Mathletics
Australian Curriculum v9

Skill Quests

Years 9 – 10

March, 2023

Mathletics

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Australian Curriculum (v9)
March 2023

Year 9 – Skill Quests

1 Algebra

Outcome	Quests	Content
AC9M9A01 - apply the exponent laws to numerical expressions with integer exponents and extend to variables	Exponent laws with numerical expressions	Mixed exponent laws numerical expressions
		Exponent laws: positive & negative integer index
	Exponent laws with variables	Mixed exponent laws algebraic expressions
AC9M9A02 - simplify algebraic expressions, expand binomial products and factorise monic quadratic expressions	Apply the distributive law	Applying the distributive law
	Binomial expansions & factorisations	Expanding binomial products
		Binomial product special results
		Factorising monic quadratic trinomials
		Further binomial expansions
AC9M9A03 - find the gradient of a line segment, the midpoint of the line interval and the distance between 2 distinct points on the Cartesian plane	Find the distance between two points	Distance between two points without the formula
		Distance between two points using the formula
	Find the midpoint between two points	Finding the midpoint without the formula
		Finding the midpoint using the formula
	Find the gradient between two points	Finding the gradient without the formula
		Finding the gradient using the formula
AC9M9A04 - identify and graph quadratic functions, solve quadratic equations graphically and numerically, and solve monic quadratic equations with integer roots algebraically, using graphing software and digital tools as appropriate	Graph & solve quadratic relationships	Using table of values to graph quadratics
		Solving simple nonlinear relationships
		Understanding parabolas
	Solve simple quadratic equations	Solving simple quadratic equations

2 Measurement

Outcome	Quests	Content
AC9M9M01 - solve problems involving the volume and surface area of right prisms and cylinders using appropriate units	Surface area & volume of cylinders	Volumes of cylinders
		Problem-solving with volume
		Surface area of cylinders
	Surface area of right prisms	Surface area of right prisms with nets
		Surface area problems
AC9M9M02 - solve problems involving very small and very large measurements, time scales and intervals expressed in scientific notation	Large & small amounts of time	Significant figures
		Understanding prefixes of numbers
		Exponent notation for large/small numbers
		Large & small time intervals
		Limits of accuracy
AC9M9M03 - solve spatial problems, applying angle properties, scale, similarity, Pythagoras' theorem and trigonometry in right-angled triangles	Pythagoras' theorem	Identifying sides on right-angled triangles
		Exploring the sides of a right-angled triangle
		Finding a shorter side using Pythagoras' theorem
		Finding the hypotenuse using Pythagoras' theorem
		Solving problems involving Pythagoras' theorem
		Using the converse of Pythagoras' theorem
		Solving Pythagoras' theorem problems: exact values
	Apply trigonometry	Finding the missing side using trig ratios
		Finding the missing angle using trig ratios
		Solving 2D & 3D problems using trig ratios
	Scale factors with similar figures	Scale factors
AC9M9M05 - use mathematical modelling to solve practical problems involving direct proportion, rates, ratio and scale, including financial contexts; formulate the problems and interpret solutions in terms of the situation; evaluate the model and report methods and findings	Proportion, rates, graphs & equations	Unit rates
		Converting rates
		Direct proportion
		Indirect/inverse proportion
		Direct & inversely proportionate graphs
		Interpret & use conversion graphs
		The constant of proportionality
		Graph equations of direct proportion
		Distance, speed & time problems
		Travel graphs

	Ratio & scales	Ratio & scales in real life

3 Space

Outcome	Quests	Content
AC9M9SP01 - recognise the constancy of the sine, cosine and tangent ratios for a given angle in right-angled triangles using properties of similarity	Introduce trigonometry	Introducing trigonometry
		Calculating trigonometric ratios & angles
AC9M9SP02 - apply the enlargement transformation to shapes and objects using dynamic geometry software as appropriate; identify and explain aspects that remain the same and those that change	Similar triangles	Introducing similarity
		Similar triangles
	Area & volume scale factors	Area & volume scale factors

4 Statistics

Outcome	Quests	Content
AC9M9ST01 - analyse reports of surveys in digital media and elsewhere for information on how data was obtained to estimate population means and medians	Make population predictions from data	Using data to make predictions about populations
AC9M9ST03 - represent the distribution of multiple data sets for numerical variables using comparative representations; compare data distributions with consideration of centre, spread and shape, and the effect of outliers on these measures	Construct & interpret data displays	Constructing & interpreting data displays
	Compare data displays	Comparing data displays
AC9M9ST05 - plan and conduct statistical investigations involving the collection and analysis of different kinds of data; report findings and discuss the strength of evidence to support any conclusions	Collect everyday data	Collecting everyday data

5 Probability

Outcome	Quests	Content
AC9M9P01 - list all outcomes for compound events both with and without replacement, using lists, tree diagrams, tables or arrays; assign probabilities to outcomes	List outcomes & find probabilities	The fundamental counting principle
		Two-step chance experiments with replacement
		Two-step chance experiments without replacement
AC9M9P02 - calculate relative frequencies from given or collected data to estimate probabilities of events involving "and", inclusive "or" and exclusive "or"	Calculate & use relative frequency	Calculating & using relative frequency

Year 9 – Activities

1 Number

Outcome	Topic	Activity Title
AC9M9N01 - recognise that the real number system includes the rational numbers and the irrational numbers, and solve problems involving real numbers using digital tools	Problem Solving & Reasoning Strand: Number & Algebra Sub-Strand: Number Theory Level 7 – 9	Square postage stamp
		Irrational bounds
	Ebook Year 11	Rational numbers

2 Algebra

Outcome	Topic	Activity Title
AC9M9A01 - apply the exponent laws to numerical expressions with integer exponents and extend to variables	A-Exponent laws	Negative Indices
		Zero Exponent and Algebra
		Multiplication with Indices
AC9M9A02 – simplify algebraic expressions, expand binomial products and factorise monic quadratic expressions	A- Algebraic expressions	Simplifying Expressions
		Expanding Binomial Products
		Highest Common Algebraic Factor
		Factorising
		Factorising with Indices
		Factoring Quadratics 1
AC9M9A03 - find the gradient of a line segment, the midpoint of the line interval and the distance between 2 distinct points on the Cartesian plane	A- Coordinate Geometry	Distance Between Two Points
		Midpoint by Formula
		Slope of a Line
		Gradient
		Equation from Two Points
AC9M9A04 - identify and graph quadratic functions, solve quadratic equations graphically and numerically, and solve monic quadratic equations with integer roots algebraically, using graphing software and digital tools as appropriate	A-Quadratic equations	Quadratic Equations 1
		Monic Quadratic Trinomial Equations
		Quadratic Equations 2
		Checking Quadratic Solutions
		Monic Quadratic Equations by Factorising
		Graphing Parabolas
		Constructing Formulae
AC9M9A05 – use mathematical modelling to solve applied problems involving change including financial contexts; formulate problems, choosing to use either linear or quadratic functions; interpret solutions in terms of the situation; evaluate the model and report methods and findings	A-Quadratic equations	Parabolas and Marbles
		Parabolas and Rectangles
	Ebook Year 9	Linear Relationships
AC9M9A06 - experiment with the effects of the variation of parameters on graphs of related functions, using digital tools, making connections between graphical and algebraic representations, and generalising emerging patterns	Problem Solving & Reasoning Strand: Number & Algebra Sub-Strand: Equations and expressions Level 7 – 9	Plot the parallel line
		Points, gradients and perpendicular lines
		Where will they meet?
		Equation of a line parallel to another given one axis intercept

	Ebooks Year 11	Graphs and Physical phenomena
		Straight lines and curves
		Straight lines

3 Measurement

Outcome	Topic	Activity Title
AC9M9M01 - solve problems involving the volume and surface area of right prisms and cylinders using appropriate units	M-Volume & Surface Area	Surface Area: Rectangular Prisms
		Surface Area: Triangular Prisms 1
		Surface Area: Triangular Prisms
		Surface Area: Cylinders
		Surface Area: Cones
		Surface Area: Rectangular Pyramids
		Volume: Cylinders
		Volume: Pyramids
		Volume: Cones
AC9M9M02 - solve problems involving very small and very large measurements, time scales and intervals expressed in scientific notation	M-Scientific Notation & Errors	Scientific Notation to Decimal
		Scientific Notation
		Scientific Notation 1
		Scientific Notation 2
		Ordering Scientific Notation
AC9M9M03 - solve spatial problems, applying angle properties, scale, similarity, Pythagoras' theorem and trigonometry in right-angled triangles	M - Pythagoras and Trigonometry	Scale Factor
		Similar Areas and Volumes
		Find Unknown Sides
		Find Unknown Angles
		Cone and Pyramid dimensions
AC9M9M04 - calculate and interpret absolute, relative and percentage errors in measurements, recognising that all measurements are estimates	M-Scientific Notation & Errors	Percentage Error
		Error in Measurement
AC9M9M05 – use mathematical modelling to solve practical problems involving direct proportion, rates, ratio and scale, including financial contexts; formulate the problems and interpret solutions in terms of the situation; evaluate the model and report methods and findings	M-Rates & Ratio problems	Best Buy
		Purchase Options

4 Space

Outcome	Topic	Activity Title
AC9M9SP01 - recognise the constancy of the sine, cosine and tangent ratios for a given angle in right-angled triangles using properties of similarity	SP-Right-angled triangles	Hypotenuse, Adjacent, Opposite
		Sin A
		Cos A
		Tan A
		Exact Trigonometric Ratios
AC9M9SP02 - apply the enlargement transformation to shapes and objects using dynamic geometry software as appropriate; identify and explain aspects that remain the same and those that change	Y9 Quests:	Y9 Quest content:
	Similar triangles	Introducing similarity
		Similar triangles
	Area & volume scale factors	Area & volume scale factors
	Problem Solving & Reasoning Strand: Geometry Sub-Strand: Symmetry, transformation & location Level 6 - 8	Enlarging triangles
		The business of logos
	Problem Solving & Reasoning Strand: Geometry Sub-Strand: Symmetry, transformation & location Level 9 - 11	Dilation dilemma
AC9M9SP03 - design, test and refine algorithms involving a sequence of steps and decisions based on geometric constructions and theorems; discuss and evaluate refinements	Problem Solving & Reasoning Strand: Geometry Sub-Strand: Symmetry, transformation & location Level 7 – 9	U move

5 Statistics

Outcome	Topic	Activity Title
AC9M9ST01 - analyse reports of surveys in digital media and elsewhere for information on how data was obtained to estimate population means and medians	Y9 Quests: Make population predictions from data	Y9 Quest content: Using data to make predictions about populations
	Problem Solving & Reasoning Strand: Statistics & Data Sub-Strand: x Level 8 – 10	Do energy drinks work?
AC9M9ST02 - analyse how different sampling methods can affect the results of surveys and how choice of representation can be used to support a particular point of view	Problem Solving & Reasoning Strand: Statistics & Data Sub-Strand: x Level 9 - 11	Number of bedrooms
		Crabby measurements
		Your privacy is showing
	Ebooks Year 12	Data Analysis – data collection and sampling
AC9M9ST03 - represent the distribution of multiple data sets for numerical variables using comparative representations; compare data distributions with consideration of centre, spread and shape, and the effect of outliers on these measures		Frequency Histograms
		Double Stem and Leaf Plots
		Histograms for Grouped Data
	Y9 Quests:	Y9 Quest content:
	Construct & interpret data displays	Constructing & interpreting data displays
	Compare data displays	Comparing data displays
	Problem Solving & Reasoning Strand: Statistics & Data Level 5 - 7	Box plot detectives
		Show your cards
		Lake Scaley fish
		Goals per game
	Ebooks Year 8	Data for statistics
AC9M9ST04 - choose appropriate forms of display or visualisation for a given type of data; justify selections and interpret displays for a given context	Problem Solving & Reasoning Strand: Statistics & Data Level 7 – 9	Angle of the sectors
		Sporty sectors
		Sector graph angles
		A piece of the pie
		Transferring visual data from pie to divided bar graph
AC9M9ST05 - plan and conduct statistical investigations involving the collection and analysis of	Y9 Quests: Collect everyday data	Y9 Quest content: Collecting everyday data

different kinds of data; report findings and discuss the strength of evidence to support any conclusions	15	

6 Probability

Outcome	Topic	Activity Title
AC9M9P01 - list all outcomes for compound events both with and without replacement, using lists, tree diagrams, tables or arrays; assign probabilities to outcomes	ST-Statistical & Probability	Probability With Replacement
		Probability Without Replacement
AC9M9P02 - calculate relative frequencies from given or collected data to estimate probabilities of events involving "and", inclusive "or" and exclusive "or"	Y9 Quests: Calculate & use relative frequency	Y9 Quest content: Calculating & using relative frequency
	Ebooks Year 9	Probability
AC9M9P03 - design and conduct repeated chance experiments and simulations, using digital tools to compare probabilities of simple events to related compound events, and describe results	Teacher directed	

Year 10 – Skill Quests

1 Algebra

Outcome	Quests	Content
AC9M10A01 - expand, factorise and simplify expressions and solve equations algebraically, applying exponent laws involving products, quotients and powers of variables, and the distributive property	Factorise algebraic expressions	Factorising algebraic expressions
	Exponent laws	Exponents: multiplication
		Exponents: division
		Exponents: power of a power
		Exponents: zero index
		Exponents: mixed operations with coefficient = 1
		Exponents: mixed operations with coefficient >1
		Exponents: negative index with numerical base
		Exponents: negative, algebraic & numerical base
		Exponents: mixed with negative indices
	Algebraic fractions	Algebraic fractions: 4 ops numerical denominators
		Algebraic fractions: simplifying
	Binomial expansions & basic quadratics	Expanding binomial products
		Binomial product special results
		Factorising monic quadratic trinomials
		Further binomial expansions
	Solve simple quadratic equations	Solving simple quadratic equations
AC9M10A02 - solve linear inequalities and simultaneous linear equations in 2 variables; interpret solutions graphically and communicate solutions in terms of the situation	Linear inequalities & their graphs	Understanding inequalities
		Solving linear inequalities – 1-step
		Solving linear inequalities – 2-step
		Solving linear inequalities – 3-step
	Linear simultaneous equations	Simultaneous equations
AC9M10A03 - recognise the connection between algebraic and graphical representations of exponential relations and solve related exponential equations, using digital tools where appropriate	Representations of nonlinear relations	Representations of nonlinear relations
	Solve exponential equations	Solving exponential equations
AC9M10A04 - use mathematical modelling to solve applied problems involving growth and decay,	Compound & simple interest	Compound interest
		Comparing simple & compound interest

including financial contexts;		Appreciation & depreciation
formulate problems, choosing to apply linear, quadratic or exponential models; interpret solutions in terms of the situation; evaluate and modify models as necessary and report assumptions, methods and findings	Problems involving linear equations	Solving word problems with linear equations

2 Measurement

Outcome	Quests	Content
AC9M10M01 - solve problems involving the surface area and volume of composite objects using appropriate units	Volume & surface area: composite solids	Volume of composite solids
		Surface area of composite solids
AC9M10M03 - solve practical problems applying Pythagoras' theorem and trigonometry of right-angled triangles, including problems involving direction and angles of elevation and depression	Angles of elevation/depression, bearings	Angles of elevation & depression
		Compass bearings
		True bearings

3 Space

Outcome	Quests	Content
AC9M10SP01 - apply deductive reasoning to proofs involving shapes in the plane and use theorems to solve spatial problems	Solve problems using geometric reasoning	Solving problems using geometric reasoning

4 Statistics

Outcome	Quests	Content
AC9M10ST01 - analyse claims, inferences and conclusions of statistical reports in the media, including ethical considerations and identification of potential sources of bias	Evaluate statistical reports	Evaluating statistical reports
AC9M10ST02 - compare data distributions for continuous numerical variables using appropriate data displays including boxplots; discuss the shapes of these distributions in terms of centre, spread, shape and outliers in the context of the data	Compare data distributions	Interquartile range
		Constructing & interpreting box plots
		Comparing box plots
		Comparing dot plots
		Comparing bar graphs
AC9M10ST03 - construct scatterplots and comment on the association between the 2 numerical variables in terms of strength, direction and linearity	Scatter plots	Scatter plots
AC9M10ST04 - construct two-way tables and discuss possible relationship between categorical variables	Two-way tables	Two-way tables
AC9M10ST05 - plan and conduct statistical investigations of situations that involve bivariate data; evaluate and report findings with consideration of limitations of any inferences	Bivariate data	Bivariate data

5 Probability

Outcome	Quests	Content
AC9M10P01 - use the language of "if …. then", "given", "of", "knowing that" to describe and interpret situations involving conditional probability	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
AC9M10P02 - design and conduct repeated chance experiments and simulations using digital tools to model conditional probability and interpret results	Three-step experiments	Three-step chance experiments with replacement
		Three-step chance experiments without replacement
		Independent events

Year 10 – Activities

1 Number

Outcome	Topic	Activity Title
AC9M10N01 - recognise the effect of using approximations of real numbers in repeated calculations and compare the results when using exact representations	Teacher directed	

2 Algebra

Outcome	Topic	Activity Title
AC9M10A01 - expand, factorise and simplify expressions and solve equations algebraically, applying exponent laws involving products, quotients and powers of variables, and the distributive property	A-Algebraic expressions and fractions	Special Binomial Products
		Grouping in Pairs
		Exponent Laws and Algebra
		Exponent Laws with Brackets
		Multiplication and Division with Exponents
		Algebraic Fractions 1
		Algebraic Fractions 2
AC9M10A02 – solve linear inequalities and simultaneous linear equations in 2 variables; interpret solutions graphically and communicate solutions in terms of the situation	A-Inequalities and simultaneous equations	Solve One-Step Inequalities 1
		Solve One-Step Inequalities 2
		Solve Two-Step Inequalities
		Solving Inequalities 1
		Solving Inequalities 2
		Linear Regions
		Graphing Inequalities on a Number Line
		Solve Systems by Graphing
		Intersecting Linear Regions
		Simultaneous Linear Equations
		Simultaneous Equations 1
		Simultaneous Equations 2
AC9M10A03 - recognise the connection between algebraic and graphical representations of exponential relations and solve related exponential equations, using digital tools where appropriate	A-Exponentials	Graphing Exponentials
		Exponential Equations
		Exponential Growth and Decay
		Compound Interest
AC9M10A04 – use mathematical modelling to solve applied problems involving growth and decay, including financial contexts; formulate problems, choosing to apply linear, quadratic or exponential models; interpret solutions in terms of the situation; evaluate and modify models as necessary and report assumptions, methods and findings	A-Exponentials	Compound Interest by Formula
		Successive Discounts
		Depreciation
		Comparing Loans
		Comparing Home Loans
AC9M10A05 - experiment with functions and relations using digital tools, making and testing conjectures and generalising emerging patterns	Problem Solving & Reasoning Strand: Number and Algebra Sub-Strand: Equations & expressions Level 9-11	Circle transformation

3 Measurement

Outcome	Topic	Activity Title
AC9M10M01 - solve problems involving the surface area and volume of composite objects using appropriate units	Y9 Quests: Volume & surface area: composite solids	Y9 Quest content: Volume of composite solids
	Problem Solving & Reasoning Strand: Measurement Sub-Strand: Volume & Capacity Level 6 - 8	Volume of composite shapes
AC9M10M02 - interpret and use logarithmic scales in applied contexts involving small and large quantities and change	Ebooks Year 11	Functions and Logarithms
		Logarithms C Series
AC9M10M03 - solve practical problems applying Pythagoras' theorem and trigonometry of right-angled triangles, including problems involving direction and angles of elevation and depression	M-Pythagoras and Trigonometry	Bearings
		Elevation and Depression
		Trigonometry Problems 2
		Trigonometry Problems 1
		3D Trigonometry
AC9M10M04 - identify the impact of measurement errors on the accuracy of results in practical contexts	Teacher directed	
AC9M10M05 – use mathematical modelling to solve practical problems involving proportion and scaling of objects; formulate problems and interpret solutions in terms of the situation; evaluate and modify models as necessary, and report assumptions, methods and findings	Teacher directed	

4 Space

Outcome	Topic	Activity Title
AC9M10SP01 - apply deductive reasoning to proofs involving shapes in the plane and use theorems to solve spatial problems	Y9 Quests: Solve problems using geometric reasoning	Y9 Quest content: Solving problems using geometric reasoning
AC9M10SP02 - interpret networks and network diagrams used to represent relationships in practical situations and describe connectedness	SP-Networks	Networks Introduction
		Minimum Spanning Trees
AC9M10SP03 - design, test and refine solutions to spatial problems using algorithms and digital tools; communicate and justify solutions	Teacher directed	

5 Statistics

Outcome	Topic	Activity Title
AC9M10ST01 - analyse claims, inferences and conclusions of statistical reports in the media, including ethical considerations and identification of potential sources of bias	Y9 Quests: Evaluate statistical reports	Y9 Quest content: Evaluating statistical reports
AC9M10ST02 – compare data distributions for continuous numerical variables using appropriate data displays including boxplots; discuss the shapes of these distributions in terms of centre, spread, shape and outliers in the context of the data	ST-Statistical data	Calculating Interquartile Range
		Box-and-Whisker Plots 1
		Box-and-Whisker Plots 2
		Skewness of Data
AC9M10ST03 – construct scatterplots and comment on the association between the 2 numerical variables in terms of strength, direction and linearity	ST-Statistical data	Correlation
AC9M10ST04 – construct two-way tables and discuss possible relationship between categorical variables	Y9 Quests: Two-way tables	Y9 Quest content: Two-way tables
	Problem Solving & Reasoning Strand: Chance & Probability Sub-Strand: x Level 6 - 8	Compare the information
	Ebooks Year 10	Probability
AC9M10ST05 - plan and conduct statistical investigations of situations that involve bivariate data; evaluate and report findings with consideration of limitations of any inferences	Y9 Quests: Bivariate data	Y9 Quest content: Bivariate data

6 Probability

Outcome	Topic	Activity Title
AC9M10P01 - use the language of "if …. then", "given", "of", "knowing that" to describe and interpret situations involving conditional probability	P-Probability	Conditional probability
		Probability - 'And' and 'Or'
AC9M10P02 - design and conduct repeated chance experiments and simulations using digital tools to model conditional probability and interpret results	Three-step experiments	Three-step chance experiments with replacement
		Three-step chance experiments without replacement
		Independent events

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