Mathletics

Mathletics NSW Curriculum

Understanding Practice and Fluency (UPF)

Stage 5

September, 2021

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NSW Curriculum

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Contents

Part I

Stage 5.1

1 Number and Algebra

1.1 Financial mathematics

MA5.1-4NA Solves financial problems involving earning, spending and investing money

Solve problems involving simple interest (ACMNA211)			
Quest: Solve problems involving simple interest			
Learning Journey	Step	Content	Description
Simple interest	1	Calculating simple interest using the formula	• calculate simple interest using the formula
	2	Calculating either the principal, the interest rate or the time periods using the rearranged simple interest formula	• calculate the principal using the rearranged simple interest formula
			• calculate the interest rate using the rearranged simple interest formula
			• calculate the time periods using the rearranged simple interest formula
	3	Solving problems involving simple interest	• solve problems involving simple interest
	4	Combination of previous content	• Combination of previous details
Understanding hire purchase agreements	1	Understanding hire purchase	• calculate the cost of purchasing items with HP, given the deposit and the details of the regular payments
			• calculate the cost of purchasing items with HP, given the deposit and the details of the regular payments, including where simple interest has been applied to the total cost
			• calculate the cost of purchasing items with a deposit and regular payments from an interest-free payments scheme
			• compare the difference between the cash price of items and the HP price and understand the advantages/disadvantages of using HP agreements

Connect the compound interest formula to repeated applications of simple interest using appropriate digital technologies (ACMNA229)			
Quest: Compound & simple interest			
Learning Journey	Step	Content	Description
Compound interest (repetition formula)	1	Calculating compound interest without using a formula; calculations based on simple interest (using appropriate digital technology)	• calculate compound interest based on using repeated calculations of simple interest, for up to 3 years

1.2 Indices

MA5.1-5NA Operates with algebraic expressions involving positive-integer and zero indices, and establishes the meaning of negative indices for numerical bases

Extend and apply the index laws to variables, using positive-integer indices and the zero index (ACMNA212)			
Quest: Index laws with variables			
Learning Journey	Step	Content	Description
Applying mixed index laws algebraic expressions	1	Applying index laws further: multiplication with integer indices (algebraic bases)	• apply the index law for multiplying expressions with the same algebraic base and integer indices
			• apply the index law to simplify the multiplication of 2 or more terms with algebraic bases and integer indices, leaving solutions in index form
	2	Applying index laws further: division with integer indices (algebraic bases)	• apply the index law for dividing expressions with the same algebraic base and integer indices
			• apply the index law to simplify the division of 2 or more terms with algebraic bases and integer indices, leaving solutions in index form
	3	Applying index laws further: power of a power with integer indices (algebraic bases)	• apply the index law for raising an expression in index form to another index (algebraic bases and integer indices)
			• apply the index law to simplify expressions involving raising a term written in index form to another index, leaving solutions in index form (algebraic bases and integer indices)
	4	Applying index laws further: zero index (algebraic bases)	• apply index laws: zero index (algebraic bases)
			• apply the zero index to simplify expressions involving the zero index and algebraic bases
	5	Applying index laws further: mixed index laws (algebraic bases)	• select the necessary index law(s) and apply them to simplify expressions of 2 or more terms involving indices with algebraic bases and the operations of multiplication, division, power of a power, and the zero index. Expressions to include positive and negative integers

Apply index laws to numerical expressions with integer indices (ACMNA209)			
Quest: Index laws with negative integer index			
Learning Journey	Step	Content	Description
Index laws: positive & negative integer index	1	Evaluating numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-1} = \frac{1}{3}$ with an index of -1	• evaluate numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-1} = \frac{1}{3}$ with an index of -1

Learning Journey	Step	Content	Description
	2	Evaluating numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-4} = \frac{1}{3}^{4} = \frac{1}{8}1$	• evaluate numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-4} = \frac{1}{3}^{4} = \frac{1}{8}1$
	3	Combination of previous content	• Combination of previous details

1.3 Linear relationships

MA5.1-6NA Determines the midpoint, gradient and length of an interval, and graphs linear relationships

Find the midpoint and gradient of a line segment (interval) on the Cartesian plane using a range of strategies, including graphing software (ACMNA294)			
Quest: Midpoint & gradient of line segments			
Learning Journey	Step	Content	Description
Finding the midpoint without the formula	1	Determining the midpoint of an interval using a diagram	• determine the midpoint of an interval using a diagram
	2	Using the process for calculating the 'mean' to find the midpoint, M, of the interval joining 2 points on the Cartesian plane	• use the process for calculating the 'mean' to find the midpoint, M, of the interval joining 2 points on the Cartesian plane
Finding the gradient without the formula	1	Plotting and joining 2 points to form an interval on the Cartesian plane and form a right-angled triangle by drawing a vertical side from the higher point and a horizontal side from the lower point	• plot and join 2 points to form an interval on the Cartesian plane and form a right-angled triangle by drawing a vertical side from the higher point and a horizontal side from the lower point
	2	Using the interval between 2 points on the Cartesian plane as the hypotenuse of a right-angled triangle and use the relationship gradient = rise/run to find the gradient of the interval joining the 2 points	• use the interval between 2 points on the Cartesian plane as the hypotenuse of a right-angled triangle and use the relationship gradient = rise/run to find the gradient of the interval joining the 2 points
			• distinguish between positive and negative gradients from a diagram

Find the distance between two points located on the Cartesian plane using a range of strategies, including graphing software (ACMNA214)			
Quest: Find the distance between two points			
Learning Journey	Step	Content	Description
Distance between two points without the formula	1	Using graphing software to find the distance between 2 points on the Cartesian plane	• use graphing software to find the distance between 2 points on the Cartesian plane
	2	Using the interval between 2 points on the Cartesian plane as the hypotenuse of a right-angled triangle and apply Pythagoras' theorem to determine the length of the interval joining the 2 points (ie 'the distance between the 2 points')	• use the interval between 2 points on the Cartesian plane as the hypotenuse of a right-angled triangle and apply Pythagoras' theorem to determine the length of the interval joining the 2 points (ie 'the distance between the 2 points')
			• describe how the distance between (or the length of the interval joining) 2 points can be calculated using Pythagoras' theorem

Sketch linear graphs using the coordinates of two points (ACMNA215)			
Quest: Linear graphs			
Learning Journey	Step	Content	Description
Understanding vertical & horizontal lines	1	Graphing horizontal linear relationships from the equation where there is no x involved	• graph horizontal linear relationships from the equation where there is no x involved
			• know that a horizontal line has a zero gradient
		Finding the equation of a given horizontal line	• find the equation of a given horizontal line
	2	Graphing vertical linear relationships from the equation where there is no y involved	• graph vertical linear relationships from the equation where there is no y involved
			• know that a vertical line has an infinite gradient
		Finding the equation of a given vertical line	• find the equation of a given vertical line
	3	Identifying the x-axis as the line $y = 0$ and the y-axis as the line $x = 0$	• identify the x-axis as the line $y = 0$ and the y-axis as the line $x = 0$
	4	Combination of previous content	• Combination of previous details
Finding & using x and y-intercepts	1	Establishing and using the fact that substituting $y = 0$ into a linear equation will give you the x-intercept	• substitute $y = 0$ into a linear equation in order to find the x-intercept
			• reproduce the x-intercept in coordinate form
	2	Establishing and using the fact that substituting $x = 0$ into a linear equation will give you the y-intercept	• substitute $x = 0$ into a linear equation in order to find the y-intercept
			• reproduce the y-intercept in coordinate form
	3	Finding the x and y-intercepts of any linear graphs	• find the x and y-intercepts of any linear graphs by substituting in $x = 0$ for the y-intercept and $y = 0$ for the x-intercept
Graphing using a table of values	1	Graphing a linear relationship on the Cartesian plane using a table of values	• graph a linear relationship on the Cartesian plane using a table of values
			• graph the number pairs on the Cartesian plane
Comparing linear relationships	1	Comparing linear relationships on the Cartesian plane without the use of digital technology	• graph more than 1 line on the same set of axes and compare the graphs to determine similarities and differences
			• identify similarities and differences between groups of linear relationships

Solve problems involving parallel lines (ACMNA238)			
Quest: Parallel lines			
Learning Journey	Step	Content	Description
Understanding parallel lines	1	Solving problems involving parallel lines	• understand the characteristics of 2 lines that make them parallel and that they have the same gradients
			• determine whether 2 given lines are parallel
	2	Finding the equation of a line that is parallel to another given line using $y = mx + c$	• find the equation of a line that is parallel to another given line using $y = mx + c$

1.4 Non-linear relationships

MA5.1-7NA Graphs simple non-linear relationships

Graph simple non-linear relations, with and without the use of digital technologies (ACMNA296)			
Quest: Graph non-linear relationships			
Learning Journey	Step	Content	Description
Graphing simple non-linear relations	1	Graphing simple quadratics by completing a table of values	• graph simple quadratics by completing a table of values
			• compare graphs of quadratics drawn from a table of values with quadratics drawn using digital technology
	2	Graphing simple circles by completing a table of values	• graph simple circles by completing a table of values
			• compare graphs of circles drawn from a table of values with quadratics drawn using digital technology
	3	Graphing simple exponentials by completing a table of values	• graph simple exponentials by completing a table of values
			• compare graphs of exponentials drawn from a table of values with exponentials drawn using digital technology
	4	Comparing the graphs of a variety of simple non-linear relationships	• compare the graphs of a variety of simple non-linear relationships

Explore the connection between algebraic and graphical representations of relations such as simple quadratics, circles and exponentials using digital technology as appropriate (ACMNA239)			
Quest: Representations of non-linear relations			
Learning Journey	Step	Content	Description
Graphing non-linear relations	1	Graphing simple quadratics using digital technology	• graph simple quadratics using digital technology
			• describe the shape and connect the shape of a simple quadratic to its equation
	2	Graphing simple circles using digital technology	• graph simple circles using digital technology
		Describing and connecting the shape of a simple circle to its equation	• describe the shape and connect the shape of a simple circle to its equation
	3	Graphing simple exponentials using digital technology	• graph simple exponentials using digital technology
			• describe the shape and connect the shape of a simple eponential to its equation
	4	Combination of previous content	• Combination of previous details

2 Measurement and Geometry

2.1 Area and surface area

MA5.1-8MG Calculates the areas of composite shapes, and the surface areas of rectangular and triangular prisms

Calculate areas of composite shapes (ACMMG216)			
Quest: Areas of composite shapes			
Learning Journey	Step	Content	Description
Exploring the areas of composite shapes	1	Identifying possible dissections of composite shapes to facilitate calculating the area of the composite shape	• identify possible dissections of composite shapes to facilitate calculating the area of the composite shape
	2	Calculating the areas of composite figures by dissection into triangles, special quadrilaterals, quadrants, semicircles and sectors	• calculate the areas of composite figures by dissection into triangles, special quadrilaterals, quadrants, semicircles and sectors
	3	Solving a variety of practical problems involving the areas of quadrilaterals and composite shapes	• solve a variety of practical problems involving the areas of quadrilaterals and composite shapes
	4	Defining an annulus and its associated terminology	• know the specific terms associated with an annulus: concentric circles, larger/external radius ('R'), smaller/interior radius ('r')
	5	Establishing and applying the area of an annulus	• find the area of an annulus by applying the area of an annulus formula
			• find the unknown variable using the area of an annulus formula in the context of a problem

Solve problems involving the surface area and volume of right prisms (ACMMG218)			
Quest: Surface area of right prisms			
Learning Journey	Step	Content	Description
Surface area of right prisms with nets	1	Identifying nets of a three-dimensional object	• identify possible nets of a three-dimensional object
	2	Constructing the net of a three-dimensional object	• identify each individual shape of each surface of a three-dimensional object using the net
	3	Naming a right prism, given its net	• name a right prism, given its net
	4	Finding the surface areas of rectangular and triangular prisms, given their net	• find the surface areas of rectangular and triangular prisms, given their net
Finding the surface area problems	1	Finding the surface area: rectangular prisms	• find the surface area of rectangular prisms
	2	Finding the surface area of rectangular prisms within the context of a problem	• find the surface area of rectangular prisms within the context of a problem

Learning Journey	Step	Content	Description
	3	Finding the surface area: triangular prisms (with and without Pythagoras' theorem)	• find the surface area of triangular prisms (with and without Pythagoras' theorem)
	4	Finding the surface area of triangular prisms (with and without Pythagoras' theorem) within the context of a problem	• find the surface area of triangular prisms (with and without Pythagoras' theorem) within the context of a problem
	5	Combination of previous content	• Combination of previous details

2.2 Numbers of any magnitude

MA5.1-9MG Interprets very small and very large units of measurement, uses scientific notation, and rounds to significant figures

Investigate very small and very large time scales and intervals (ACMMG219)			
Quest: Large/small amounts time, data, limits			
Learning Journey	Step	Content	Description
Significant figures	1	Introducing significant figures: whole numbers	• determine how many significant figures there are in a number, no zeros present
			• determine how many significant figures there are in a number, where there are zeros surrounded by other digits
			• determine how many significant figures there are in a number, where there are zeros at the end
		Identifying what values in a number are significant	• identify what values in a number are significant, eg in the amount $10 000 000, when would you consider a change in value of one of the 0s as being a significant change to the overall amount?
		Finding the number of significant figures in numbers <1	• determine how many significant figures there are in a number, no zeros present (except before the decimal point)
			• determine how many significant figures there are in a number, where there are zeros surrounded by other digits
			• determine how many significant figures there are in a number, where there are zeros at the end after the other digits or at the start
	2	Rounding significant figures and whole numbers	• round whole numbers to 1 significant figure using the appropriate rule on 5
			• round whole numbers to 2 significant figures using the appropriate rule on 5
			• round whole numbers to a specified number of significant figures using the appropriate rule on 5
	3	Rounding significant figures and decimals >1	• determine how many significant figures there are in a number, no zeros present
			• determine how many significant figures there are in a number, where there are zeros surrounded by other digits
			• determine how many significant figures there are in a number, where there are zeros at the end

Learning Journey	Step	Content	Description
		Rounding significant figures and decimals >1 to 1 significant figure	• round decimals >1 to 1 significant figure using the appropriate rule on 5
			• round decimals >1 to 2 significant figures using the appropriate rule on 5
			• round decimals >1 to a specified number of significant figures using the appropriate rule on 5
	4	Rounding significant figures and decimals <1 (positive)	• round decimals <1 to 1 significant figure using the appropriate rule on 5
			• round decimals <1 to 2 significant figures using the appropriate rule on 5
			• round decimals <1 to a specified number of significant figures using the appropriate rule on 5
	5	Combination of previous content	• Combination of previous details
Amounts of data	1	Interpreting the meaning of prefixes for very small and very large units of measurement, such as 'nano', 'micro', 'mega', 'giga' and 'tera'	• interpret the meaning of prefixes for very small and very large units of measurement, such as 'nano', 'micro', 'mega', 'giga' and 'tera'
	2	Recording measurements of digital information using correct abbreviations, eg kilobytes	• record measurements of digital information using correct abbreviations, eg kilobytes
	3	Converting between units of measurement of digital information, eg gigabytes to terabytes, megabytes to kilobytes	• convert between units of measurement of digital information, eg gigabytes to terabytes, megabytes to kilobytes
Large & small time intervals	1	Using appropriate units of time to measure very small or very large time intervals	• use appropriate units of time to measure very small or very large time intervals
	2	Converting very large and very small time intervals into different units	• convert very large and very small time intervals into different units
	3	Solving problems involving the conversion of very large of very small time intervals into different units	• solve problems involving the conversion of very large of very small time intervals into different units
Representing large & small numbers	1	Understanding prefixes for very large numbers	• understand prefixes for very large numbers
	2	Understanding prefixes for very small numbers	• understand prefixes for very small numbers
	3	Converting very large numbers written with a prefix into scientific notation and vice versa	• convert very large numbers written with a prefix into scientific notation and vice versa

Learning Journey	Step	Content	Description
	4	Converting very small numbers written with a prefix into scientific notation and vice versa	• convert very small numbers written with a prefix into scientific notation and vice versa
Limits of accuracy	1	Identifying the accuracy/precision of a measurement	• identify the accuracy/precision of a measurement after it has been rounded both quantitatively and qualitatively
	2	Interpreting limits of accuracy	• apply and interpret limits of accuracy when rounding or truncating (including upper and lower bounds)

Express numbers in scientific notation (ACMNA210)			
Quest: Express numbers in scientific notation			
Learning Journey	Step	Content	Description
Introducing scientific notation	1	Introducing scientific notation (also called standard form) for whole numbers	• understand that scientific notation is a way of writing numbers which has 2 parts to it
			• establish how to write 1, 10, 100, 1000 etc as an exponent of the 10
			• write whole numbers as a number between 1 and 10 multiplied by 10, 100, 1000 etc
			• represent whole numbers in scientific notation
	2	Introducing scientific notation (also called standard form) for rational numbers	• compare integers written in scientific notation
			• refer to science context for the use of scientific notation
Converting: scientific not. & basic numbers	1	Converting from scientific notation to standard form for very large numerals	• convert from scientific notation to standard form for very large numbers
	2	Converting from scientific notation to standard form for very small numerals	• convert from scientific notation to standard form for very small numbers
	3	Converting from standard form to scientific notation for very large numbers	• convert from standard form to scientific notation for very large numbers
	4	Converting from standard form to scientific notation for very small numbers	• convert from standard form to scientific notation for very small numbers
	5	Combination of previous content	• Combination of previous details
Calculating & rounding with scientific notation	1	Calculating in scientific notation	• perform calculations involving scientific notation (without a calculator) applying laws of exponents where there is 1 bracket
			• perform calculations involving scientific notation (without a calculator) using laws of exponents and 2 brackets to be multiplied

Learning Journey	Step	Content	Description
			• perform calculations involving scientific notation (without a calculator) using laws of exponents with 2 brackets involving division
	2	Using the calculator for scientific notation	• perform calculations involving scientific notation (with a calculator)
			• solve problems in context using scientific notation, with and without a calculator
	3	Rounding values in scientific notation to a given number of decimal places	• round values in scientific notation to a given number of decimal places
	4	Rounding values in scientific notation to a given number of significant figures	• round values in scientific notation to a given number of significant figures
		Identifying the number of significant figures in a number when written in scientific notation	• identify the number of significant figures in a number when written in scientific notation
	5	Combination of previous content	• Combination of previous details

2.3 Right-angled triangles (trigonometry)

MA5.1-10MG Applies trigonometry, given diagrams, to solve problems, including problems involving angles of elevation and depression

Use similarity to investigate the constancy of the sine, cosine and tangent ratios for a given angle in right-angled triangles (ACMMG223)			
Quest: Introduction to trigonometry			
Learning Journey	Step	Content	Description
Introducing trigonometry	1	Identifying and labelling parts of a right-angled triangle with reference to a given angle	• identify the location of the opposite, adjacent and hypotenuse in right-angled triangles of different orientation
		Labelling and assigning sides and their corresponding angles in triangles	• label sides in relation to angles in any triangle, eg side c is opposite angle C
	2	Establishing the sine trigonometric relationship on right-angled triangles	• establish the relationship of the opposite side to the hypotenuse with respect to a given angle as the sine of that angle
		Establishing the cosine trigonometric relationship on right-angled triangles	• establish the relationship of the adjacent side to the hypotenuse with respect to a given angle as the cosine of that angle.
		Establishing the tangent trigonometric relationship on right-angled triangles	• establish the relationship of the opposite side to the adjacent with respect to a given angle as the tangent of that angle
	3	Determining which 2 sides each trigonometric ratio applies with reference to a given angle	• determine which 2 sides of a right-angled triangle each trigonometric ratio applies to
			• select correct trigonometric ratio on triangles of different orientation
	4	Attaining the 3 primary trigonometric ratios on simple right-angled triangles with respect to a given angle	• attain the sine ratio in a right-angled triangle of different orientations with respect to each acute angle in the triangle. Sides are either values or pronumerals
			• attain the cosine ratio in a right-angled triangle of different orientations with respect to each acute angle in the triangle. Sides are either values or pronumerals
			• attain the tangent ratio in a right-angled triangle of different orientations with respect to each acute angle in the triangle. Sides are either values or pronumerals
	5	Identifying which trigonometric ratio to use given 2 sides and an angle in a right-angled triangle	• identify that the sine ratio is relevant when given the opposite and hypotenuse sides with respect to a given angle
			• identify that the cosine ratio is relevant when given the adjacent and hypotenuse sides with respect to a given angle

Learning Journey	Step	Content	Description
			• identify that the tangent ratio is relevant when given the opposite and adjacent sides with respect to a given angle
Calculating trigonometric ratios and angles	1	Calculating the approximation of trigonometric ratios for a given angle measured in degrees using the calculator	• calculate the approximate value of the sine ratio for a given angle measured in whole degrees on right-angled triangles with different orientation using the calculator, eg sin 30°=0.5
			• calculate the approximate value of the cosine ratio for a given angle measured in whole degrees on right-angled triangles with different orientation using the calculator, eg cos 60°=0.5
			• calculate the approximate value of the tangent ratio for a given angle measured in whole degrees on right-angled triangles with different orientation using the calculator, eg tan 45°=1
	2	Using a calculator to find an angle correct to the nearest degree, given one of the trigonometric ratios for the angle	• use a calculator to find an angle correct to the nearest degree, given one of the trigonometric ratios for the angle

Solve right-angled triangle problems including those involving direction and angles of elevation and depression (ACMMG245)			
Quest: Angles of elevation/depression &bearings			
Learning Journey	Step	Content	Description
Introducing angles of elevation & depression	1	Introducing angles of elevation and depression	• introduce and define angles of elevation and depression
			• identify angles of elevation and depression on diagrams
			• interpret, condtruct and label diagrams involving angles of depression and elevation

2.4 Properties of geometrical figures

MA5.1-11MG Describes and applies the properties of similar figures and scale drawings

Use the enlargement transformation to explain similarity (ACMMG220)			
Quest: Similar triangles			
Learning Journey	Step	Content	Description
Introducing similarity	1	Introducing similarity	• introduce the definition of similarity
			• introduce the symbol for similarity
		Identifying that the ratio of corresponding sides of similar shapes are proportional, including its shape and dilation	• identify the ratio in which a shape has been dilated
	2	Identifying similar triangles, with coordinate grids	• identify which of a set of given triangles are similar with coordinate grids
	3	Identifying similar triangles without coordinate grids	• identify which of a set of given triangles are similar without coordinate grids
	4	Constructing similar triangles by enlargement	• construct and label a similar triangle to a given triangle and scaling constant by enlarging the triangle
			• construct and label a similar triangle to a given triangle and scaling constant by reducing the triangle
	5	Using scale to analyse similar triangles	• find the missing side on a triangle given its similar figure and scale factor
			• find the missing angle on a triangle given its similar figure and scale factor

Solve problems using ratio and scale factors in similar figures (ACMMG221)			
Quest: Scale factors with similar figures			
Learning Journey	Step	Content	Description
Using scale factors	1	Using scale to analyse similar triangles	• find the missing side on a triangle given its similar figure and scale factor
			• find the missing angle on a triangle given its similar figure and scale factor
	2	Finding the missing side on a shape given its similar figure and scale factor	• find the missing side on a shape given its similar figure and scale factor
		Finding the missing angle on a shape given its similar figure and scale factor	• find the missing angle on a shape given its similar figure and scale factor
	3	Applying the scale factor to find unknown lengths in similar figures in a variety of practical situations	• apply the scale factor to find unknown lengths in similar figures in a variety of practical situations

Learning Journey	Step	Content	Description
	4	Calculating the scale factor between an object and its image and vice versa involving similar 2D shapes	• calculate the scale factor between an object and its image and vice versa involving similar 2D shapes
		Calculating the scale factor between an object and its image and vice versa involving similar figures in a variety of practical situations	• calculate the scale factor between an object and its image and vice versa involving similar figures in a variety of practical situations
		Using scales on maps and diagrams to solve practical problems	• use scales on maps and diagrams to solve practical problems
	5	Constructing scale drawings given an object and the scale factor	• construct scale drawings given an object and the scale factor

3 Statistics and Probability

3.1 Single variable data analysis

MA5.1-12SP Uses statistical displays to compare sets of data, and evaluates statistical claims made in the media

Identify everyday questions and issues involving at least one numerical and at least one categorical variable, and collect data directly and from secondary sources (ACMSP228)			
Quest: Collection of everyday data			
Learning Journey	Step	Content	Description
Collecting everyday data	1	Identifying everyday questions and issues involving at least 1 numerical and at least 1 categorical-variable	• identify everyday questions and issues involving at least 1numerical and at least 1categorical-variable
	2	Investigating relevant issues involving at least 1 numerical and at least 1 categorical variable using information gained from secondary sources	• investigate relevant issues involving at least 1 numerical and at least 1 categorical variable using information gained from secondary sources

Construct back-to-back stem-and-leaf plots and histograms and describe data, using terms including 'skewed', 'symmetric' and 'bi modal' (ACMSP282)			
Quest: Construct & interpret data displays			
Learning Journey	Step	Content	Description
Constructing & interpreting data displays	1	Constructing frequency histograms and polygons from a frequency distribution table	• construct frequency histograms and polygons from a frequency distribution table
	2	Constructing back-to-back stem-and-leaf plots to display and compare 2 like sets of numerical-data	• construct back-to-back stem-and-leaf plots to display and compare 2 like sets of numerical-data
			• construct back-to-back stem-and-leaf plots with decimal values to display and compare 2 like sets of numerical-data
	3	Describing the shape of distributions of data using the terms 'positively skewed', 'negatively skewed', 'symmetric' or 'bi-modal'	• describe the shape of distributions of data using the terms 'positively skewed', 'negatively skewed', 'symmetric' or 'bi-modal'
		Describing the shape of data displayed in stem-and-leaf plots, dot plots and histograms	• describe the shape of data displayed in stem-and-leaf plots, dot plots and histograms

Compare data displays using mean, median and range to describe and interpret numerical data sets in terms of location (centre) and spread (ACMSP283)			
Quest: Comparison of data displays			
Learning Journey	Step	Content	Description
Comparing data displays	1	Calculating and comparing means, medians and ranges of 2 sets of numerical data displayed in back-to-back stem-and-leaf plots	• calculate and compare means, medians and ranges of 2 sets of numerical data displayed in back-to-back stem-and-leaf plots

Learning Journey	Step	Content	Description
			• make comparisons between 2 like sets of data by referring to the mean, median and/or range for data displayed in back-to-back stem-and-leaf plots
	2	Calculating and comparing means, medians and ranges of 2 sets of numerical data displayed in parallel dot plots	• calculate and compare means, medians and ranges of 2 sets of numerical data displayed in parallel dot plots
			• make comparisons between 2 like sets of data by referring to the mean, median and/or range for data displayed in parallel dot plots
	3	Calculating and comparing means, medians and ranges of 2 sets of numerical data displayed in histograms	• calculate and compare means, medians and ranges of 2 sets of numerical data displayed in histograms
			• make comparisons between 2 like sets of data by referring to the mean, median and/or range for data displayed in histograms

Evaluate statistical reports in the media and other places by linking claims to displays, statistics and representative data (ACMSP253)			
Quest: Evaluate statistical reports			
Learning Journey	Step	Content	Description
Evaluating statistical reports	1	Analysing graphical displays to recognise features that may have been manipulated to cause a misleading interpretation and/or support a particular point of view	• analyse graphical displays to recognise features that may have been manipulated to cause a misleading interpretation and/or support a particular point of view

3.2 Probability

MA5.1-13SP Calculates relative frequencies to estimate probabilities of simple and compound events

Calculate relative frequencies from given or collected data to estimate probabilities of events involving 'and' or 'or' (ACMSP226)			
Quest: Calculate & use relative frequency			
Learning Journey	Step	Content	Description
Calculating & using relative frequency	1	Predicting future relative outcomes using relative frequency	• predict future relative outcomes using relative frequency
	2	Calculating probabilities of events, including events involving 'and', 'or' and 'not', from data contained in Venn diagrams representing 2 or 3 attributes	• calculate probabilities of events, including events involving 'and', 'or' and 'not', from data contained in Venn diagrams representing two or three attributes
	3	Calculating probabilities of events, including events involving 'and', 'or' and 'not', from data contained in two-way tables	• calculate probabilities of events, including events involving 'and', 'or' and 'not', from data contained in two-way tables

Part II
Stage 5.2

4 Number and Algebra

4.1 Financial mathematics

MA5.2-4NA Solves financial problems involving compound interest

Connect the compound interest formula to repeated applications of simple interest using appropriate digital technologies (ACMNA229)			
Quest: Compound & simple interest			
Learning Journey	Step	Content	Description
Compound interest	1	Establishing and calculating compound interest using a formula in the form A= P(1 + R)n	• establish the formula to find compound interest, A= P(1 + R)n, where A is the total amount, P is the principal, R is the rate per compounding period as a decimal and n is the number of compounding periods
	2	Solving problems involving the compound interest formula finding the variables other than A	• solve problems involving the compound interest formula finding the variables other than A
			• calculate the interest earned on a sum of money, given the amount, the interest rate and the number of years invested using I = A – P
	3	Solving problems involving compound interest, determining the time period required to achieve a particular total amount invested	• solve problems involving compound interest, by calculating the principal or interest rate needed to obtain a particular total amount for a compound interest investment
			• use a ”given and check” strategy to determine the number of time periods required to obtain a particular total amount for a compound interest investment
	4	Solving problems involving compound interest, determining the amount of money to be invested in order to achieve a particular total amount invested after a given number of time periods with a given interest rate	• solve problems involving compound interest, determining the amount of money to be invested in order to achieve a particular total amount invested after a given number of time periods with a given interest rate
	5	Calculating and comparing investments for different compounding periods	• calculate and compare investments where the interest is applied at different times, eg applied monthly or annually
Comparing simple & compound interest	1	Comparing simple and compound interest situations	• compare simple and compound interest from calculations in practical situations, eg to determine the most beneficial investment or loan
			• compare simple and compound interest on investments over various time periods using tables, graphs or spreadsheets

Learning Journey	Step	Content	Description
	2	Comparing investments made in compound or simple interest	• compare the total amounts obtained for a particular investment when the interest is calculated as compound interest and as simple interest
Understanding appreciation & depreciation	1	Understanding the financial terms 'appreciation' and 'depreciation'	• understand the financial terms 'appreciation' and 'depreciation'
			• understand factors that impact appreciation and depreciation
		Understanding and calculating appreciation	• understand what appreciation is, and the types of items which appreciate in value
			• calculate the value of items which have appreciated, using the repeated calculation simple interest form
	2	Calculating to find appreciation, based on using the compound interest formula	• use the compound interest formula to calculate appreciation on certain items
	3	Understanding and calculating depreciation	• calculate the value of items which have depreciated, using the repeated calculation simple interest form
			• calculate the simple rate of depreciation on an item, given the time period of the depreciation and the value of the item after that time period
			• calculate how long it will take for an item to depreciate to a certain amount, given the initial value and the simple rate of depreciation
			• calculate the amount by which an item has depreciated by, given the initial value, the depreciation rate and the number of depreciating periods using D = P – A
	4	Calculating to find depreciation, based on using the compound interest formula	• apply the compound interest formula to calculate depreciation
			• solve problems finding all the different variables in the compound interest formula for depreciation
	5	Solving problems involving appreciation and depreciation	• solve problems involving appreciation and depreciation

4.2 Ration and rates

MA5.2-5NA Recognises direct and indirect proportion, and solves problems involving direct proportion

Solve problems involving direct proportion. Explore the relationship between graphs and equations corresponding to simple rate problems (ACMNA208)			
Quest: Proportion, rates, graphs & equations			
Learning Journey	Step	Content	Description
Understanding unit rates	1	Understanding how to find the unit rate	• understand how to find the unit rate in a problem
			• understand that if the unit rate is known, then this can be used to quantify other amounts
	2	Solving problems with and without digital technology involving calculations of the unit rate	• solve appropriate problems with and without digital technology using the calculation of the unit rate
	3	Making comparisons using unit rates	• make comparisons using unit rates within real-life scenarios
	4	Interpreting the unit rate as the slope of the line that models the relationship	• interpret the unit rate as the slope of the line that models the relationship
Converting rates	1	Converting between related compound units (rates of pay, prices, density, pressure) in numerical and algebraic contexts	• convert between related compound units (rates of pay, prices, density, pressure) in numerical and algebraic contexts
	2	Converting speeds from one rate to another	• convert between units of speed, eg m/s converted to km/h
	3	Comparing speeds written in different rates	• convert different speeds to the same rate to compare
Direct proportion	1	Recognising proportional relationships between quantities	• interpret information between 2 quantities and decide if they are in a proportional relationship
		Investigating and understanding direct variation/proportion	• investigate situations which are examples of direct variation/proportion
			• understand that x and y are directly proportional - if a value of x increases the value of y increases in the same proportion and as the value of x decreases then the value of y decreases in the same proportion
	2	Understanding what direct variation/proportion graphs look like	• understand that straight-line graphs represent direct variation/proportion for the values given on each axis
	3	Interpreting and comparing direct variation/proportion graphs	• interpret and compare graphs in real-life situations to make informed choices, eg mobile phone charges, temperature conversions, time/distance/speed etc
Indirect/inverse proportion	1	Investigating and understanding indirect or inverse variation/proportion	• investigate situations which are examples of indirect or inverse variation/proportion

Learning Journey	Step	Content	Description
	2	Solving problems based on indirect (inverse) variation/proportion with and without digital technology	• solve problems using an understanding of indirect (inverse) variation/proportion with and without digital technology
Direct & inversely proportionate graphs	1	Applying information to create indirect (inverse) variation/proportion graphs	• create tables of values for indirect (inverse) variation/proportion problems and then plot on the number plane
			• understand and/or comment on the significance of the shape of a graph representing indirect variation/proportionality
	2	Interpreting graphs which represent direct and indirect variation/proportion	• recognise and interpret graphs representing direct and indirect variation/proportion
			• identify whether a linear graph represents direct or indirect variation/proportion with reference to the values on each axis
Interpreting & using conversion graphs	1	Interpreting conversion graphs, eg conversions between different currencies or metric and imperial measures	• interpret conversion graphs, eg conversions between different currencies or metric and imperial measures
	2	Using conversion graphs to convert from 1 unit to another, eg conversions between different currencies or metric and imperial measures	• use conversion graphs to convert from one unit to another, eg conversions between different currencies or metric and imperial measures
The constant of proportionality	1	Identifying the constant of proportionality (unit rate) in tables, graphs, equations, diagrams and verbal descriptions of proportional relationships	• identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams and verbal descriptions of proportional relationships
	2	Representing proportional relationships by equations	• represent proportional relationships by equations
	3	Determining the constant of proportionality (k = y/x) within mathematical problems	• determine the constant of proportionality (k = y/x) within mathematical problems
		Determining the constant of proportionality (k = y/x) within real-world problems	• determine the constant of proportionality (k = y/x) within real-world problems
	4	Finding the value of the constant of variation (or proportionality) and using it to solve problems	• use information to write a direct variation/proportion equation and find the value of the constant of variation/proportion/proportionality
			• write, apply and solve equations within the context of direct variation/proportion problems
	5	Solving direct variation/proportion problems in various contexts	• solve problems involving rates and directly proportional relationships in various contexts, using dynamic geometry software to construct and measure scale drawings

Learning Journey	Step	Content	Description
Graphing equations of direct proportion	1	Applying unitary information to create graphs	• apply the unitary information to create a table of values which can be plotted on the number plane
			• understand the significance of the slope and direction of the graph (as 1 value increases so does the other or as 1 value decreases so does the other)
	2	Graphing proportional relation-ships	• graph proportional relationships

4.3 Algebraic techniques

MA5.2-6NA Simplifies algebraic fractions, and expands and factorises quadratic expressions

Apply the four operations to simple algebraic fractions with numerical denominators (ACMNA232)			
Quest: Algebraic fractions			
Learning Journey	Step	Content	Description
Algebraic fractions: 4 ops numerical denominators	1	Simplifying expressions that involve algebraic fractions requiring addition with numerical denominators	• simplify expressions that involve algebraic fractions with numerical denominators involving addition
	2	Simplifying expressions that involve algebraic fractions requiring subtraction with numerical denominators	• simplify expressions that involve algebraic fractions with numerical denominators involving subtraction
	3	Simplifying expressions that involve algebraic fractions requiring multiplication with numerical denominators	• simplify expressions that involve algebraic fractions with numerical denominators involving multiplication
	4	Simplifying expressions that involve algebraic fractions requiring division with numerical denominators	• simplify expressions that involve algebraic fractions with numerical denominators involving division
	5	Combination of previous content	• Combination of previous details
Algebraic fractions: Simplifying	1	Simplifying algebraic fractions with pronumerals in numerator only	• simplify algebraic fractions with pronumerals in numerator only
	2	Simplifying algebraic fractions with pronumerals in numerator and/or denominator	• simplify algebraic fractions with pronumerals in numerator and/or denominator
	3	Simplifying algebraic fractions with pronumerals in numerator and/or denominator including those involving indices	• simplify algebraic fractions with pronumerals in numerator and/or denominator including those involving indices
	4	Combination of previous content	• Combination of previous details

Apply the distributive law to the expansion of algebraic expressions, including binomials, and collect like terms where appropriate (ACMNA213)			
Quest: Apply the distributive law			
Learning Journey	Step	Content	Description
Applying the distributive law	1	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a and c are positive integers and b is a variable with coefficient of 1	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a and c are positive integers and b is a variable with coefficient of 1
		Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a and c are positive or negative integers and b is a variable with coefficient of 1	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a and c are positive or negative integers and b is a variable with coefficient of 1

Learning Journey	Step	Content	Description
	2	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b, and c can be positive numbers or variables (coefficients are 1)	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b, and c can be positive numbers or variables (coefficients are 1)
		Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b and c can be positive or negative numbers or variables (coefficients 1 or -1)	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b and c can be positive or negative numbers or variables (coefficients 1 or -1)
		Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b and c can be positive or negative numbers or variables (coefficients integers not limited to 1)	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b and c can be positive or negative numbers or variables (coefficients integers not limited to 1)
	3	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law). Coefficients of pronumerals to be positive integers. Involve indices where power is a positive integer.	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law). Coefficients of pronumerals to be positive integers. Involve indices where power is a positive integer.
		Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law). Coefficients of pronumerals to be positive or negative integers. Involve indices where power is a positive integer.	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law). Coefficients of pronumerals to be positive or negative integers. Involve indices where power is a positive integer.
	4	Expanding algebraic expressions by removing grouping symbols and collecting like terms where applicable	• expand algebraic expressions by removing grouping symbols and collecting like terms where applicable
	5	Combination of previous content	• Combination of previous details

Factorise algebraic expressions by taking out a common algebraic factor (ACMNA230)			
Quest: Factorise algebraic expressions			
Learning Journey	Step	Content	Description
Factorising algebraic expressions	1	Factorising algebraic expressions by identifying only algebraic factors	• factorise algebraic expressions by finding a common algebraic factor and bringing it out the front of the brackets with its product inside the brackets
	2	Factorising algebraic expressions by taking out a common algebraic factor where the highest common factor is a term with 1 pronumeral and the power of the pronumeral is 1	• factorise algebraic expressions by taking out a common algebraic factor where the highest common factor is a term with 1 pronumeral and the power of the pronumeral is 1

Learning Journey	Step	Content	Description
		Factorising algebraic expressions by taking out a common algebraic factor where the highest common factor is a term with one pronumeral and the power of the pronumeral is an integer greater or equal to 1.	• factorise algebraic expressions by taking out a common algebraic factor where the highest common factor is a term with one pronumeral and the power of the pronumeral is an integer greater or equal to 1.
	3	Factorising algebraic expressions by taking out a common algebraic factor where the highest common factor is a term with multiple pronumerals and the power of the pronumerals is an integer greater or equal to 1.	• factorise algebraic expressions by taking out a common algebraic factor where the highest common factor is a term with multiple pronumerals and the power of the pronumerals is an integer greater or equal to 1.
	4	Recognising that expressions such as $24x^2y + 16xy^2 = 4xy(6x + 4y)$ may represent 'partial factorisation' and that further factorisation is necessary to 'factorise fully'	• fully factorise expressions that have only been partially factorised
	5	Combination of previous content	• Combination of previous details

Expand binomial products and factorise monic quadratic expressions using a variety of strategies (ACMNA233)			
Quest: Binomial expansions & basic quadratics			
Learning Journey	Step	Content	Description
Expanding binomial products	1	Expanding binomial products by finding the areas of rectangles	• expand binomial products by finding the areas of rectangles
	2	Using algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient of 1 and operators are +'s	• use algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient of 1 and operators are +'s
	3	Using algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient of 1 and operators can be + or -	• use algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient of 1 and operators can be + or -
	4	Using algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient greater or equal to 1 and operators can be + or -	• use algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient greater or equal to 1 and operators can be + or -
	5	Using algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient greater or equal to 1 and operators can be + or - and expansion involves indices	• use algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient greater or equal to 1 and operators can be + or - and expansion involves indices

4.4 Indices

MA5.2-7NA Applies index laws to operate with algebraic expressions involving integer indices

Apply index laws to algebraic expressions involving integer indices			
Quest: Index laws			
Learning Journey	Step	Content	Description
Indices: Multiplication	1	Applying index laws further: multiplication with integer indices (positive and negative indices)	• apply the index law for multiplying expressions with the same numerical base and integer indices (introducing negative indices)
			• apply the index law to simplify the multiplication of 2 or more terms with numerical bases and integer indices, leaving solutions in index form
			• apply the index law to simplify the multiplication of 2 or more terms with numerical bases and integer indices, evaluating the solution with and without a calculator
	2	Applying index laws further: multiplication with integer indices (algebraic bases)	• apply the index law for multiplying expressions with the same algebraic base and integer indices
			• apply the index law to simplify the multiplication of 2 or more terms with algebraic bases and integer indices, leaving solutions in index form
Indices: Division	1	Applying index laws further: division with integer indices (positive and negative indices)	• apply the index law to simplify the division of 2 or more terms with numerical bases and integer indices (introducing negative indices)
			• apply the index law to simplify the division of 2 or more terms with numerical bases and integer indices, leaving solutions in index form
			• apply the index law to simplify the division of two or more terms with numerical bases and integer indices, evaluating the solution with and without a calculator
	2	Applying index laws further: division with integer indices (algebraic bases)	• apply the index law for dividing expressions with the same algebraic base and integer indices
			• apply the index law to simplify the division of 2 or more terms with algebraic bases and integer indices, leaving solutions in index form
Indices: Power of a power	1	Applying index laws further: power of a power with integer indices (positive whole number bases)	• apply the index law for raising an expression in index form to another index (positive numerical bases, positive and negative integer indices)
			• apply the index law to simplify expressions involving raising a term written in index form to another index, leaving solutions in index form (positive numerical bases, integer indices)

Learning Journey	Step	Content	Description
			• apply the index law to simplify expressions involving raising a term written in index form to another index, evaluating the solution with and without a calculator (positive numerical bases, integer indices)
	2	Applying index laws further: power of a power with integer indices (algebraic bases)	• apply the index law for raising an expression in index form to another index (algebraic bases and integer indices)
			• apply the index law to simplify expressions involving raising a term written in index form to another index, leaving solutions in index form (algebraic bases and integer indices)
Indices: Zero index	1	Applying index laws further: zero index (positive and negative whole number bases)	• apply the meaning of the zero index for expressions with positive and negative numerical bases
			• apply the zero index to simplify expressions involving the zero index and integer numerical bases
	2	Applying index laws further: zero index (algebraic bases)	• apply index laws: zero index (algebraic bases)
			• apply the zero index to simplify expressions involving the zero index and algebraic bases
Indices:Mixed basic operations with coefficient = 1	1	Applying index laws further: mixed index laws (integer bases) expressions to involve either 2 or more terms	• select the necessary index law(s) and apply them to simplify expressions of 2 or more terms involving indices with numerical bases and the operations of multiplication, division, power of a power, and the zero index
	2	Applying index laws further: mixed index laws (algebraic bases)	• select the necessary index law(s) and apply them to simplify expressions of 2 or more terms involving indices with algebraic bases and the operations of multiplication, division, power of a power, and the zero index. Expressions to include positive and negative integers
Indices:Mixed basic operations with coefficient >1	1	Simplifying expressions that involve the product of simple algebraic terms containing positive-integer indices with integer coefficients ≥1	• simplify expressions that involve the product of simple algebraic terms containing positive-integer indices with integer coefficients ≥1
	2	Simplifying expressions that involve the quotient of simple algebraic terms containing positive-integer indices with integer coefficients ≥1	• simplify expressions that involve the quotient of simple algebraic terms containing positive-integer indices with integer coefficients ≥1

Learning Journey	Step	Content	Description
	3	Simplifying expressions that involve raising a power to a power involving simple algebraic terms containing positive-integer indices with integer coefficients ≥1	• simplify expressions that involve raising a power to a power involving simple algebraic terms containing positive-integer indices with integer coefficients ≥1
	4	Comparing expressions such as $3a^2 \times 5a$ and $3a^2 + 5a$ by substituting values for a	• compare expressions such as $3a^2 \times 5a$ and $3a^2 + 5a$ by substituting values for a
	5	Combination of previous content	• Combination of previous details
Indices: Negative index with numerical base	1	Evaluating numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-1} = \frac{1}{3}$ with an index of -1	• evaluate numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-1} = \frac{1}{3}$ with an index of -1
	2	Evaluating numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-4} = \frac{1}{3}^4 = \frac{1}{81}$	• evaluate numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-4} = \frac{1}{3}^4 = \frac{1}{81}$
Indices:Negative index, algebraic & numerical base	1	Evaluating algebraic expressions involving a negative index by first rewriting with a positive index, eg $a^{-1} = 1/a$ with an index of -1 and a coefficient of 1	• evaluate algebraic expressions involving a negative index by first rewriting with a positive index, eg $a^{-1} = 1/a$ with an index of -1 and a coefficient of 1
	2	Evaluating algebraic expressions involving a negative index by first rewriting with a positive index, eg $a^{-1} = 1/a$ with an index of -1 and a coefficient greater or equal to 1	• evaluate algebraic expressions involving a negative index by first rewriting with a positive index, eg $a^{-1} = 1/a$ with an index of -1 and a coefficient greater or equal to 1
Indices: Mixed with negative indices	1	Simplifying expressions that involve the product of simple algebraic terms with integer coefficients ≥1 with some negative powers	• simplify expressions that involve the product of simple algebraic terms containing positive-integer indices with integer coefficients ≥1
	2	Simplifying expressions that involve the quotient of simple algebraic terms with integer coefficients ≥1 with some negative powers	• simplify expressions that involve the quotient of simple algebraic terms containing positive-integer indices with integer coefficients ≥1
	3	Simplifying expressions that involve the raising a power to a power involving simple algebraic terms with integer coefficients ≥1 with some negative powers	• simplify expressions that involve the raising a power to a power involving simple algebraic terms containing positive-integer indices with integer coefficients ≥1
		Verifying whether a given expression represents a correct simplification of another algebraic expression by substituting numbers for pronumerals	• verify whether a given expression represents a correct simplification of another algebraic expression by substituting numbers for pronumerals

Learning Journey	Step	Content	Description
	4	Writing the numerical value of a given numerical fraction raised to the power of –1, leading to $(a/b)^{-1} = b/a$	• write the numerical value of a given numerical fraction raised to the power of –1, leading to $(a/b)^{-1} = b/a$
	5	Combination of previous content	• Combination of previous details

4.5 Equations

MA5.2-8NA Solves linear and simple quadratic equations, linear inequalities and linear simultaneous equations, using analytical and graphical techniques

Solve linear equations (ACMNA215)			
Quest: Solve linear equations			
Learning Journey	Step	Content	Description
Solving linear equations	1	Solving equations involving multiple sets of brackets	• solve equations involving multiple sets of brackets
	2	Solving equations involving brackets with pronumerals on both sides	• solve equations involving brackets with pronumerals on both sides
	3	Combination of previous content	• Combination of previous details

Solve linear equations involving simple algebraic fractions (ACMNA240)			
Quest: Equations involving algebraic fractions			
Learning Journey	Step	Content	Description
Solving equations involving algebraic fractions	1	Solving linear equations involving algebraic fractions	• solve a range of linear equations, including equations that involve 2 or more fractions
	2	Solving monic linear equations involving algebraic fractions where at least 1 entire expression is in the numerator or denominator of a fraction	• solve monic linear equations involving algebraic fractions where at least 1 entire expression is in the numerator or denominator of a fraction
	3	Solving non-monic linear equations involving algebraic fractions where at least 1 entire expression is in the numerator or denominator of a fraction	• solve non-monic linear equations involving algebraic fractions where at least 1 entire expression is in the numerator or denominator of a fraction
	4	Solving non-monic linear equations involving algebraic fractions where at least 1 entire expression is in the numerator or denominator of a fraction and must be factorised first	• solve non-monic linear equations involving algebraic fractions where at least 1 entire expression is in the numerator or denominator of a fraction and must be factorised first
	5	Combination of previous content	• Combination of previous details

Solve simple quadratic equations using a range of strategies (ACMNA241)			
Quest: Solve simple quadratic equations			
Learning Journey	Step	Content	Description
Solving simple quadratic equations	1	Checking solutions of a quadratic equation by substituting	• check solutions of a quadratic equation by substituting
	2	Solving simple quadratic equations of the form $ax^2 = c$, leaving answers as decimal approximations	• solve simple quadratic equations of the form $ax^2 = c$, leaving answers as decimal approximations

Learning Journey	Step	Content	Description
	3	Solving simple quadratic equations of the form $ax^2 = c$, leaving answers in exact form	• solve simple quadratic equations of the form $ax^2 = c$, leaving answers in exact form
	4	Solving monic quadratic equations of the form $ax^2 + bx + c = 0$ by factorisation	• solve monic quadratic equations of the form $ax^2 + bx + c = 0$ by factorisation

Substitute values into formulas to determine an unknown (ACMNA234)			
Quest: Substitute values into formulas			
Learning Journey	Step	Content	Description
Using authentic formula	1	Using authentic formulas to solve problems involving substituting in known variables to solve a problem	• use authentic formulas to solve problems involving substituting in known variables to solve a problem
	2	Solving equations arising from substitution into formulas, eg given $P = 2l + 2b$ and $P = 20, l = 6$, solve for b	• solve equations arising from substitution into formulas, eg given $P = 2l + 2b$ and $P = 20, l = 6$, solve for b
	3	Substituting into formulas from other strands of the syllabus or from other subjects to solve problems and interpret solutions, eg $A = \frac{1}{2}xy$, $v = u + at$, $C = \frac{5}{9}(F - 32)$, $V = \pi r^2 h$	• substitute into formulas from other strands of the syllabus or from other subjects to solve problems and interpret solutions, eg $A = \frac{1}{2}xy$, $v = u + at$, $C = \frac{5}{9}(F - 32)$, $V = \pi r^2 h$

Solve problems involving linear equations, including those derived from formulas (ACMNA235)			
Quest: Problems involving linear equations			
Learning Journey	Step	Content	Description
Solving linear equation word problems	1	Translating word problems into linear equations	• translate word problems into linear equations
			• solve word problems involving familiar formulas, eg 'If the area of a triangle is 30 square centimetres and the base length is 12 centimetres, find the perpendicular height of the triangle'
	2	Solving word equations and interpret the solutions within a given context	• solve word equations and interpret the solutions within a given context

Solve linear inequalities and graph their solutions on a number line (ACMNA236)			
Quest: Linear inequalities & their graphs			
Learning Journey	Step	Content	Description
Understanding inequalities	1	Understanding the inequality signs	• understand the meaning of the five inequality signs $<, >, \neq, \leq, \geq$
		Checking whether an inequality is true using substitution	• check whether an inequality is true using substitution

Learning Journey	Step	Content	Description
	2	Representing inequalities using the signs	• represent word statements using inequalities 'greater than' and 'less than' and vice versa
			• represent a written or spoken inequality using symbols <, >, ≠, ≤ , ≥
			• write basic true inequality statements, eg 4 < 5
	3	Representing algebraic inequalities on a number line	• represent an inequality on a number line using open or closed circles, depending on the sign to mark the end point
	4	Writing an algebraic inequality given the representation of a number line	• write an algebraic inequality given the representation of a number line
Solving linear inequalities	1	Solving inequalities using inverse operations involving 1 step with integer solutions	• solve inequalities using inverse operations involving 1 step with integer solutions
		Solving inequalities using inverse operations involving 1 step with integer solutions, plotting solution on a number line	• solve inequalities using inverse operations involving 1 step with integer solutions plotting the solution on a number line
		Solving inequalities using inverse operations involving 1 step with integer and non-integer solutions	• solve inequalities using inverse operations involving 1 step with integer and non-integer solutions
		Solving inequalities using inverse operations involving 1 step with integer and non-integer solutions plotting solution on a number line	• solve inequalities using inverse operations involving 1 step with integer and non-integer solutions plotting solution on a number line
	2	Solving inequalities using inverse operations involving 2 steps with integer solutions	• solve inequalities using inverse operations involving 2 steps with integer solutions
		Solving inequalities using inverse operations involving 2 steps with integer solutions, plotting solution on a number line	• solve inequalities using inverse operations involving 2 steps with integer solutions plotting the solution on a number line
		Solving inequalities using inverse operations involving 2 steps with integer and non-integer solutions	• solve inequalities using inverse operations involving 2 steps with integer and non-integer solutions
		Solving inequalities using inverse operations involving 2 steps with integer and non-integer solutions plotting solution on a number line	• solve inequalities using inverse operations involving 2 steps with integer and non-integer solutions plotting the solution on a number line
	3	Solving inequalities using inverse operations involving 3 steps with integer and non-integer solutions	• solve inequalities using inverse operations involving 3 steps with integer and non-integer solutions

Learning Journey	Step	Content	Description
		Solving inequalities using inverse operations involving 3 steps with integer and non-integer solutions, plotting solution on a number line	• solve inequalities using inverse operations involving 3 steps with integer and non-integer solutions plotting the solution on a number line
		Solving inequalities with variables either side of the equals sign	• solve inequalities with variables either side of the equals sign
	4	Representing and solving real-life scenario's using inequalities	• represent and solving real-life scenario's using inequalities
	5	Combination of previous content	• Combination of previous details

Solve linear simultaneous equations, using algebraic and graphical techniques, including using digital technology (ACMNA237)			
Quest: Linear simultaneous equations			
Learning Journey	Step	Content	Description
Working with simultaneous equations	1	Understanding simultaneous equations	• understand that solutions to a system of 2 linear equations in 2 variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously
		Solving simultaneous equations with 2 variables graphically	• solve simultaneous equations graphically
	2	Solving simultaneous equations algebraically using the substitution method	• solve simultaneous equations algebraically using the substitution method
	3	Solving simultaneous equations algebraically using the elimination method	• solve simultaneous equations algebraically using the elimination method
	4	Checking the solution of simultaneous equations either graphically or algebraically	• check solution of simultaneous equation either graphically or algebraically
	5	Solving real-world and mathematical problems leading to 2 linear equations in 2 variables	• solve real-world and mathematical problems leading to 2 linear equations in 2 variables, eg given coordinates for 2 pairs of points, determine whether the line through the first pair ofpoints intersects the line through the second pair

4.6 Linear relationships

MA5.2-9NA uses the gradient-intercept form to interpret and graph linear relationships

Interpret and graph linear relationships using the gradient-intercept form of the equation of a straight line			
Quest: Linear graphs & solving linear equations			
Learning Journey	Step	Content	Description
Graphing using the gradient-intercept method	1	Establishing that when given in the form y = mx + b, m is the gradient in the form rise/run	• establish that when given in the form y = mx + b, m is the gradient in the form rise/run
		Understanding that the gradient is the slope of a line in the form rise/run	• understand that the gradient is the slope of a line in the form rise/run
			• understand how a negative and positive gradient differ
	2	Graphing a linear relationship on the Cartesian plane using the gradient and y-intercept when the equation is in the form y = mx + b	• graph a linear relationship on the Cartesian plane using the gradient and y-intercept when the equation is in the form y = mx + b by first plotting the y-intercept
	3	Graphing a linear relationship on the Cartesian plane using the gradient and y-intercept when the equation is not in the form y = mx + b by rearranging to be in this form	• graph a linear relationship on the Cartesian plane using the gradient and y-intercept when the equation is not in the form y = mx + b by rearranging to be in this form first

Solve problems involving parallel and perpendicular lines (ACMNA238)			
Quest: Parallel & perpendicular lines			
Learning Journey	Step	Content	Description
Perpendicular lines	1	Solving problems involving perpendicular lines	• understand the characteristics of 2 lines that make them perpendicular: $m_1 m_2 = -1$ or $m_1 = \frac{-1}{m_2}$
			• determine whether 2 given lines are perpendicular
	2	Finding the equation of a line that is perpendicular to another given line using y = mx + c	• find the equation of a line that is perpendicular to another given line using y = mx + c

4.7 Non-linear relationships

MA5.2-10NA connects algebraic and graphical representations of simple non-linear relationships

Graph simple non-linear relations with and without the use of digital technologies and solve simple related equations (ACMNA296)			
Quest: Graph & solve non-linear relationships			
Learning Journey	Step	Content	Description
Solving simple non-linear relationships	1	Solving simple quadratic equations by inspection eg $x^2 = 49$	• solve simple quadratic equations by inspection eg $x^2 = 49$
	2	Solving simple cubic equations of the form $ax^3 = k$, leaving answers in exact form and as decimal approximations	• solve simple cubic equations of the form $ax^3 = k$, leaving answers in exact form
			• solve simple cubic equations of the form $ax^3 = k$, leaving answers as decimal approximations
	3	Solving exponential equations containing equal bases	• solve exponential equations containing equal bases (linear exponents only)eg: $53x = 57x - 2$
Parabolas	1	Understanding the language and important features of parabolas	• understand the language of parabolas, turning point (vertex), concavity, roots, x-intercept, y-intercept, axis of symmetry
		Understanding that $y = ax^2 + bx + c$ is the general equation of a parabola and manipulate equations to be in this form	• manipulate equations to be in the form $y = ax^2 + bx + c$
		Investigating how the parabola with the equation $y = ax^2$ changes as the value of a is changed using digital technology	• describe the features of the graph and how they change as the value of 'a' changes for both positive and negative values of 'a'
			• understand that the sign of the coefficient of x^2 (a) is what makes a parabola concave up or down. If $a > 0$ the parabola is concave up, If $a < 0$ the parabola is concave down
	2	Investigating how the parabola with the equation $y = ax^2 + k$ changes as the value of k is changed using digital technology	• describe the features of the graph and how they change as the value of k changes for both positive and negative values of k
	3	Finding y-intercept for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $x = 0$	• find y-intercept for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $x = 0$
	4	Graphing parabolas in the form $y = ax^2 + k$ with different values of a and k	• graph parabolas in the form $y = ax^2 + k$ with different values of a and k
	5	Determining the equation of a parabola, given a graph of the parabola with the main features clearly indicated	• determine the equation of a parabola, given a graph of the parabola with the main features clearly indicated

Learning Journey	Step	Content	Description
Exponential graphs	1	Recognising and describing an exponential graph	• describe an exponential graph
	2	Graphing exponential relationships with the equation in the form y = ax	• graph exponential relationships with the equation in the form y = ax for various values of a
			• compare features and describe how the graph changes as the value of a changes
			• identify that all exponential equations of the form y = ax will have a y-intercept of (0,1)
	3	Graphing exponential relationships with the equation in the form y = ax + b	• graph exponential relationships with the equation in the form y = ax + b for various values of a and b
			• compare features and describe how the graph changes as the values of a and b change
	4	Graphing exponential relationships with the equation in the form y = a-x + b	• graph exponential relationships with the equation in the form y= a -x + b for various values of a and b
			• compare features and describe how the graph changes as the values of a and b change
Circles	1	Sketching circles of the form $x^2 + y^2 = r^2$ where r is the radius of the circle	• sketch circles of the form $x^2 + y^2 = r^2$ where r is the radius of the circle

Explore the connection between algebraic and graphical representations of relationships such as simple quadratics, circles and exponentials using digital technologies as appropriate (ACMNA239)			
Quest: Representations of non-linear relations			
Learning Journey	Step	Content	Description
Representing non-linear relations	1	Identifying and naming different types of graphs from their equations	• identify and name different types of graphs from their equations
	2	Sketching any particular curve by determining its features from its equation	• sketch any particular curve by determining its features from its equation including x and y-intercepts, turning points (if applicable), asymptotes (if applicable)

5 Measurement and Geometry

5.1 Area and surface area

MA5.2-11MG Calculates the surface areas of right prisms, cylinders and related composite solids

Calculate the surface area and volume of cylinders and solve related problems (ACMMG217)			
Quest: Surface area & volume of cylinders			
Learning Journey	Step	Content	Description
Finding the surface area of cylinders	1	Finding the surface area: cylinders	• find the surface area of cylinders
	2	Finding the surface area of parts of cylinders	• find the surface area of parts of cylinders
	3	Finding the surface area of cylinders within the context of a problem	• find the surface area of cylinders within the context of a problem
	4	Finding the surface area of parts of cylinders within the context of a problem	• find the surface area of parts of cylinders within the context of a problem

Solve problems involving surface area and volume for a range of prisms, cylinders and composite solids (ACMMG242)			
Quest: Surface area of composite solids			
Learning Journey	Step	Content	Description
Finding the surface area of composite solids	1	Finding the surface area: composite solids involving prisms	• find the surface area of composite three-dimensional objects involving prisms
			• find the surface area of composite three-dimensional objects involving prisms within the context of a problem
	2	Finding the surface area: composite solids involving cylinders	• find the surface area of composite three-dimensional objects involving cylinders
			• find the surface area of composite three-dimensional objects involving cylinders within the context of a problem
	3	Solving a variety of practical problems related to surface areas of prisms, cylinders and related composite solids	• solve a variety of practical problems related to surface areas of prisms, cylinders and related composite solids

5.2 Volume

MA5.2-12MG Applies formulas to calculate the volumes of composite solids composed of right prisms and cylinders

Solve problems involving the surface area and volume of right prisms (ACMMG218)			
Quest: Surface area & volume of right prisms			
Learning Journey	Step	Content	Description
Volumes of composite right prisms	1	Calculating the volumes of composite right prisms with cross-sections that may be dissected into triangles and special quadrilaterals	• calculate the volumes of composite right prisms with cross-sections that may be dissected into triangles and special quadrilaterals
	2	Calculating the volumes of composite right prisms with cross-sections that may be dissected into triangles and special quadrilaterals requiring the use of Pythagoras' theorem	• calculate the volumes of composite right prisms with cross-sections that may be dissected into triangles and special quadrilaterals requiring the use of Pythagoras' theorem
	3	Comparing the surface areas of prisms with the same volume	• compare the surface areas of prisms with the same volume
	4	Solving a variety of practical problems related to the volumes and capacities of composite right prisms with and without the use of Pythagoras' theorem	• solve a variety of practical problems related to the volumes and capacities of composite right prisms with and without the use of Pythagoras' theorem

Solve problems involving surface area and volume for a range of prisms, cylinders and composite solids (ACMMG242)			
Quest: Volume of composite solids			
Learning Journey	Step	Content	Description
Volume of composite solids	1	Finding the volumes of solids that have uniform cross-sections that are sectors, including semicircles and quadrants	• find the volumes of solids that have uniform cross-sections that are sectors, including semicircles and quadrants
	2	Finding the volumes of composite solids involving prisms and cylinders, eg a cylinder on top of a rectangular prism	• find the volumes of composite solids involving prisms and cylinders, eg a cylinder on top of a rectangular prism
			• dissect composite solids into 2 or more simpler solids to find their volumes
	3	Solving a variety of practical problems related to the volumes and capacities of prisms, cylinders and related composite solids	• solve a variety of practical problems related to the volumes and capacities of prisms, cylinders and related composite solids

5.3 Right-angled triangles (trigonometry)

MA5.2-13MG Applies trigonometry to solve problems, including problems involving bearings

Apply trigonometry to solve right-angled triangle problems (ACMMG224)			
Quest: Apply trigonometry			
Learning Journey	Step	Content	Description
Finding the missing side using trig ratios	1	Calculating the approximation of trigonometric ratios for a given angle measured in degrees, minutes and seconds using the calculator	• calculate the approximate value of each of the 3 trigonometric ratios for a given angle measured in degrees, minutes and seconds on right-angled triangles with different orientation using the calculator, eg sin 32°43'15 = 0.54...
		Using trigonometric ratios to find the length of the missing numerator side on a right angled triangles	• use the tangent ratio to calculate the length of the 'opposite' side given the respective angle and adjacent side in a right-angled triangle
			• use the sine ratio to calculate the length of the 'opposite' side given the respective angle and hypotenuse in a right-angled triangle
			• use the cosine ratio to calculate the length of the 'adjacent' side given the respective angle and hypotenuse in a right-angled triangle
	2	Selecting the correct ratio in order to calculate the missing numerator side given an angle in a right-angled triangle with different orientations	• select the correct ratio in order to calculate the missing numerator side given an angle in a right-angled triangle with different orientations
	3	Using trigonometric ratios to find the length of the missing denominator side on a right-angled triangles	• use the tangent ratio to calculate the length of the 'adjacent' side given the respective angle and opposite side in a right-angled triangle
			• use the sine ratio to calculate the length of the 'hypotenuse' side given the respective angle and opposite side in a right-angled triangle
			• use the cosine ratio to calculate the length of the 'hypotenuse' side given the respective angle and adjacent side in a right-angled triangle
	4	Selecting the correct ratio in order to calculate any missing denominator given an angle in a right-angled triangle with different orientations	• select the correct ratio in order to calculate any missing denominator given an angle in a right-angled triangle with different orientations
	5	Solving more complex problems involving finding the missing side on a right-angled triangle	• solve a range of more complex right-angled triangle problems that involve finding the missing side given 1 angle with diagrams included
			• solve a range of more complex worded right-angled triangle problems that involve finding the missing side given 1 angle without diagrams included

Learning Journey	Step	Content	Description
			• solve a range of more complex problems involving 1 or more than 1 right-angled triangle where side lengths needs to be found. Include examples in context using metric units, eg shadows, reflections, scale models, surveying, navigation, inaccessible objects around the school (using a clinometer)
Finding the missing angle using trig ratios	1	Introducing inverse trigonometric ratios as undoing the original function of the trigonometric ratio	• use inverse trigonometric functions to find an angle, given the ratio eg if sin C = $\frac{1}{2}$, find the size of angle C C = sin-1($\frac{1}{2}$) C = 30°
	2	Using trigonometric ratios to find the size of a missing angle on a right-angled triangle	• use the inverse tangent ratio to find the size of a missing angle given the respective opposite and adjacent sides in right-angled triangles of different orientations
			• use the inverse sine ratio to find the size of a missing angle given the respective opposite and adjacent sides in right-angled triangles of different orientations
			• use the inverse cosine ratio to find the size of a missing angle given the respective opposite and adjacent sides in right-angled triangles of different orientations
	3	Selecting the correct inverse ratio in order to calculate any missing angle given 2 or more sides in a right-angled triangle with different orientations	• select the correct inverse ratio in order to calculate any missing angle given 2 or more sides in a right-angled triangle with different orientations
	4	Solving more complex problems involving finding the missing angle on a right-angled triangle	• solve a range of more complex right-angled triangle problems that involve finding the missing angle with diagrams included
			• solve a range of more complex worded right-angled triangle problems that involve finding the missing angle without diagrams included
			• solve a range of more complex problems involving 1 or more than 1 right-angled triangle where angle needs to be found. Include examples in context using metric units, eg shadows, reflections, scale models, surveying, navigation, inaccessible objects around the school (using a clinometer)

Learning Journey	Step	Content	Description
Solving 2D problems using trig ratios	1	Solving various right-angled triangle problems involving two-dimensional problems	• represent word problems with a sketch with all important details
			• solve various two-dimensional problems involving right-angled triangles of different orientation, with or without a diagram. Sides and/or angles

Solve right-angled triangle problems including those involving direction and angles of elevation and depression (ACMMG245)			
Quest: Angles of elevation/depression &bearings			
Learning Journey	Step	Content	Description
Solving angles of elevation & depression	1	Solving problems involving angles of elevation and depression	• connect the alternate angles formed when parallel lines are cut by a transversal with angles of elevation and depression
			• solve problems involving angles of elevation and depression with and without diagrams provided
Working with compass bearings	1	Introducing compass bearings	• introduce compass bearings including using degrees, eg N25°W
			• convert a direction on a compass to a compass bearing and vice versa
	2	Constructing diagrams of given information (compass bearings)	• construct accurate scale diagrams of given information (compass bearings)
			• represent problems involving compass bearings in diagrammatic form in order to assist solving problems
	3	Solving problems involving compass bearings using Pythagoras' theorem	• solve problems involving compass bearings using Pythagoras' theorem with and without diagrams
			• solve a variety of practical problems involving compass bearings using Pythagoras' theorem within a given context
	4	Solving problems involving compass bearings using trigonometric ratios	• solve problems involving compass bearings using trigonometric ratios with and without diagrams
			• solve a variety of practical problems involving compass bearings using trigonometric ratios within a given context
	5	Solving problems involving compass bearings	• solve problems involving compass bearings with and without diagrams
			• solve a variety of practical problems involving compass bearings within a given context
Using true bearings	1	Introducing true bearings	• introduce true bearings including using degrees, eg 045°
			• convert between true bearings and compass bearings

Learning Journey	Step	Content	Description
	2	Constructing diagrams of given information (true bearings)	• construct accurate scale diagrams of given information (true bearings)
			• represent problems involving true bearings in diagrammatic form in order to assist solving problems
	3	Solving problems involving true bearings using Pythagoras' theorem	• solve problems involving true bearings using Pythagoras' theorem with and without diagrams
			• solve a variety of practical problems involving true bearings using Pythagoras' theorem within a given context
	4	Solving problems involving true bearings using trigonometric ratios	• solve problems involving true bearings using trigonometric ratios with and without diagrams
			• solve a variety of practical problems involving true bearings using trigonometric ratios within a given context
	5	Solving problems involving true bearings	• solve problems involving true bearings with and without diagrams
			• solve a variety of practical problems involving true bearings within a given context

5.4 Properties of geometrical figures

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

Use the enlargement transformation to explain similarity and develop the conditions for triangles to be similar (ACMMG220)			
Quest: Similar triangles			
Learning Journey	Step	Content	Description
Similar triangles	1	Understanding the importance of enlargement transformations in reasoning and proofs	• use enlargement transformations to establish and explain similarity
		Establishing and using the 4 tests for 2 triangles to be similar: if the 3 sides of a triangle are proportional to the 3 sides of another triangle, then the 2 triangles are similar	• establish and use the 4 tests for 2 triangles to be similar: if the 3 sides of a triangle are proportional to the 3 sides of another triangle, then the 2 triangles are similar
	2	Establishing and using the 4 tests for 2 triangles to be similar: if 2 sides of a triangle are proportional to 2 sides of another triangle, and the included angles are equal, then the 2 triangles are similar	• establish and use the 4 tests for 2 triangles to be similar: if 2 sides of a triangle are proportional to 2 sides of another triangle, and the included angles are equal, then the 2 triangles are similar
	3	Establishing and using the 4 tests for 4 triangles to be similar: if 4 angles of a triangle are equal to 4 angles of another triangle, then the 4 triangles are similar	• establish and use the 4 tests for 2 triangles to be similar: if 2 angles of a triangle are equal to 2 angles of another triangle, then the 2 triangles are similar
	4	Establishing and using the 4 tests for 2 triangles to be similar: if the hypotenuse and a second side of a right-angled triangle are proportional to the hypotenuse and a second side of another right-angled triangle, then the 2 triangles are similar	• establish and use the 4 tests, for 2 triangles to be similar: if the hypotenuse and a second side of a right-angled triangle are proportional to the hypotenuse and a second side of another right-angled triangle, then the 2 triangles are similar
	5	Combination of previous content	• Combination of previous details

6 Statistics and Probability

6.1 Single variable data analysis

MA5.2-15SP Uses quartiles and box plots to compare sets of data, and evaluates sources of data

Determine quartiles and interquartile range (ACMSP248)			
Quest: Interquartile range			
Learning Journey	Step	Content	Description
Interquartile range	1	Defining quartiles and interquartile-range	• defining quartiles and interquartile-range
		Describing the proportion of data values contained between various quartiles	• describe the proportion of data values contained between various quartiles
	2	Determining the upper and lower extremes, median, and upper and lower quartiles for sets of numerical-data	• determine the upper and lower extremes, median, and upper and lower quartiles for sets of numerical-data
	3	Determining the interquartile range for sets of data	• determine the interquartile range for sets of data

Construct and interpret box plots and use them to compare data sets (ACMSP249)			
Quest: Construct & interpret box plots			
Learning Journey	Step	Content	Description
Constructing & interpreting box plots	1	Constructing a box-and-whisker plot using the median, the upper and lower quartiles, and the upper and lower extremes of a set of data	• construct a box-and-whisker plot using the median, the upper and lower quartiles, and the upper and lower extremes of a set of data
	2	Comparing 2 or more sets of data using parallel box-and-whisker-plots drawn on the same scale	• compare 2 or more sets of data using parallel-box-and-whisker-plots drawn on the same scale

Compare shapes of box plots to corresponding histograms and dot plots (ACMSP250)			
Quest: Compare box plots			
Learning Journey	Step	Content	Description
Comparing box plots	1	Determining quartiles from data displayed in histograms and dot plots, and using these to draw a box-and-whisker plot to represent the same set of data	• determine quartiles from data displayed in histograms and dot plots
			• draw a box-and-whisker plot to represent the same set of data displayed in a histogram
	2	Identifying skewed and symmetrical sets of data displayed in histograms and dot plots, and describing the shape/features of the corresponding box-and-whisker plot for such sets of data	• identify skewed and symmetrical sets of data displayed in histograms and dot plots
			• describe the shape/features of the corresponding box-and-whisker plot for such sets of data

Investigate reports of surveys in digital media and elsewhere for information on how data were obtained to estimate population means and medians (ACMSP227)			
Quest: Make population predictions from data			
Learning Journey	Step	Content	Description
Using data to make predictions about populations	1	Making predictions from a sample that may apply to the whole population	• make predictions from a sample that may apply to the whole population
			• consider the size of the sample when making predictions about the population
	2	Investigating the appropriateness of sampling methods and sample size used in reports where statements about a population are based on a sample	• investigate the appropriateness of sampling methods and sample size used in reports where statements about a population are based on a sample

6.2 Bivariate data analysis

MA5.2-16SP Investigates relationships between two statistical variables, including their relationship over time

Investigate and describe bivariate numerical data where the independent variable is time (ACMSP252)			
Quest: Bivariate data			
Learning Journey	Step	Content	Description
Bivariate data	1	Recognising the difference between an independent variable and its dependent variable	• recognise the difference between an independent variable and its dependent variable
		Distinguishing bivariate data from single variable (univariate) data	• distinguish bivariate data from single variable (univariate) data
	2	Describing changes in the dependent variable over time	• describe changes in the dependent variable over time
	3	Interpreting data displays representing 2 or more dependent numerical-variables against time	• interpret data displays representing 2 or more dependent numerical-variables against time

Use scatter plots to investigate and comment on relationships between two numerical variables (ACMSP251)			
Quest: Scatter plots			
Learning Journey	Step	Content	Description
Using scatter plots	1	Describing, informally, the strength and direction of the relationship between 2 variables displayed in a scatter plot	• describe, informally, the strength and direction of the relationship between 2 variables displayed in a scatter plot
	2	Making predictions from a given scatter plot or other graph	• make predictions from a given scatter plot or other graph
	3	Drawing conclusions from a given scatter plot	• draw conclusions from a given scatter plot

6.3 Probability

MA5.2-17SP Describes and calculates probabilities in multi-step chance experiments

List all outcomes for two-step chance experiments, both with and without replacement using tree diagrams or arrays. Assign probabilities to outcomes and determine probabilities for events (ACMSP225)			
Quest: List outcomes & find probabilities			
Learning Journey	Step	Content	Description
The fundamental counting principle	1	Understanding the fundamental counting principle	• understand the fundamental counting principle
	2	Solving problems involving the fundamental counting principle	• solve problems involving the fundamental counting principle
Two-step chance experiments with replacement	1	Listing all outcomes for 2-step chance experiments, with replacement and assign probabilities to outcomes	• list all outcomes for 2-step chance experiments, with replacement and assign probabilities to outcomes
	2	Determining probabilities for events for 2-step chance experiments with replacement	• determine probabilities for events for 2-step chance experiments with replacement
	3	Calculating probabilities of simple and compound events in 2-step chance experiments, with replacement	• calculate probabilities of simple and compound events in 2-step chance experiments, with replacement
Two-step chance experiments without replacement	1	Listing all outcomes for 2-step chance experiments, without replacement and assign probabilities to outcomes	• list all outcomes for 2-step chance experiments, without replacement and assign probabilities to outcomes
	2	Determining probabilities for events for 2-step chance experiments without replacement	• determine probabilities for events for 2-step chance experiments without replacement
	3	Calculating probabilities of simple and compound events in 2-step chance experiments without replacement	• calculate probabilities of simple and compound events in 2-step chance experiments without replacement

Describe the results of two- and three-step chance experiments, both with and without replacements, assign probabilities to outcomes and determine probabilities of events. Investigate the concept of independence (ACMSP246)			
Quest: Two/three step experiments, independence			
Learning Journey	Step	Content	Description
Three-step chance experiments with replacement	1	Listing all outcomes for 3-step chance experiments, with replacement and assign probabilities to outcomes	• list all outcomes for 3-step chance experiments, with replacement and assign probabilities to outcomes
	2	Determining probabilities for events for 3-step chance experiments with replacement	• determine probabilities for events for 3-step chance experiments with replacement

Learning Journey	Step	Content	Description
	3	Calculating probabilities of simple and compound events in 3-step chance experiments, with replacement	• calculate probabilities of simple and compound events in 3-step chance experiments, with replacement
Three-step chance experiments without replacement	1	Listing all outcomes for 3-step chance experiments, without replacement and assigning probabilities to outcomes	• list all outcomes for 3-step chance experiments, without replacement and assign probabilities to outcomes
	2	Determining probabilities for events for 3-step chance experiments without replacement	• determine probabilities for events for 3-step chance experiments without replacement
	3	Calculating probabilities of simple and compound events in 3-step chance experiments without replacement	• calculate probabilities of simple and compound events in 3-step chance experiments without replacement
Independent events	1	Understanding that independent events have a set probability that do not rely on previous events	• explore examples of independent events, eg consecutive rolls of dice
		Understanding that dependent events have a probability that changes according to previous events	• explore examples of dependent events, eg drawing cards from a deck
	2	Determining if 2 events, A and B, are independent by using the characteristic that if the probability of A and B occurring together is the product of their probabilities	• determine if 2 events, A and B, are independent by using the characteristic that if the probability of A and B occurring together is the product of their probabilities
	3	Recognising and using the fact that for independent events P(A and B) = P(A) × P(B)	• recognise and use the fact that for independent events P(A and B) = P(A) × P(B)

Use the language of 'if....then, 'given', 'of', 'knowing that' to investigate conditional statements and identify common mistakes in interpreting such language (ACMSP247)			
Quest: Conditional probability			
Learning Journey	Step	Content	Description
Conditional probability introduction	1	Identifying mistakes in interpreting conditional probability statements	• identify mistakes in interpreting conditional probability statements
	2	Determining the conditional probability of A given B as the fraction of B's outcomes that also belong to A	• determine the conditional probability of A given B as the fraction of B's outcomes that also belong to A
			• interpret the answer to questions modelled on conditional probability calculations
	3	Applying the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B), and interpreting the answer in terms of the model	• apply the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B)
			• interpret the answer to questions modelled on the addition rule for probability

Learning Journey	Step	Content	Description
	4	Applying the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpreting the answer in terms of the model	• apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B)
			• interpret the answer to questions modelled on the multiplication rule for probability
Conditional probability & two-way tables	1	Constructing and interpreting two-way frequency tables of data when 2 categories are associated with each object being classified	• construct and interpret two-way frequency tables of data when two categories are associated with each object being classified
	2	Determining if events are independent using a two-way table as a sample space	• determine if events are independent using a two-way table as a sample space
	3	Approximating conditional probabilities using two-way tables as a samples space	• approximate conditional probabilities using two-way tables as a samples space
	4	Calculating and interpreting conditional probabilities through representation using expected frequencies with two-way tables	• calculate probabilities through representation using expected frequencies with two-way tables
			• interpret conditional probabilities through representation using expected frequencies with two-way tables
	5	Calculating and interpreting probabilities of compound events using two-way tables	• calculate probabilities of compound events using two-way tables
			• interpret probabilities of compound events using two-way tables
Conditional probability & tree diagrams	1	Calculating and interpreting conditional probabilities through representation using expected frequencies with tree diagrams	• calculate conditional probabilities through representation using expected frequencies with tree diagrams
			• interpret conditional probabilities through representation using expected frequencies with tree diagrams
	2	Calculating and interpreting probabilities of compound events using tree diagrams	• calculate and interpret probabilities of compound events using tree diagrams
			• interpret probabilities of compound events using tree diagrams
Conditional probability & arrays	1	Calculating and interpreting conditional probabilities through representation using expected frequencies with arrays	• calculate conditional probabilities through representation using expected frequencies with arrays
			• interpret conditional probabilities through representation using expected frequencies with arrays
	2	Calculating and interpreting probabilities of compound events using arrays	• calculate probabilities of compound events using arrays
			• interpret probabilities of compound events using arrays

Learning Journey	Step	Content	Description
Conditional probability & Venn diagrams	1	Calculating and interpreting conditional probabilities through representation using expected frequencies with Venn diagrams	• calculate conditional probabilities through representation using expected frequencies with Venn diagrams
			• interpret conditional probabilities through representation using expected frequencies with Venn diagrams
	2	Calculating and interpreting probabilities of compound events using Venn diagrams	• calculate probabilities of compound events using Venn diagrams
			• interpret probabilities of compound events using Venn diagrams
Set theory & Venn diagrams	1	Defining unions, intersections and complements of subsets using symbols	• define unions as the combination of subsets, ie if an element is in A U B then the element can be in either A or B
			• define intersections as the crossover between subsets, ie if an element is in A ∩ B then the element must be in A and B
			• define complements of an event as all outcomes that are not the event
	2	Identifying different regions on a Venn diagram using set theory	• identify different regions on a Venn diagram using set theory

Part III

Stage 5.3

7 Number and Algebra

7.1 Ratio and rates

MA5.3-4NA Draws, interprets and analyses graphs of physical phenomena

Solve problems involving direct proportion; explore the relationship between graphs and equations corresponding to simple rate problems (ACMNA208)			
Quest: Travel graphs			
Learning Journey	Step	Content	Description
Interpreting/sketching travel graphs	1	Interpreting information from travel graphs (time/distance graphs) when the speed is variable, to solve problems	• interpret information from a travel graph (time/distance graph) to solve problems
			• interpret information from 2 travel graphs (time/distance graphs) on the same set of coordinate axes (number plane) to solve problems
	2	Sketching travel graphs with variable speed	• sketch a graph from a simple description given a variable rate of change (speed)

7.2 Algebraic techniques

MA5.3-5NA Selects and applies appropriate algebraic techniques to operate with algebraic expressions

Expand binomial products using a variety of strategies (ACMNA233)			
Quest: Binomial expansions & basic quadratics			
Learning Journey	Step	Content	Description
Binomial product special results	1	Recognising and applying the special product: $(a + b)^2 = a^2 + 2ab + b^2$	• apply the special product: $(a + b)^2 = a^2 + 2ab + b^2$
	2	Recognising and applying the special product: $(a - b)^2 = a^2 - 2ab + b^2$	• apply the special product: $(a - b)^2 = a^2 - 2ab + b^2$
	3	Recognising and applying the special product: $(a - b)(a + b) = a^2 - b^2$	• apply the special product: $(a - b)(a + b)=a^2 - b^2$
Factorising monic quadratic trinomials	1	Factorising monic quadratic expressions involving grouping in pairs with four-term expressions	• factorise monic quadratic expressions involving grouping in pairs with four-term expressions
	2	Factorising monic quadratic expressions involving quadratic trinomials	• factorise monic quadratic expressions involving quadratic trinomials
Simplifying binomial expansions	1	Simplifying a variety of expressions involving binomial products, eg $(3x + 1)(2 - x) + 2x + 4$	• simplify a variety of expressions involving binomial products, eg $(3x + 1)(2 - x) + 2x + 4$
	2	Simplifying a variety of expressions involving binomial products including those with special results, eg $(x - y)^2 - (x + y)^2$	• simplify a variety of expressions involving binomial products including those with special results, eg $(x - y)^2 - (x + y)^2$

Factorise monic and non-monic quadratic expressions (ACMNA269)			
Quest: Factorise quadratics			
Learning Journey	Step	Content	Description
Factorising using difference of 2 squares	1	Factorising monic quadratic expressions involving the difference of 2 squares	• factorise monic quadratic expressions involving the difference of 2 squares
	2	Factorising non-monic quadratic expressions involving the difference of 2 squares	• factorise non-monic quadratic expressions involving the difference of 2 squares
	3	Factorising non-monic quadratic expressions involving the difference of 2 squares where a HCF needs to be taken out first	• factorise non-monic quadratic expressions involving the difference of 2 squares where a HCF needs to be taken out first
	4	Combination of previous content	• Combination of previous details
Factorising using grouping	1	Factorising monic quadratic expressions involving grouping in pairs with four-term expressions	• factorise monic quadratic expressions involving grouping in pairs with four-term expressions

Learning Journey	Step	Content	Description
	2	Factorising non-monic quadratic expressions involving grouping in pairs with four-term expressions	• factorise non-monic quadratic expressions involving grouping in pairs with four-term expressions
	3	Factorising non-monic quadratic expressions involving grouping in pairs with four-term expressions where a HCF needs to be taken out first	• factorise non-monic quadratic expressions involving grouping in pairs with four-term expressions where a HCF needs to be taken out first
	4	Combination of previous content	• Combination of previous details
Factorising using perfect squares	1	Factorising monic quadratic expressions involving perfect squares	• factorise monic quadratic expressions involving perfect squares
	2	Factorising non-monic quadratic expressions involving perfect squares	• factorise non-monic quadratic expressions involving perfect squares
	3	Factorising non-monic quadratic expressions involving perfect squares where a HCF needs to be taken out first	• factorise non-monic quadratic expressions involving perfect squares where a HCF needs to be taken out first
	4	Combination of previous content	• Combination of previous details
Factorising quadratic trinomials	1	Factorising monic quadratic expressions involving quadratic trinomials	• factorise monic quadratic expressions involving quadratic trinomials
	2	Factorising non-monic quadratic expressions involving quadratic trinomials	• factorise non-monic quadratic expressions involving quadratic trinomials
	3	Factorising non-monic quadratic expressions involving quadratic trinomials where a HCF needs to be taken out first	• factorise non-monic quadratic expressions involving quadratic trinomials where a HCF needs to be taken out first
	4	Combination of previous content	• Combination of previous details
Factorising complex fractions	1	Factorising and simplifying expressions where at least one entire quadratic expression sits in the numerator or denominator position of a fraction	• factorise and simplify expressions where at least one entire quadratic expression sits in the numerator or denominator and must be factorised first
	2	Factorising and simplifying expressions where at least 1 entire quadratic expression sits in the numerator or denominator position of a fraction where a HCF needs to be taken out first	• factorise and simplify expressions where at least 1 entire quadratic expression sits in the numerator or denominator and must be factorised first where a HCF needs to be taken out first
	3	Combination of previous content	• Combination of previous details

7.3 Surds and indices

MA5.3-6NA Performs operations with surds and indices

Define rational and irrational numbers and perform operations with surds and fractional indices (ACMNA264)			
Quest: Rational & irrational numbers & surds			
Learning Journey	Step	Content	Description
Understanding rational and irrational numbers	1	Defining rational numbers as any number that can be represented in the form p/q, where p and q are integers and q ≠ 0	• define rational numbers as any number that can be represented in the form p/q, where p and q are integers and q ≠ 0
	2	Defining irrational numbers	• define irrational numbers as any number that cannot be represented in the form p/q where p and q are integers
	3	Understanding the properties of rational numbers	• know that rational numbers have commutative, associative and distributive properties
			• apply the rules for the order of operations to calculations involving rational numbers
	4	Distinguishing between rational and irrational numbers	• distinguish between rational and irrational numbers
Introducing surds	1	Introducing surds	• establish that a surd is an irrational number, providing examples
	2	Understanding surd form	• understand surd form and its notation
			• read and articulate surds and fractional indices
	3	Estimating the value of a surd	• estimate the approximate value of a surd based on knowledge of perfect squares, cubes etc
	4	Establishing the square of a square root identity	• establish the square of a square root identity
	5	Converting from surd form (with nth root) to index form	• write surds in index form for positive fractions with a numerator of 1
			• write surds in index form for positive/negative fractions with a numerator of 1
			• write surds in index form for positive proper fractions with numerator greater or equal to 1
			• write surds in index form for positive/negative proper fractions with numerator greater or equal to 1
			• write surds in index form for positive/negative improper/vulgar fractions with numerator greater or equal to 1

Learning Journey	Step	Content	Description
Understanding surd general rules	1	Understanding multiplication general formulae for surd rules	• understand multiplication general formulae for surd rules
	2	Understanding division general formulae for surd rules	• understand division general formulae for surd rules
Simplifying & adding/subtracting of surds	1	Simplifying a surd: the radicand being a whole number	• apply the method to simplify a single surd realising you need to look for a factor that is a perfect square
	2	Rewriting simplified surds	• return a simplified surd into a single surd (unsimplified form)
	3	Simplifying expressions involving surds in calculations: addition/subtraction where surd simplification is not necessary	• simplify surds in calculations: addition/subtraction where surd simplification is not necessary
	4	Simplifying expressions involving surds in calculations: addition/subtraction where surd simplification is necessary	• simplify surds in calculations: addition/subtraction where surd simplification is necessary
Multiplying & dividing surds	1	Simplifying expressions involving surds in calculations: multiplication where surd simplification is not necessary	• apply simplifying surds to simple surd multiplication examples
	2	Simplifying expressions involving surds in calculations: multiplication where surd simplification is necessary	• apply simplifying expressions involving surds in calculations to simplify surd multiplication examples
	3	Simplifying surds in calculations: division	• apply simplifying surds n calculations to simple division examples
	4	Simplifying expressions involving surds in calculations: division where the surds have coefficients	• apply the method used to simplify the division of surds with coefficients
	5	Combination of previous content	• Combination of previous details
Expanding brackets with surds	1	Simplifying expressions involving surds in calculations: use of the distributive law required	• extend simplifying expressions involving surds in calculations to find solutions when examples have single brackets requiring expansion by a single value
			• extend simplifying expressions involving surds in calculations to find solutions when examples have single brackets requiring expansion by a surd
			• extend simplifying expressions involving surds in calculations to find solutions when examples have single brackets requiring expansion by a surd with a coefficient
	2	Expanding and simplifying expressions involving surds in calculations: binomial expansion required	• extend expanding and simplifying expressions involving surds in calculations to find solutions when examples have 2 brackets requiring expansion

Learning Journey	Step	Content	Description
			• extend expanding and simplifying expressions involving surds in calculations to find solutions when examples have 2 brackets requiring expansion involving surds with coefficients
	3	Expanding and simplifying expressions involving surds in calculations: expanding a square required	• expand and simplify surds in calculations: expanding a square required
Rationalising the denominator	1	Rationalising the denominator with a single surd	• rationalise the denominator with a single surd
	2	Rationalising the denominator of a surd which has a coefficient	• rationalise the denominator of a surd which has a coefficient
	3	Rationalising more complex denominators using conjugate surds	• apply rationalising a denominator using conjugate surds to examples
	4	Combination of previous content	• Combination of previous details
Converting recurring decimals to rational numbers	1	Converting a decimal expansion that repeats into a rational number	• convert a decimal expansion that repeats into a rational number
Solving problems involving surds	1	Applying surds to problems within context: trigonometry	• calculate the exact value of a trigonometric ratio in a right-angled triangle, given the lengths of 2 sides
	2	Solving problems using surds	• solve problems involving surds, with and without a calculator

7.4 Equations

MA5.3-7NA Solves complex linear, quadratic, simple cubic and simultaneous equations, and rearranges literal equations

Solve a wide range of quadratic equations derived from a variety of contexts (ACMNA269)			
Quest: Solve quadratics			
Learning Journey	Step	Content	Description
Solving quadratic equations by factorisation	1	Solving monic quadratic equations of the form $ax^2 + bx + c = 0$ by factorisation	• solve monic quadratic equations of the form $ax^2 + bx + c = 0$ by factorisation
	2	Solving non-monic quadratic equations of the form $ax^2 + bx + c = 0$ by factorisation	• solve non-monic quadratic equations of the form $ax^2 + bx + c = 0$ by factorisation
	3	Combination of previous content	• Combination of previous details
Solving quadratic equations: Completing the square	1	Solving monic quadratic equations of the form $ax^2 + bx + c = 0$ by completing the square	• solve monic quadratic equations of the form $ax^2 + bx + c = 0$ by completing the square
	2	Solving non-monic quadratic equations of the form $ax^2 + bx + c = 0$ by completing the square	• solve non-monic quadratic equations of the form $ax^2 + bx + c = 0$ by completing the square
	3	Combination of previous content	• Combination of previous details
Solving quadratic equations: Quadratic formula	1	Solving monic quadratic equations of the form $ax^2 + bx + c = 0$ by using the quadratic formula	• solve monic quadratic equations of the form $ax^2 + bx + c = 0$ by using the quadratic formula
	2	Solving non-monic quadratic equations of the form $ax^2 + bx + c = 0$ by using the quadratic formula	• solve non-monic quadratic equations of the form $ax^2 + bx + c = 0$ by using the quadratic formula
	3	Combination of previous content	• Combination of previous details
Solving a variety of quadratic equations	1	Solving a variety of monic quadratic equations	• solve a variety of monic quadratic equations
	2	Solving a variety of non-monic quadratic equations	• solve a variety of non-monic quadratic equations
	3	Checking solutions of a quadratic equation by substituting	• check solutions of a quadratic equation by substituting
	4	Combination of previous content	• Combination of previous details
The discriminant	1	Using the discriminant to identify whether a given quadratic equation has real solutions and whether those solutions are unique or equal	• identify whether a given quadratic equation has real solutions, and if there are real solutions, whether they are or are not equal
Using quadratic equations in context	1	Solving quadratic equations resulting from substitution into formulas	• solve quadratic equations resulting from substitution into formulas

Learning Journey	Step	Content	Description
	2	Solving real-life problems involving quadratic equations within a given context	• solve real-life problems involving quadratic equations within a given context
	3	Creating quadratic equations to solve a variety of problems and check solutions	• create quadratic equations to solve a variety of problems and check solutions
	4	Explaining why one of the solutions to a quadratic equation generated from a word problem may not be a possible solution to the problem	• explain why one of the solutions to a quadratic equation generated from a word problem may not be a possible solution to the problem

7.5 Linear relationships

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

Find the midpoint and gradient of a line segment (interval) on the Cartesian plane (ACMNA294)			
Quest: Midpoint & gradient of line segments			
Learning Journey	Step	Content	Description
Finding the midpoint using the formula	1	Using the formula to find the midpoint of the interval joining 2 points on the Cartesian plane	• use the formula to find the midpoint of the interval joining 2 points on the Cartesian plane
	2	Using the formula to find the midpoint of the interval joining 2 points in order to solve a problem in a given context	• use the formula to find the midpoint of the interval joining 2 points on the Cartesian plane in order to solve a problem in a given context
			• use the formula to find the midpoint of the interval joining 2 points on a map in order to solve a real-life problem in a given context
	3	Using the midpoint formula to find the missing point on the line interval given 1 point and the midpoint	• use the midpoint formula to find the missing point on the line interval given 1 point and the midpoint
Finding the gradient using the formula	1	Using the formula to find the gradient of the interval joining 2 points on the Cartesian plane	• use the formula to find the gradient of the interval joining 2 points on the Cartesian plane
	2	Using the formula to find the gradient of the interval joining 2 points in order to solve a problem in a given context	• use the formula to find the gradient of the interval joining 2 points on the Cartesian plane in order to solve a problem in a given context
			• use the formula to find the gradient of the interval joining 2 points on a diagram in order to solve a real-life problem in a given context

Find the distance between two points located on the Cartesian plane (ACMNA214)			
Quest: Find the distance between two points			
Learning Journey	Step	Content	Description
Finding distance between 2 points using formula	1	Using the formula to find the distance between 2 points on the Cartesian plane	• use the formula to find the distance between 2 points on the Cartesian plane
	2	Using the formula to find the distance of the interval joining 2 points in order to solve a problem in a given context	• use the formula to find the distance of the interval joining two points on the Cartesian plane in order to solve a problem in a given context
			• use the formula to find the distance of the interval joining 2 points on a diagram in order to solve a real-life problem in a given context

Sketch linear graphs using the coordinates of two points (ACMNA215)			
Quest: Use x and y intercepts			
Learning Journey	Step	Content	Description
Graphing a line using x and y intercepts	1	Graphing a linear relationship on the Cartesian plane using the x and y intercepts	• graph a linear relationship on the Cartesian plane by finding the x and y intercepts and ruling a line through them

Solve problems involving parallel and perpendicular lines (ACMNA238)			
Quest: Parallel and perpendicular lines			
Learning Journey	Step	Content	Description
Equations of lines: parallel & perpendicular lines	1	Finding the equation of a line that is parallel to another given line and going through a given point	• find the equation of a line that is parallel to another given line and goes through a given point
	2	Finding the equation of a line that is perpendicular to another given line and going through a given point	• find the equation of a line that is perpendicular to another given line and goes through a given point
	3	Finding the equation of a perpendicular bisector of a line interval	• find the equation of a perpendicular bisector of a line interval
Problems involving parallel & perpendicular lines	1	Solving problems involving collinearity	• show that 3 given points are collinear
	2	Using coordinate geometry to investigate and describe the properties of triangles and quadrilaterals	• use coordinate geometry to investigate and describe the properties of triangles and quadrilaterals
	3	Showing that 4 specified points form the vertices of particular quadrilaterals	• show that 4 specified points form the vertices of particular quadrilaterals
	4	Proving that a particular triangle drawn on the Cartesian plane is right angled	• prove that a particular triangle drawn on the Cartesian plane is right angled
	5	Combination of previous content	• Combination of previous details

7.6 Non-linear relationships

MA5.3-9NA Sketches and interprets a variety of non-linear relationships

Describe, interpret and sketch parabolas, hyperbolas, circles and exponential functions and their transformations (ACMNA267)			
Quest: Functions & their transformations			
Learning Journey	Step	Content	Description
Exploring parabolas	1	Understanding the language and important features of parabolas	• understand the important features to be marked on a parabola; y-intercept, x-intercept(s)/roots, turning point(vertex)
	2	Understanding that $y = ax^2 + bx + c$ is the general equation of a parabola and manipulate equations to be in this form	• manipulate equations to be in the form $y = ax^2 + bx + c$
	3	Investigating how the parabola with the equation $y = ax^2$ changes as the value of a is changed using digital technology	• describe the features of the graph and how they change as the value of 'a' changes for both positive and negative values of 'a'
			• understand that the sign of the coefficient of x^2 (a) is what makes a parabola concave up or down. If $a > 0$ the parabola is concave up, If $a < 0$ the parabola is concave down
		Investigating how the parabola with the equation $y = ax^2 + k$ changes as the value of k is changed using digital technology	• describe the features of the graph and how they change as the value of k changes for both positive and negative values of k
	4	Graphing parabolas in the form $y = ax^2 + k$ with different values of a and k	• graph parabolas in the form $y = ax^2 + k$ with different values of a and k
	5	Investigating how the parabola with the equation $y = (x + a)^2$ changes as the value of a is changed using digital technology	• describe the features of the graph and how they change as the value of a changes for both positive and negative values of a
		Investigating how the parabola with the equation $y = (x + a)^2 + k$ changes as the value of k is changed using digital technology	• describe the features of the graph and how they change as the value of k changes for both positive and negative values of k
Parabolas: vertex & axis of symmetry	1	Determining the equation of the axis of symmetry of a parabola using the midpoint of the interval joining the points at which the parabola cuts the x-axis	• determine the equation of the axis of symmetry of a parabola using the midpoint of the interval joining the points at which the parabola cuts the x-axis
	2	Determining the equation of the axis of symmetry of a parabola using the formula $x = -b/2a$	• determine the equation of the axis of symmetry of a parabola using the formula $x = -b/2a$

Learning Journey	Step	Content	Description
	3	Finding the coordinates of the vertex of a parabola by using the midpoint of the interval joining the points at which the parabola cuts the x-axis and substituting to obtain the y-coordinate of the vertex	• find the coordinates of the vertex of a parabola by using the midpoint of the interval joining the points at which the parabola cuts the x-axis and substituting to obtain the y-coordinate of the vertex
	4	Finding the coordinates of the vertex of a parabola by using the formula for the axis of symmetry to obtain the x-coordinate and substituting into the equation to obtain the y-coordinate of the vertex	• find the coordinates of the vertex of a parabola by using the formula for the axis of symmetry to obtain the x-coordinate and substituting to obtain the y-coordinate of the vertex
Graphing parabolas	1	Graphing a variety of parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c using a table of values	• graph a variety of parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c using a table of values
	2	Finding y-intercept for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $x = 0$	• find y-intercept for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $x = 0$
	3	Finding x-intercepts (roots or zeros) of a parabola, where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and factorising	• find x-intercepts (roots or zeros), where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and factorising for monic equations
			• find x-intercepts (roots or zeros), where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and factorising for non-monic equations
		Graphing parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c by finding x-intercept(s) (using factorising), the y-intercept and the turning point (vertex)	• graph parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c by finding x-intercept(s) (using factorising), the y-intercept and the turning point (vertex)
	4	Finding x-intercepts (roots or zeros) of a parabola, where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and completing the square	• find x-intercepts (roots or zeros), where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and completing the square for monic equations
			• find x-intercepts (roots or zeros), where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and completing the square for non-monic equations

Learning Journey	Step	Content	Description
		Graphing parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c by finding x-intercept(s) (using completing the square), the y-intercept and the turning point (vertex)	• graph parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c by finding x-intercept(s) (using completing the square), the y-intercept and the turning point (vertex)
		Finding x-intercepts (roots or zeros) of a parabola, where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and using the quadratic formula	• find x-intercepts (roots or zeros), where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and using the quadratic formula for monic equations
			• find x-intercepts (roots or zeros), where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and using the quadratic formula for non-monic equations
		Graphing parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c by finding x-intercept(s) (using the quadratic formula), the y-intercept and the turning point (vertex)	• graph parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c by finding x-intercept(s) (using the quadratic formula), the y-intercept and the turning point (vertex)
	5	Combination of previous content	• Combination of previous details
Parabolas & their transformations	1	Describing, interpreting and sketching parabolas and their translations	• describe, interpret and sketch parabolas and their translations
	2	Describing, interpreting and sketching parabolas and their reflections	• describe, interpret and sketch parabolas and their reflections
	3	Describing, interpreting and sketching parabolas and their rotations	• describe, interpret and sketch parabolas and their rotations
	4	Describing, interpreting and sketching parabolas and their dilations	• describe, interpret and sketch parabolas and their dilations
	5	Combination of previous content	• Combination of previous details
Graphing hyperbolas	1	Graphing hyperbolic relationships of the form $y = k/x$ for integer values of k	• describe the effect on the graph of $y = 1/x$ of multiplying $1/x$ by different constants
			• explain what happens to the y-values of the points on the hyperbola $y = k/x$ as the x-values become very large or closer to zero
	2	Investigating how the hyperbola with the equation $y = k/x + c$ changes as the value of k and c change using digital technology	• describe the effect on the graph changing k and c have for both small and large negative and positive values

Learning Journey	Step	Content	Description
	3	Understanding and finding asymptotes relating to hyperbolas	• explain why asymptotes exist using the equation of a hyperbola
			• determine the equations of the asymptotes of a hyperbola in the form $y = k/x + c$ or $y = k/(x - a)$
	4	Graphing a variety of hyperbolic curves, including where the equation is given in the form $y = k/x + c$ or $y = k/x - a$ for integer values of k, a and c	• identify features of hyperbolas from their equations to assist in sketching their graphs, eg identify asymptotes, orientation, x- and/or y-intercepts where they exist
Hyperbolas & their transformations	1	Describing, interpreting and sketching hyperbolas and their translations	• describe, interpret and sketch hyperbolas and their translations
	2	Describing, interpreting and sketching hyperbolas and their reflections	• describe, interpret and sketch hyperbolas and their reflections
	3	Describing, interpreting and sketching hyperbolas and their rotations	• describe, interpret and sketch hyperbolas and their rotations
	4	Describing, interpreting and sketching hyperbolas and their dilations	• describe, interpret and sketch hyperbolas and their dilations
	5	Combination of previous content	• Combination of previous details
Graphing circles	1	Graphing circles with equations in the form $(x - a)^2 + (y - b)^2 = r^2$ for various values of a, b, r	• graph circles with equations in the form $(x - a)^2 + (y - b)^2 = r^2$ for various values of a, b, r
	2	Investigating how circles with equations in the form $(x - a)^2 + (y - b)^2 = r^2$ change as the values of a,b,r change using digital technology	• investigate and describe how circles with equations in the form $(x - a)^2 + (y - b)^2 = r^2$ change as the value of a changes using digital technology
			• investigate and describe how circles with equations in the form $(x - a)^2 + (y - b)^2 = r^2$ change as the value of b changes using digital technology
			• investigate and describe how circles with equations in the form $(x - a)^2 + (y - b)^2 = r^2$ change as the value of r changes using digital technology
	3	Determining whether a particular point is inside, on, or outside a given circle	• determine whether a particular point is inside, on, or outside a given circle
	4	Finding the centre and radius of a circle whose equation is in the form $x^2 + y2 + ax + by + c = 0$ by completing the square	• find the centre and radius of a circle whose equation is in the form $x^2 + y2 + ax + by + c = 0$ by completing the square
Circles & their transformations	1	Describing, interpreting and sketching circles and their translations	• describe, interpret and sketch circles and their translations

Learning Journey	Step	Content	Description
	2	Describing, interpreting and sketching circles and their reflections	• describe, interpret and sketch circles and their reflections
	3	Describing, interpreting and sketching circles and their rotations	• describe, interpret and sketch circles and their rotations
	4	Describing, interpreting and sketching circles and their dilations	• describe, interpret and sketch circles and their dilations
	5	Combination of previous content	• Combination of previous details
Exponential functions & their transformations	1	Describing, interpreting and sketching exponential functions and their translations	• describe, interpret and sketch exponential functions and their translations
	2	Describing, interpreting and sketching exponential functions and their reflections	• describe, interpret and sketch exponential functions and their reflections
	3	Describing, interpreting and sketching exponential functions and their rotations	• describe, interpret and sketch exponential functions and their rotations
	4	Describing, interpreting and sketching exponential functions and their dilations	• describe, interpret and sketch exponential functions and their dilations
	5	Combination of previous content	• Combination of previous details
General non linear relationships	1	Identifying and naming different types of graphs from their equations	• identify and name different types of graphs from their equations
	2	Sketching any particular curve by using a table of values	• sketch any particular curve by using a table of values
	3	Sketching any particular curve by determining its features from its equation	• sketch any particular curve by determining its features from its equation including x and y-intercepts, turning points (if applicable), asymptotes (if applicable)
	4	Identifying equations whose graph is symmetrical about the y-axis	• identify equations whose graph is symmetrical about the y-axis
	5	Determining a possible equation from a given graph and check using digital technologies	• determine a possible equation from a given graph and check using digital technologies
		Comparing and contrasting different types of graphs and determining possible equations from the key features	• compare and contrast different types of graphs and determine possible equations from the key features

7.7 Polynomials

MA5.3-10NA Recognises, describes and sketches polynomials, and applies the factor and remainder theorems to solve problems

Investigate the concept of a polynomial and apply the factor and remainder theorems to solve problems (ACMNA266)			
Quest: Introduction to polynomials			
Learning Journey	Step	Content	Description
Introducing polynomials	1	Understanding the definition of a polynomial to be an expression in the form $a_n x_n + a_{n-1} x_{n-1} + ... a_1 x_1 + a_0 x_0$	• recognise a polynomial
		Understanding the definitions involved with polynomials	• understand the terms 'degree', 'leading term', 'leading coefficient', 'constant term' and 'monic polynomial'
	2	Stating the number of zeros that a polynomial of degree n can have	• state the number of zeros that a polynomial of degree n can have
	3	Performing operations with polynomials	• add and subtract polynomials
			• multiply polynomials by linear expressions
Remainder & factor theorems	1	Using the remainder theorem to find the remainder when a polynomial is divided by the expression (x-a)	• use the remainder theorem to find the remainder when a polynomial is divided by the expression (x-a)
	2	Using the remainder and factor theorems to determine whether (x-a) is a factor of a given polynomial	• use the remainder and factor theorems to determine whether (x-a) is a factor of a given polynomial
	3	Solving problems involving the factor and/or remainder theorems where an unknown variable must be found	• solve problems involving the factor and/or remainder theorems where an unknown variable must be found
	4	Dividing polynomials by linear expressions to find the quotient and remainder, expressing the polynomial as the product of the linear expression and another polynomial plus a remainder, ie P(x)=(x – a)Q(x) + c	• divide polynomials by linear expressions to find the quotient and remainder, expressing the polynomial as the product of the linear expression and another polynomial plus a remainder, ie P(x)=(x – a)Q(x) + c
	5	Using the factor theorem to factorise particular polynomials completely	• use the factor theorem to factorise particular polynomials completely
		Using the factor theorem and long division to find all zeros of a simple polynomial P(x) and then solve P(x) = 0	• use the factor theorem and long division to find all zeros of a simple polynomial P(x) and then solve P(x) = 0 (degree ≤ 4)

Apply understanding of polynomials to sketch a range of curves and describe the features of these curves from their equation (ACMNA268)			
Quest: Sketch polynomials			
Learning Journey	Step	Content	Description
Sketching polynomials	1	Connecting the roots of the equation P(x) = 0 to the x-intercepts, and the constant term to the y-intercept, of the graph of y = P(x)	• connect the roots of the equation P(x) = 0 to the x-intercepts, and the constant term to the y-intercept, of the graph of y = P(x)
		Determining the importance of the sign of the leading term of a polynomial on the behaviour of the curve as $x \to \pm\infty$	• explain the importance of the sign of the leading term of a polynomial on the behaviour of the curve as $x \to \pm\infty$
		Determining the effect of single, double and triple roots of a polynomial equation P(x) = 0 on the shape of the graph of y = P(x)	• determine the effect of single, double and triple roots of a polynomial equation P(x) = 0 on the shape of the graph of y = P(x)
	2	Using the leading term, the roots of the equation P(x) = 0, and the x- and y-intercepts to sketch the graph of y = P(x)	• use the leading term, the roots of the equation P(x) = 0, and the x- and y-intercepts to sketch the graph of y = P(x)
			• describe the key features of a polynomial
	3	Sketching the graph of a polynomial, given its key features including zeros	• sketch the graph of a polynomial, given its key features including zeros
	4	Sketching a polynomial curve given the polynomial of any degree in factored form	• sketch a polynomial curve given the polynomial of any degree in factored form
	5	Finding the polynomial in factored form given a sketch of its graph	• find the polynomial in factored form given a sketch of its graph
		Using the graph of y = P(x) to sketch y = –P(x), y = P(–x), y = P(x) + c, y = kP(x)	• use the graph of y = P(x) to sketch y = –P(x), y = P(–x), y = P(x) + c, y = kP(x)

7.8 Logarithms

MA5.3-11NA Uses the definition of a logarithm to establish and apply the laws of logarithms

Use the definition of a logarithm to establish and apply the laws of logarithms (ACMNA265)			
Quest: Logarithms & their laws			
Learning Journey	Step	Content	Description
Introducing logarithms	1	Introducing and defining logarithms	• translate general statements (those with pronumerals) from index notation into equivalent statements using the Logarithmic form
			• translate general statements (those with pronumerals) from logarithmic form into equivalent statements using index notation
	2	Evaluating logarithms involving whole numbers	• evaluate logarithms involving whole numbers,eg log216
	3	Evaluating fractional logarithms with rational answers not involving surds	• evaluate fractional logarithms with rational answers, eg evaluate log7($\frac{1}{4}$9)
	4	Evaluating logarithms with rational answers involving surds	• evaluate logarithms with rational answers involving surds,eg evaluate log2□64
	5	Combination of previous content	• Combination of previous details
Multiplication Log law	1	Deducing the rule: $log_a x + log_a y = log_a(xy)$	• know the rule: $log_a x + log_a y = log_a(xy)$
	2	Expanding using the rule (using numbers only): $log_a x + log_a y = log_a(xy)$	• expand expressions using the rule (using numbers only): $log_a x + log_a y = log_a(xy)$
	3	Simplifying using the rule (using numbers only): $log_a x + log_a y = log_a(xy)$	• simplify expressions using the rule (using numbers only): $log_a x + log_a y = log_a(xy)$
	4	Expanding using the rule (using numbers and variables): $log_a x + log_a y = log_a(xy)$	• expand expressions using the rule (using numbers and variables): $log_a x + log_a y = log_a(xy)$
	5	Simplifying using the rule (using numbers and variables): $log_a x + log_a y = log_a(xy)$	• simplify expressions using the rule (using numbers and variables): $log_a x + log_a y = log_a(xy)$
Division Log law 1	1	Deducing the rule: $log_a x - log_a y = log_a(\frac{x}{y})$	• know the rule: $log_a x - log_a y = log_a(\frac{x}{y})$
	2	Expanding using the rule (using numbers only): $log_a x - log_a y = log_a(\frac{x}{y})$	• expand expressions using the rule (using numbers only): $log_a x - log_a y = log_a(\frac{x}{y})$
	3	Simplifying using the rule (using numbers only): $log_a x - log_a y = log_a(\frac{x}{y})$	• simplify expressions using the rule (using numbers only): $log_a x - log_a y = log_a(\frac{x}{y})$
	4	Expanding using the rule (using numbers and variables): $log_a x - log_a y = log_a(\frac{x}{y})$	• expand expressions using the rule (using numbers and variables): $log_a x - log_a y = log_a(\frac{x}{y})$
	5	Simplifying using the rule (using numbers and variables): $log_a x - log_a y = log_a(\frac{x}{y})$	• simplify expressions using the rule (using numbers and variables): $log_a x - log_a y = log_a(\frac{x}{y})$
Division Log law 2	1	Deducing the rule: $log_a x^n = nlog_a x$	• know the rule: $log_a x^n = nlog_a x$

Learning Journey	Step	Content	Description
	2	Expanding using the rule (using numbers only): $log_a x^n = nlog_a x$	• expand expressions using the rule (using numbers only): $log_a x^n = nlog_a x$
	3	Simplifying using the rule (using numbers only): $log_a x^n = nlog_a x$	• simplify expressions using the rule (using numbers only): $log_a x^n = nlog_a x$
	4	Expanding using the rule (using numbers and variables): $log_a x^n = nlog_a x$	• expand expressions using the rule (using numbers and variables): $log_a x^n = nlog_a x$
	5	Simplifying using the rule (using numbers and variables): $log_a x^n = nlog_a x$	• simplify expressions using the rule (using numbers and variables): $log_a x^n = nlog_a x$
Log results	1	Establishing the result: $loga_a^x = x$	• know the rule: $loga_a^x = x$
		Establishing the result: $log_a a = 1$	• know the rule: $log_a a = 1$
	2	Establishing the result: $log_a 1 = 0$	• know the rule: $log_a 1 = 0$
	3	Establishing the result: $log_a(\frac{1}{x}) = -log_a x$	• know the rule: $log_a(\frac{1}{x}) = -log_a x$
	4	Applying the result: $log_a(\frac{1}{x}) = -log_a x$	• expand expressions using the result: $log_a(\frac{1}{x}) = -log_a x$
			• simplify expressions using the result: $log_a(\frac{1}{x}) = -log_a x$
			• solve equations using the result: $log_a(\frac{1}{x}) = -log_a x$
	5	Combination of previous content	• Combination of previous details
Log graphs & relationship with exponentials	1	Understanding the inverse relationship between exponents and logarithms	• understand that there is an inverse relationship between exponents and logarithms
			• compare and contrast exponential and logarithmic graphs drawn on the same axes,eg y = ax and y = logax
	2	Constructing graphs of logarithms (no natural log)	• graph logarithmic functions, showing intercepts and end behaviour without the use of graphing software (no natural log)
			• graph logarithmic functions, showing intercepts and end behaviour with the use of graphing software (no natural log)
			• analyse and describe features of graphs of logarithms (no natural log)
		Comparing graphs of logarithms (no natural logs)	• compare features of graphs of logarithms (no natural log)
	3	Using logarithm rules and results to solve real world problems without change of base rule	• use logarithm rules and results to solve real world problems without change of base rule
	4	Using logarithm rules and results to solve real world problems using graphs	• analyse graphs of logarithms in relation the their practical context

Learning Journey	Step	Content	Description
Solving equations with Logarithms	1	Solving equations using the rule (using numbers and variables): $log_a x + log_a y = log_a(xy)$	• solve equations using the rule (using numbers and variables): $log_a x + log_a y = log_a(xy)$
	2	Solving equations using the rule (using numbers and variables): $log_a x - log_a y = log_a(\frac{x}{y})$	• solve equations using the rule (using numbers and variables): $log_a x - log_a y = log_a(\frac{x}{y})$
	3	Solving equations using the rule (using numbers and variables): $log_a x^n = nlog_a x$	• solve equations using the rule (using numbers and variables): $log_a x^n = nlog_a x$
	4	Solving basic equations involving logarithms with surds	• solve basic equations involving logarithms with surds
	5	Combination of previous content	• Combination of previous details

Solve simple exponential equations (ACMNA270)			
Quest: Solve exponential equations			
Learning Journey	Step	Content	Description
Solving exponential equations	1	Identifying that if ax = ay, then x = y	• identify that if ax = ay, then x = y
	2	Solving exponential equations containing equal bases	• solve exponential equations containing equal bases (linear exponents only)eg: 53x = 57x – 2
			• solve exponential equations containing equal bases (non-linear exponents)eg: $2x^2 = 23x - 4$
			• solve exponential equations containing equal bases where one side requires reciprocation prior to solving(linear exponents only)eg: $44 - 3x = \frac{1}{4}x - 2$
	3	Solving exponential equations containing different bases	• solve exponential equations containing different bases (one base a power of the other, linear exponents only)eg: 32x = 93x + 12
			• solve exponential equations containing different bases (one base a power of the other, non-linear exponents)eg: $4x^2 = 23x + 1$

8 Measurement and Geometry

8.1 Area and surface area

MA5.3-13MG Applies formulas to find the surface areas of right pyramids, right cones, spheres and related composite solids

Solve problems involving surface area and volume of right pyramids, right cones, spheres and related composite solids (ACMMG271)			
Quest: Surface area of composite solids			
Learning Journey	Step	Content	Description
Surface area of pyramids & cones	1	Finding the surface area: pyramids (without Pythagoras' theorem)	• find the surface area of pyramids (without Pythagoras' theorem)
			• find the surface area of pyramids (without Pythagoras' theorem) within the context of a problem
	2	Finding the surface area: pyramids (with and without Pythagoras' theorem)	• find the surface area of pyramids (with and without Pythagoras' theorem)
			• find the surface area of pyramids (with and without Pythagoras' theorem) within the context of a problem
	3	Finding the surface area: cones (without Pythagoras' theorem)	• find the surface area of cones (without Pythagoras' theorem)
			• find the surface area of cones (without Pythagoras' theorem) within the context of a problem
	4	Finding the surface area: cones (with and without Pythagoras' theorem)	• find the surface area of cones (with and without Pythagoras' theorem)
			• find the surface area of cones (with and without Pythagoras' theorem) within the context of a problem
	5	Combination of previous content	• Combination of previous details
Surface area of spheres	1	Finding the surface area: spheres	• find the surface area of spheres
			• find the surface area of spheres within the context of a problem
	2	Finding the surface area: parts of spheres	• find the surface area of parts of spheres
			• find the surface area of parts of spheres within the context of a problem
	3	Combination of previous content	• Combination of previous details
Find dimensions of objects given the surface area	1	Finding possible dimensions of three-dimensional objects given the surface area	• find possible dimensions of three-dimensional objects given the surface area
			• find possible dimensions of three-dimensional objects given the surface area within the context of a problem
	2	Finding the missing dimension, given the other necessary dimensions and the surface area	• find the missing dimension, given the other necessary dimensions and the surface area

Learning Journey	Step	Content	Description
			• find the missing dimension, given the other necessary dimensions and the surface area within the context of a problem
Surface area of composite solids	1	Finding the surface area: composite solids involving pyramids	• find the surface area of composite three-dimensional objects involving pyramids
			• find the surface area of composite three-dimensional objects involving pyramids within the context of a problem
	2	Finding the surface area: composite solids involving cones	• find the surface area of composite three-dimensional objects involving cones
			• find the surface area of composite three-dimensional objects involving cones within the context of a problem
	3	Finding the surface area: composite solids involving spheres and parts of spheres	• find the surface area of composite three-dimensional objects involving spheres and parts of spheres
			• find the surface area of composite three-dimensional objects involving spheres within the context of a problem
	4	Finding the surface area: composite solids involving the addition of any three-dimensional objects	• find the surface area of composite three-dimensional objects involving the addition any three-dimensional shapes
			• find the surface area of composite three-dimensional objects involving the addition of shapes within the context of a problem
		Finding the surface area: composite solids involving the subtraction of any three-dimensional objects	• find the surface area of composite 3D objects involving the subtraction of any 3D shapes
			• find the surface area of composite 3D objects involving the subtraction of shapes within the context of a problem

8.2 Volume

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

Solve problems involving surface area and volume of right pyramids, right cones, spheres and related composite solids (ACMMG271)			
Quest: Volume of composite solids			
Learning Journey	Step	Content	Description
Volume of cones	1	Developing the formula for the volume of cones	• develop and use the formula to find the volumes of cones
	2	Solving a variety of practical problems involving the volume of cones	• solve a variety of practical problems involving the volume of cones
	3	Developing a formula to find the volume of pyramids	• develop and use the formula to find the volumes of pyramids
	4	Solving a variety of practical problems involving the volume of pyramids	• solve a variety of practical problems involving the volume of pyramids
	5	Combination of previous content	• Combination of previous details
Volume of spheres	1	Developing the formula for the volume of a sphere	• develop and use the formula to find the volumes of spheres
	2	Solving a variety of practical problems involving the volume of spheres	• solve a variety of practical problems involving the volume of spheres including related problems such as half of spheres
	3	Finding dimensions of a sphere given its volume (metric units)	• find the dimensions of a sphere, given its volume, by substitution into a formula
			• find the dimensions of a sphere, given its volume, by substitution into a formula within the context of a problem
	4	Finding dimensions of part of a sphere given its volume (metric units)	• find the dimensions of a part of a sphere, given its volume, by substitution into a formula
			• find the dimensions of a part of a sphere, given its volume, by substitution into a formula within the context of a problem
	5	Combination of previous content	• Combination of previous details
Volume of composite solids	1	Calculating the volume of composite solids without spheres and cones (metric units)	• dissect composite solids into 2 or more simpler solids, without spheres or cones
			• find the volumes of composite solids without spheres or cones
			• solve a variety of practical problems in context without spheres or cones
	2	Calculating the volume of composite solids with spheres and cones included (metric units)	• dissect composite solids into 2 or more simpler solids with spheres or cones
			• find the volumes of composite solids with spheres or cones
			• solve a variety of practical problems in context with spheres or cones

Learning Journey	Step	Content	Description
	3	Calculating the volume of composite solids (metric units) (Pythagoras' theorem necessary)	• dissect composite solids into 2 or more simpler solids (Pythagoras' theorem necessary)
			• find the volumes of composite solids (Pythagoras' theorem necessary)
			• solve a variety of practical problems in context (Pythagoras' theorem necessary)
	4	Solving real-life problems involving the calculations of composite solids	• solve real-life problems involving the calculations of composite solids

8.3 Trigonometry and Pythagoras' theorem

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

Apply Pythagoras' Theorem and trigonometry to solving three-dimensional problems in right-angled triangles (ACMMG276)			
Quest: Solve problems in three dimensions			
Learning Journey	Step	Content	Description
Solving problems in three dimensions	1	Solving problems involving the lengths of the edges and diagonals of rectangular prisms and other three-dimensional objects using Pythagoras' theorem and/or trigonometry	• solve problems involving the lengths of the edges and diagonals of rectangular prisms and other three-dimensional objects using Pythagoras' theorem and/or trigonometry
		Solving various right-angled triangle problems involving three-dimensional problems	• use the trigonometric ratios to calculate the lengths of edges and diagonals in rectangular prisms. Pythagoras can also be used in this context. Solve problems when the diagram is provided
			• solve various authentic three-dimensional problems involving right-angled triangles of different orientation, with or without a diagram
	2	Using a given diagram to solve problems involving right-angled triangles in 3 dimensions using Pythagoras' Theorem and/or trigonometry	• use a given diagram to solve problems involving right-angled triangles in 3 dimensions using Pythagoras' Theorem and/or trigonometry
	3	Drawing diagrams and using them to solve word problems involving right-angled triangles in 3 dimensions, including using bearings and angles of elevation or depression using Pythagoras' theorem and/or trigonometry	• draw diagrams and use them to solve word problems involving right-angled triangles in 3 dimensions, including using bearings and angles of elevation or depression using Pythagoras' theorem and/or trigonometry

Use the unit circle to define trigonometric functions, and graph them with and without the use of digital technologies (ACMMG274)			
Quest: Trigonometry: identities, ratios, angles			
Learning Journey	Step	Content	Description
Using trigonometric identities	1	Deriving and using the trigonometric identitiy $\tan\theta = \sin\theta/\cos\theta$ using the unit circle (using θ)	• use the trigonometric identity that the tangent ratio is expressed as $\tan\theta = \sin\theta/\cos\theta$ using the unit circle
	2	Deriving and using the Pythagorean identity $\sin^2\theta + \cos^2\theta = 1$ (using θ)	• use the Pythagorean identity $\sin^2\theta + \cos^2\theta = 1$

Learning Journey	Step	Content	Description
Investigating trigonometric ratios	1	Investigating the sine, cosine, tangent ratios for (at least) $0° \leq \theta \leq 360°$ using the unit circle and dynamic mathematical software (using θ)	• communicate how the value of each trigonometric ratio changes as θ travels from 0° to 360°
			• find the value of each trigonometric ratio for angles of any magnitude using the calculator and confirming with the aid of the unit circle
	2	Comparing the features of trigonometric curves, including periodicity and symmetry	• compare the features of trigonometric curves, including periodicity and symmetry
	3	Sketching the sine, cosine, tangent ratios for (at least) $0° \leq \theta \leq 360°$	• sketch the sine, cosine, tangent ratios for (at least) $0° \leq \theta \leq 360°$
Angles of any magnitude	1	Investigating graphs of the sine, cosine and tangent functions for angles of any magnitude, including negative angles	• investigate graphs of the sine, cosine and tangent functions for angles of any magnitude, including negative angles
	2	Using the unit circle or graphs of trigonometric functions to establish and use the following relationships for obtuse angles, where $0° \leq A \leq 90°$: $\sin A = \sin(180° - A)$	• use the unit circle or graphs of trigonometric functions to establish and use the following relationships for obtuse angles, where $0° \leq A \leq 90°$: $\sin A = \sin(180° - A)$
	3	Using the unit circle or graphs of trigonometric functions to establish and use the following relationships for obtuse angles, where $0° \leq A \leq 90°$: $\cos A = -\cos(180° - A)$	• use the unit circle or graphs of trigonometric functions to establish and use the following relationships for obtuse angles, where $0° \leq A \leq 90°$: $\cos A = -\cos(180° - A)$
	4	Using the unit circle or graphs of trigonometric functions to establish and use the following relationships for obtuse angles, where $0° \leq A \leq 90°$: $\tan A = -\tan(180° - A)$	• use the unit circle or graphs of trigonometric functions to establish and use the following relationships for obtuse angles, where $0° \leq A \leq 90°$: $\tan A = -\tan(180° - A)$
	5	Solving problems using the angles of any magnitude identities	• solve problems using the angles of any magnitude identities
Angle of inclination of a line and its gradient	1	Determining the angle of inclination, θ, of a line on the Cartesian plane by establishing and using the relationship $m = \tan\theta$ where m is the gradient of the line (for $0 < m < 1$)	• determine the angle of inclination, θ, of a line on the Cartesian plane by establishing and using the relationship $m = \tan\theta$ where m is the gradient of the line
	2	Determining the angle of inclination, θ, of a line on the Cartesian plane by establishing and using the relationship $m = \tan\theta$ where m is the gradient of the line (for $-1 < m < 0$)	• determine the angle of inclination, θ, of a line on the Cartesian plane by establishing and using the relationship $m = \tan\theta$ where m is the gradient of the line

Learning Journey	Step	Content	Description
	3	Determining the gradient, m, of a line on the Cartesian plane by establishing and using the relationship m = tanθ where θ is the angle of inclination of the line	• determine the gradient, m, of a line on the Cartesian plane by establishing and using the relationship m = tanθ where θ is the angle of inclination of the line
	4	Combination of previous content	• Combination of previous details

Solve simple trigonometric equations (ACMMG275)			
Quest: Solve simple trigonometric equations			
Learning Journey	Step	Content	Description
Solving simple trigonometric equations	1	Finding the exact values of trigonometric ratios	• construct triangles in order to obtain exact trigonometric ratios for 0°, 30°, 45°, 60°
			• find the exact value for sine ratio for angles 0°, 30°, 45°, 60°
			• find the exact value for cosine ratio for angles 0°, 30°, 45°, 60°
			• find the exact value for tangent ratio for angles 0°, 30°, 45°, 60°
	2	Solving problems using the exact trigonometric ratios	• solve problems using the of trigonometric ratios leaving in exact form where necessary
	3	Deriving relationships between sine and cosine ratios of complementary angles in right-angled triangles (using θ)	• use complementary angle relationships to solve problems
	4	Solving trigonometric equations involving exact ratios and complementary angles giving all possible solutions	• solve trigonometric equations involving exact ratios and complementary angles giving all possible solutions

Establish the sine, cosine and area rules for any triangle and solve related problems (ACMMG273)			
Quest: Trigonometry: non right-angled triangles			
Learning Journey	Step	Content	Description
Sine rule	1	Applying the sine rule	• identify relevant information on a triangle for input into the sine rule
	2	Finding an unknown side using the sine rule	• apply the sine rule as a formula isolating the lower case pronumeral (side length)
			• find the missing side on a triangle using the sine rule given its corresponding angle and another side and angle that are corresponding
	3	Finding an unknown angle using the sine rule	• apply the sine rule as a formula isolating the upper case pronumeral (angle)
			• find the missing angle on a triangle using the sine rule given its corresponding side and another side and angle that are corresponding. Include the ambiguous case

Learning Journey	Step	Content	Description
	4	Solving problems using the sine rule	• solve problems in context using the sine rule
Cosine rule	1	Applying the cosine rule	• apply the cosine rule as a formula isolating the lower case pronumeral (side length)
			• apply the cosine rule as a formula isolating the upper case pronumeral (angle)
			• rearrange cosine rule to make different pronumerals the subject
	2	Using the cosine rule to find a missing side	• find the missing side on a triangle using the cosine rule given its corresponding angle and the other 2 sides
	3	Using the cosine rule to find a missing angle	• find the missing angle on a triangle using the cosine rule given the 3 sides of the triangle
	4	Solving problems using the cosine rule	• solve problems in context using the cosine rule in order to extend the knowledge of the cosine rule
Area rule	1	Applying the area of a triangle rule	• apply the area of a triangle rule as a formula isolating the lower case pronumeral (side length)
			• apply the area of a triangle rule as a formula isolating the upper case pronumeral (angle)
			• rearrange the area of a triangle rule to make different pronumerals the subject
	2	Using the area of a triangle rule to find the area of a triangle	• find the area of a triangle using the area of a triangle rule given 2 sides and the included angle
	3	Using the area of a triangle rule to find a missing side	• find the missing side on a triangle using the area of a triangle rule given the other 3 variables
	4	Using the area of a triangle rule to find a missing angle	• find the missing angle in a triangle using the area of a triangle rule given the other 3 variables
	5	Using the area of a triangle rule to solve problems	• solve problems in context using the area of a triangle rule in order to extend the knowledge of the area of a triangle rule
Solving problems in non-right angled triangles	1	Solving a variety of two-dimensional problems involving the sine, cosine and area of a triangle rules of different orientation	• solve a variety of two-dimensional problems involving the sine, cosine and area of a triangle rules of different orientation
	2	Solving a variety of three-dimensional problems involving the sine, cosine and area of a triangle rules of different orientation	• solve a variety of three-dimensional problems involving the sine, cosine and area of a triangle rules of different orientation

8.4 Properties of geometrical figures

MA5.3-16MG Proves triangles are similar, and uses formal geometric reasoning to establish properties of triangles and quadrilaterals

Apply logical reasoning, including the use of congruence and similarity, to proofs and numerical exercises involving plane shapes (ACMMG244)			
Quest: Scale factors with similar figures			
Learning Journey	Step	Content	Description
Area & volume scale factors	1	Establishing the relationship between linear and area scale factors (ratio)	• compare the areas of similar shapes, where the original shape has been enlarged by a given scale factor
			• understand and use the connection between the linear scale factor and the area scale factor to calculate the area of the enlarged shape, given the area of the original shape and the scale factor
			• understand and use the connection between the linear scale factor and the area scale factor to calculate the length of a missing side when the area and the related side length are known
	2	Solving problems in similar figures using area ratios	• solve problems in similar figures using the knowledge of the ratio of corresponding sides and their areas
	3	Establishing the relationship between linear and volume scale factors (ratio)	• compare the volumes of similar shapes, where the original shape has been enlarged by a given scale factor
			• understand and use the connection between the linear scale factor and the volume scale factor to calculate the volume of the enlarged shape, given the volume of the original shape and the scale factor
			• understand and use the connection between the linear scale factor and the volume scale factor to calculate the length of a missing side when the volume and the related side length are known
	4	Solving problems in similar figures using volume ratios	• solve problems in similar figures using the knowledge of the ratio of corresponding sides and their volumes
Quest: Solve problems using geometric reasoning			
Solving problems using geometric reasoning	1	Proving and applying theorems to triangles	• prove and apply that the exterior angle of a triangle is equal to the sum of the 2 interior opposite angles
	2	Solving problems involving similarity ratios and areas and volumes	• solve problems involving similarity ratios and areas and volumes

Learning Journey	Step	Content	Description
	3	Applying theorems and properties related to triangles and quadrilaterals in order to solve problems, giving reasons for each step	• apply theorems and properties related to triangles and quadrilaterals in order to solve problems, giving reasons for each step. Find both missing angles and/or missing sides.
	4	Applying tests for quadrilaterals	• apply tests for quadrilaterals

8.5 Circle geometry

MA5.3-17MG Applies deductive reasoning to prove circle theorems and to solve related problems

Prove and apply angle and chord properties of circles (ACMMG272)			
Quest: Properties of circles			
Learning Journey	Step	Content	Description
Circle terminology	1	Identifying and naming the primary parts of the circle	• identify and name parts of a circle (centre, radius, diameter, circumference, sector, arc, tangents, semicircle)
		Understanding the use of the terms 'major' and 'minor' within the context of circles	• understand the terms 'major sector' and 'minor sector'
			• understand the terms 'major arc' and 'minor arc'
			• understand the terms 'major segment' and 'minor segment'
	2	Identifying and naming further parts of the circle	• identify and name parts of a circle (chord, secant, segment)
		Using terminology associated with angles in circles	• use terminology associated with angles in circles
		Identifying the arc on which an angle at the centre or circumference stands	• identify the arc on which an angle at the centre or circumference stands
Circle properties: tangents	1	Understanding and demonstrating that at any point on a circle there is a unique tangent to the circle	• understand and demonstrate that at any point on a circle there is a unique tangent to the circle
	2	Understanding and demonstrating that a tangent is perpendicular to the radius at the point of contact	• understand and demonstrate that a tangent is perpendicular to the radius at the point of contact
Circle properties: equal radii	1	Applying the property that all radii on a circle are equal in length	• apply the property that all radii on a circle are equal in length including the implication that any triangle formed with 2 radii will be isosceles to solve problems
	2	Using the property that all radii on a circle are equal in length to find the length of a chord given the angle at the centre (angle in degrees)	• use the property that all radii on a circle are equal in length to find the length of a chord given the angle at the centre (angle in degrees)
	3	Using the property that all radii on a circle are equal in length to find the area of the isosceles triangle given the angle at the centre (angle in degrees)	• use the property that all radii on a circle are equal in length to find the area of the isosceles triangle given the angle at the centre (angle in degrees)

Learning Journey	Step	Content	Description
	4	Using the property that all radii on a circle are equal in length to find the area of the minor segment given the angle at the centre (angle in degrees)	• use the property that all radii on a circle are equal in length to derive the formula for the area of the minor segment given the angle at the centre
			• use the property that all radii on a circle are equal in length to find the area of the minor segment given the angle at the centre
		Using the area of the minor segment, find the area of the major segment	• use the area of the minor segment find the area of the major segment
	5	Combination of previous content	• Combination of previous details
Circle properties: chord properties	1	Proving and applying the property that chords of equal length in a circle subtend equal angles at the centre and are equidistant from the centre	• apply the property that chords of equal length in a circle are equidistant from the centre to solve problems
	2	Proving and applying the property that a perpendicular from the centre of a circle to a chord bisects the chord and that conversely, the line from the centre of a circle to the midpoint of a chord is perpendicular to the chord	• apply the property that a perpendicular from the centre of a circle to a chord bisects the chord and that conversely, the line from the centre of a circle to the midpoint of a chord is perpendicular to the chord to solve problems
		Proving and applying the property that the perpendicular bisector of a chord of a circle passes through the centre	• apply the property that the perpendicular bisector of a chord of a circle passes through the centre to solve problems
	3	Proving and applying the property that given any 3 non-collinear points, the point of intersection of the perpendicular bisectors of any 2 sides of the triangle, formed by the 3 points, is the centre of the circle through all 3 points	• apply the property that given any 3 non-collinear points, the point of intersection of the perpendicular bisectors of any 2 sides of the triangle, formed by the 3 points, is the centre of the circle through all 3 points to solve problems
	4	Proving and applying the property that when 2 circles intersect, the line joining their centres bisects their common chord at right angles	• apply the property that when 2 circles intersect, the line joining their centres bisects their common chord at right angles to solve problems
	5	Combination of previous content	• Combination of previous details
Circle properties: angle in a semicircle property	1	Proving and applying the property that the angle in a semicircle is a right angle	• apply the property that the angle in a semicircle is a right angle to solve problems involving the value of unknown angles
		Applying the property that the angle in a semicircle is a right angle involving Pythagoras' theorem	• apply the property that the angle in a semicircle is a right angle involving Pythagoras' theorem to find an unknown diameter length (Pythagoras' theorem finding the hypotenuse)

Learning Journey	Step	Content	Description
			• apply the property that the angle in a semicircle is a right angle involving Pythagoras' theorem to find an unknown chord length (Pythagoras' theorem finding a shorter side)
	2	Applying the property that the angle in a semicircle is a right angle involving trigonometric ratios	• apply the property that the angle in a semicircle is a right angle involving trigonometric ratios to find an unknown diameter length
			• apply the property that the angle in a semicircle is a right angle involving trigonometric ratios to find an unknown chord length
			• apply the property that the angle in a semicircle is a right angle involving trigonometric ratios to find an unknown angle
	3	Applying the property that the angle in a semicircle is a right angle to find the area of a triangle	• apply the property that the angle in a semicircle is a right angle to find the area of a triangle
	4	Applying the property that the angle in a semicircle is a right angle to find the area of a triangle in order to find the area of the segment	• apply the property that the angle in a semicircle is a right angle to find the area of a triangle in order to find the area of the minor segment
			• apply the property that the angle in a semicircle is a right angle to find the area of a triangle in order to find the area of the minor segment in order to find the major segment
	5	Combination of previous content	• Combination of previous details
Circle properties: angle properties	1	Proving and applying the property that the angle at the centre of a circle is twice the angle at the circumference standing on the same arc	• apply the property that the angle at the centre of a circle is twice the angle at the circumference standing on the same arc to solve problems
	2	Proving and applying the property that angles at the circumference, standing on the same arc, are equal	• apply the property that angles at the circumference, standing on the same arc, are equal to solve problems
	3	Proving and applying the property that the opposite angles of cyclic quadrilaterals are supplementary	• apply the property that the opposite angles of cyclic quadrilaterals are supplementary to solve problems
	4	Proving and applying the property that an exterior angle at a vertex of a cyclic quadrilateral is equal to the interior opposite angle	• apply the property that an exterior angle at a vertex of a cyclic quadrilateral is equal to the interior opposite angle to solve problems
	5	Combination of previous content	• Combination of previous details

Learning Journey	Step	Content	Description
Circle properties: solve problems using properties	1	Applying chord properties of circles to find unknown angles, lengths and areas in diagrams	• apply chord properties of circles to find unknown angles, lengths and areas in diagrams
	2	Applying angle properties of circles to find unknown angles, lengths and areas in diagrams	• apply angle properties of circles to find unknown angles, lengths and areas in diagrams
	3	Combination of previous content	• Combination of previous details

9 Statistics and Probability

9.1 Single variable data analysis

MA5.3-18SP Uses standard deviation to analyse data

Calculate and interpret the mean and standard deviation of data and use these to compare data sets (ACMSP278)			
Quest: Mean & standard deviation			
Learning Journey	Step	Content	Description
Using the mean & standard deviation of data sets	1	Defining standard deviation and the percentiles they represent	• define standard deviation and the percentiles they represent
	2	Finding the standard deviation of a set of data using digital technologies	• find the standard deviation of a set of data using digital technologies
	3	Investigating and describing the effect, if any, on the standard deviation of adding a data value to the set of data	• investigate and describe the effect, if any, on the standard deviation of adding a data value to the set of data
		Investigating and describing the effect, if any, on the standard deviation of altering all of the data values in the set of data by operations such as doubling all data values or adding a constant to all data values	• investigate and describe the effect, if any, on the standard deviation of altering all of the data values in the set of data by operations such as doubling all data values or adding a constant to all data values
		Estimating population percentages of a data set using its mean and standard deviation	• estimate population percentages of a data set using its mean and standard deviation (assuming the population fits a normal distribution)
	4	Fitting a data set to a normal distribution using its mean and standard deviation	• fit a data set to a normal distribution using its mean and standard deviation
	5	Estimating areas under the normal curve using calculators and tables	• estimate areas under the normal curve using calculators and tables
Comparing data using mean & standard deviation	1	Comparing 2 sets of data by using the mean and standard deviation	• compare 2 sets of data by using the mean and standard deviation
	2	Comparing and describing the spread of sets of data with the same mean but different standard deviations	• compare and describe the spread of sets of data with the same mean but different standard deviations
	3	Comparing and describing the spread of sets of data with different means by referring to standard deviation	• compare and describe the spread of sets of data with different means by referring to standard deviation

9.2 Bivariate data analysis

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

Use information technologies to investigate bivariate numerical data sets. Where appropriate use a straight line to describe the relationship allowing for variation (ACMSP279)			
Quest: Bivariate data & lines of best fit			
Learning Journey	Step	Content	Description
Bivariate data & lines of best fit	1	Constructing a line of best fit for bivariate numerical data using digital technologies, such as a spreadsheet	• construct a line of best fit for bivariate numerical data using digital technologies, such as a spreadsheet
	2	Predicting what might happen between known data values and predicting what might happen beyond known data values using lines of best fit	• predict what might happen between known data values (interpolation) and predict what might happen beyond known data values using lines of best fit

Investigate reports of studies in digital media and elsewhere for information on their planning and implementation (ACMSP277)			
Quest: Critical analysis of data in the media			
Learning Journey	Step	Content	Description
Critical analysis of data in the media	1	Investigating the appropriateness of sampling methods and sample size used in reports where statements about a population are based on a sample	• investigate the appropriateness of sampling methods and sample size used in reports where statements about a population are based on a sample
		Determining whether a sample used enables inferences or conclusions to be drawn about the relevant population	• determine whether a sample used enables inferences or conclusions to be drawn about the relevant population
	2	Evaluating whether graphs in a report could mislead, and whether graphs and numerical information support the claims	• evaluate whether graphs in a report could mislead, and whether graphs and numerical information support the claims

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