Mathematics Years 7–10 continuum of key ideas

Number and Algebra

Stage 4	Stage 5.1	Stage 5.2	Stage 5.3
Computation with Integers Apply associative, commutative and distributive laws to aid mental computation Apply the four operations with integers Apply the order of operations			
Fractions, Decimals and Percentages Apply the four operations with fractions, including mixed numerals, and decimals Convert between fractions, decimals and percentages Express one quantity as a fraction/percentage of another Calculate fractions/percentages of quantities Solve problems involving fractions, decimals and percentages Investigate the concept of irrational numbers			
Financial Mathematics Perform calculations involving GST Calculate discounts and 'best buys' Solve problems involving profit and loss	**Financial Mathematics** Solve problems involving earning money and taxation Apply the simple interest formula to solve problems, including buying on terms Calculate compound interest using repeated applications of simple interest	**Financial Mathematics** Apply the compound interest formula to solve problems, including depreciation	
Ratios and Rates Apply ratios and rates to solve problems Interpret and draw distance/time graphs		**Ratios and Rates** Solve problems involving constant rates of change Interpret graphs of change where the relationship between the variables is constant Construct graphs of direct linear proportion	**Ratios and Rates** Interpret and describe graphs of change where the relationship between the variables is not constant Sketch graphs of physical phenomena
Algebraic Techniques *Part 1* Use letters to represent numbers Recognise and use simple equivalent algebraic expressions Simplify algebraic expressions involving the four operations *Part 2* Substitute into algebraic expressions Expand and factorise simple algebraic expressions		**Algebraic Techniques** Apply the four operations to simplify simple algebraic fractions Expand and simplify algebraic expressions where appropriate, including binomial products Factorise monic quadratic trinomial expressions	**Algebraic Techniques** Add and subtract algebraic fractions with binomial numerators Recognise and apply the special products to expand binomial products Factorise monic and non-monic quadratic expressions Apply factorisation to simplify algebraic fractions
Indices Use index notation for positive integral indices Express a whole number as a product of its prime factors Apply the order of operations to evaluate numerical expressions involving indices Determine and apply tests of divisibility Find square roots and cube roots Determine and apply the index laws for numerical expressions with positive-integer indices Determine and apply the meaning of the zero index	**Indices** Apply the index laws to simplify algebraic expressions with positive-integer indices and the zero index Define and use negative-integer indices to evaluate numerical expressions	**Indices** Convert algebraic expressions with negative indices to expressions with positive indices and vice versa Simplify algebraic expressions involving positive, negative and zero indices	**Surds and Indices** Define the system of real numbers and distinguish between rational and irrational numbers Perform operations with surds Convert between surd and index form and vice versa
Equations Solve simple linear equations using algebraic techniques Solve simple quadratic equations of the form $x^2 = c$		**Equations** Solve linear equations involving grouping symbols Solve linear equations involving algebraic fractions Solve quadratic equations of the form $ax^2 = c$ Solve quadratic equations of the form $ax^2 + bx + c = 0$ (where $a = 1$) using factors Solve equations resulting from substitution into formulas Solve word problems using linear equations Solve linear inequalities Solve linear simultaneous equations using algebraic and graphical techniques	**Equations** Solve complex linear equations involving two or more algebraic fractions Solve quadratic equations by factorising, by completing the square or by using the quadratic formula Solve simple cubic equations of the form $ax^3 = k$ Rearrange literal equations Solve simultaneous equations where one equation is non-linear, using algebraic and graphical techniques

Linear Relationships

Locate and describe points on the Cartesian plane using coordinates

Describe translations and reflections in an axis on the Cartesian plane

Describe rotations of multiples of 90º on the Cartesian plane

Recognise, describe and record geometric and number patterns in words and algebraic symbols

Plot linear relationships created from simple patterns and equations

Solve simple linear equations using graphical techniques

Linear Relationships

Find the midpoint, gradient and length of intervals on the Cartesian plane using informal strategies

Graph linear relationships from equations

Determine that parallel lines on the Cartesian plane have equal gradients

Linear Relationships

Apply the gradient-intercept form of the equation of a straight line to interpret and graph straight lines

Apply the properties of the gradients of parallel and perpendicular lines on the Cartesian plane

Linear Relationships

Use formulas to find the midpoint, gradient and length of intervals on the Cartesian plane

Apply various standard forms of the equation of a straight line

Solve problems involving straight lines on the Cartesian plane, including parallel and perpendicular lines

Non-Linear Relationships

Graph simple parabolas, exponentials and circles on the Cartesian plane using tables of values and digital technologies

Non-Linear Relationships

Identify, draw and compare graphs of parabolas of the form $y = ax^2 + c$

Identify, graph and compare exponential curves and circles

Non-Linear Relationships

Draw, interpret and compare graphs of parabolas of the form $y = ax^2 + bx + c$ using a variety of techniques

Determine the equation of the axis of symmetry and the coordinates of the vertex of a parabola

Draw, interpret and compare graphs of hyperbolas, exponentials, circles and simple cubic functions

Polynomials

Add, subtract, multiply and divide polynomials

Apply the factor and remainder theorems

Identify features of graphs of polynomials from their equations

Sketch a range of polynomials

Logarithms

Define logarithms

Establish and apply the laws of logarithms

Solve simple exponential equations

Functions and Other Graphs

Define functions and use function notation

Determine inverse functions

Measurement and Geometry

Stage 4	Stage 5.1	Stage 5.2	Stage 5.3
Length Find perimeters of two-dimensional shapes Establish and use formulas to find circumferences of circles Find arc lengths and the perimeters of quadrants, semi-circles and sectors Solve problems involving perimeter and circumference			
Area Convert between metric units of area Establish and use formulas to find the areas of triangles, special quadrilaterals and circles Solve problems involving area	**Area and Surface Area** Solve problems involving areas of composite shapes by dissection into triangles, quadrilaterals, quadrants, semi-circles and sectors Solve problems involving the surface area of rectangular and triangular prisms	**Area and Surface Area** Solve problems involving surface area of right prisms, cylinders and related composite solids	**Area and Surface Area** Solve problems involving surface area of right pyramids, right cones, spheres and related composite solids
Volume Visualise and draw different views of three-dimensional objects Convert between metric units of volume and capacity Establish and use formulas to find volumes of right prisms and cylinders Solve problems involving volume and capacity		**Volume** Solve problems involving volume and capacity of prisms, cylinders and related composite solids	**Volume** Solve problems involving volume of right pyramids, right cones, spheres and related composite solids
Time Perform operations with time units mentally and with a calculator Interpret international time zones	**Numbers of Any Magnitude** Round numbers to a specified number of significant figures Convert between metric units for very large and very small measurements, including measurements of digital information Express numbers in scientific notation using positive and negative powers of 10		
Right-Angled Triangles (Pythagoras) Establish and apply Pythagoras' theorem to find sides in right-angled triangles Solve problems involving Pythagoras' theorem	**Right-Angled Triangles (Trigonometry)** Use trigonometry to find sides and angles in right-angled triangles (angles measured to nearest degree) Apply trigonometry to solve problems involving right-angled triangles, including the use of angles of elevation and depression, from a given diagram	**Right-Angled Triangles (Trigonometry)** Use trigonometry to find sides and angles in right-angled triangles (including angles measured to nearest minute or second) Apply trigonometry to solve word problems involving right-angled triangles, including the use of three-figure bearings and angles of elevation and depression	**Trigonometry and Pythagoras' Theorem** Apply Pythagoras' theorem and trigonometry to solve three-dimensional problems involving right-angled triangles Define trigonometric functions and draw them for at least $0° \le x \le 360°$ Determine and use the exact trigonometric ratios for 30°, 45° and 60° to solve problems Determine possible acute and/or obtuse angles for a given trigonometric ratio Apply the sine, cosine and area rules to solve problems involving non-right-angled triangles
Properties of Geometrical Figures Classify and determine properties of triangles and quadrilaterals Identify line and rotational symmetries Determine the angle sums of triangles and quadrilaterals Use properties of shapes to find unknown sides and angles in triangles and quadrilaterals giving a reason Identify congruent figures Identify congruent triangles using the four tests	**Properties of Geometrical Figures** Identify similar figures and describe their properties informally Use scale factors and proportion statements to determine unknown lengths in similar figures Use scales on maps, plans and drawings	**Properties of Geometrical Figures** Write formal proofs of congruent triangles Verify properties of isosceles and equilateral triangles, and special quadrilaterals using congruent triangles Determine the minimum conditions for triangles to be similar Use deductive reasoning in numerical exercises involving plane shapes Establish and use the sum of exterior angles and the sum of interior angles results for polygons	**Properties of Geometrical Figures** Write formal proofs of similar triangles Use similarity relationships for area and volume Apply deductive reasoning to prove properties of isosceles and equilateral triangles, and special quadrilaterals Apply deductive reasoning, including use of congruence and similarity, in numerical and non-numerical geometry exercises
Angle Relationships Use the language, notation and conventions of geometry Apply the geometric properties of angles at a point to find unknown angles with appropriate reasoning Apply the properties of corresponding, alternate and co-interior angles on parallel lines to find unknown angles with appropriate reasoning Determine and justify that particular lines are parallel Solve simple numerical exercises based on geometrical properties			**Circle Geometry** Prove and apply angle, chord, tangent and secant properties of circles

Statistics and Probability

Stage 4	Stage 5.1	Stage 5.2	Stage 5.3
Data Collection and Representation Identify variables as categorical or numerical (discrete or continuous) Identify and distinguish between a 'population' and a 'sample' Investigate techniques for collecting data and consider their implications and limitations Collect and interpret data from primary and secondary sources, including surveys Construct and interpret frequency tables, histograms and polygons Construct and interpret dot plots, stem-and-leaf plots, divided bar graphs, sector graphs and line graphs			
Single Variable Data Analysis Calculate mean, median, mode and range for sets of data Investigate the effect of outliers on the mean and median Describe and interpret a variety of data displays using mean, median and range Calculate and compare summary statistics of different samples drawn from the same population	**Single Variable Data Analysis** Construct and interpret back-to-back stem-and-leaf plots Describe data, using terms including 'skewed', 'symmetric' and 'bi-modal' Compare two sets of numerical data in a display using mean, median and range Interpret and critically evaluate reports in the media and elsewhere that link claims to data displays and statistics	**Single Variable Data Analysis** Determine quartiles and interquartile range Construct, interpret and use box plots to compare sets of data Compare shapes of box plots to corresponding histograms and dot plots Critically evaluate sources of data in media reports and elsewhere	**Single Variable Data Analysis** Calculate the standard deviation of a set of data Use mean and standard deviation to compare two sets of data
		Bivariate Data Analysis Construct and interpret displays of bivariate numerical data where the independent variable is time Construct and interpret scatter plots of two numerical variables	**Bivariate Data Analysis** Construct a line of best fit for bivariate numerical data using digital technology Critically evaluate the processes of planning, collecting, analysing and reporting studies in the media and elsewhere Recognise that statistics are used in the decision-making processes of governments and companies
Probability *Part 1* Construct sample spaces for single-step experiments with equally likely outcomes Find probabilities of events in single-step experiments Identify complementary events and use the sum of probabilities to solve problems *Part 2* Describe events using language of 'at least', exclusive 'or' (A or B but not both), inclusive 'or' (A or B or both) and 'and' Represent events in two-way tables and Venn diagrams and solve related problems	**Probability** Calculate relative frequencies to estimate probabilities Calculate probabilities from Venn diagrams and two-way tables	**Probability** Calculate probabilities for simple and compound events in two- and three-step chance experiments with and without replacement Distinguish between independent and dependent events informally Calculate probabilities of events where a condition is given that restricts the sample space Critically evaluate conditional statements in chance situations	