 Number and Algebra

Outcome	Quests	Content
Algebra	Factorising (factoring)	Factorising (factoring)
		Factorising (factoring) using difference of 2 sq
		Factorising (factoring) using grouping
		Factorising (factoring) using perfect squares
		Factorising (factoring) quadratic trinomials
		Factorising (factoring) complex fractions
	Quadratic equations	Solving quadratic equations by factorisation
		Solving quadratic equations: completing the square
		Solving quadratic equations with quadratic formula
		Solving a variety of quadratic equations
		The discriminant
		Quadratic equations in context
	Polynomials	Introducing polynomials
		Using the remainder and factor theorems
		Dividing polynomials
		Using theorems to factor and solve polynomials
		Understanding key points of polynomial graphs
		Sketching polynomials
Number theory	Surds (radicals)	Introducing surds (radicals)
		Understanding surd (radicals) general rules
		Simplification and +/- of surds (radicals)
		Multiplying and dividing surds (radicals)
		Expanding brackets with surds (radicals)
		Making the denominator rational
		Solving problems involving surds (radicals)
Functions and graphs	Functions	Identifying functions

	Parabolas	Understanding key features of parabolas
		Investigating parabola graphs
		Parabolas: vertex and axis of symmetry
		Finding x- and y-intercepts of parabolas
		Graphing parabolas
		Parabolas and their transformations
	Exponentials	Exponential functions and their transformations
	Non-linear relationships	Sketching non-linear graphs
		Determining equations of non-linear graphs
Coordinate geometry	Parallel and perpendicular lines	Identifying parallel lines
		Identifying perpendicular lines
		Equations of lines: parallel & perpendicular lines
		Problems involving parallel & perpendicular lines

2 Measurement

Outcome	Quests	Content
Measurement – surface area	Surface area	Finding surface area of pyramids & cones
		Finding surface area of spheres
		Finding dimensions of objects given surface area
	Surface area of composite solids	Surface area of composite solids involving prisms
		Surface area of composite solids with pyramids
Measurement – volume	Volume of solids	Volume of cones
		Volume of spheres
	Volume of composite solids	Finding the volume of composite solids
		Calculating the volume of composite solids

3 Geometry

Outcome	Quests	Content
Geometry – circles	Circle terminology	Circle terminology
	Circle properties	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
Geometry – reasoning	Geometric reasoning to solve problems	Solving problems using geometric reasoning
Trigonometry	Bearings	True bearings
	Triangles with no right angles	Using the sine rule
		Using the cosine rule
		Using the area rule
	Solve problems using trigonometry	Solving problems in triangles without right angles
	Trigonometric Identities and ratios	Using trigonometric identities
		Investigating trigonometric ratios
Angles of any magnitude	Angles of any magnitude	
Trigonometric equations	Solving simple trigonometric equations	

4 Chance and Probability

Outcome	Quests	Content
Chance	Chance experiments	Three-step chance experiments with replacement
		Three-step chance experiments without replacement
		Understanding independent events
	Conditional probability	Introducing conditional probability
		Conditional probability and two-way tables
		Conditional probability and tree diagrams
		Conditional probability and arrays
		Conditional probability and Venn diagrams
		Set theory and Venn diagrams

5 Data

Outcome	Quests	Content
Data	Interquartile range	Interquartile range
	Box-and-whisker plots	Constructing and interpreting box-and-whisker plot
		Comparing box-and-whisker plots
	Bivariate data	Scatter plots
		Line of best fit
		Bivariate data
	Reviewing data in the media	Evaluating statistical reports
		Critical analysis of data in the media
	Data analysis	Using the mean and standard deviation of data sets
		Estimating population percentages
		Comparing data using mean and standard deviation
		Bivariate data and lines of best fit

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