



MATHS Y11 - CURRICULUM PLANNING SEQUENCE

Subject	Year	Term	NUMBER	ALGEBRA	RATIO AND PROPORTION	SHAPE AND SPACE	DATA - PROBABILITY	DATA - STATISTICS
Maths	Year 11	Term 1 - 56hrs	# # #	Estimate the gradient of a curved graph by drawing a tangent, and interpret the result in different contexts.	Distinguish between instantaneous rate of change (gradient of tangent) and average rate of change (gradient of chord), and interpret the result (e.g. in terms of velocity or acceleration, or in a financial context).	Use the standard circle theorems to prove results in geometry.		
				Estimate the area under a graph, using the trapezium rule or other approximation method, and interpret the result (e.g. distance travelled).	Solve problems involving growth and decay, including compound interest.	Use the sine and cosine rules to calculate lengths and angles in 2D.		
				Understand and interpret the equation of a circle with its centre at the origin.		Use vectors to prove results to geometry.		
				Work out the equation of the tangent to a circle at any given point.				
				For any function $f(x)$, sketch and interpret the graphs of $y = f(x - a)$, $y = f(x) + a$, $y = -f(x)$ and $y = f(-x)$.				
				Use iteration to solve equations to a given degree of accuracy.				
		Work with sequences defined by an iterative formula.						
		Work out the upper and lower bounds of multi-stage calculations, where the numbers involved are expressed to a known degree of accuracy.	Understand the 'composition' of two functions to make a third function.	Use numerical, algebraic or graphical methods to solve problems involving more complex forms of proportion (e.g. P proportional to $1/Q$).	Know and derive the standard circle theorems and use them to work out angles between radii, chords and tangents.			
		Appreciate that the set of integers is a subset of the set of rational numbers, which is a subset of the set of real numbers.	Work out the inverse function $f^{-1}(x)$ for any given function $f(x)$.	Inversely proportional to Q^2 .	Use the sine and cosine rules to calculate lengths and angles in 2D.			
		Understand the concept of an irrational number.	Manipulate and simplify expressions involving the addition, subtraction, multiplication and division of algebraic fractions.	Understand and use the formulae $\frac{1}{2}ab \sin C$ to calculate the area of a triangle.	Understand and use the formulae $\frac{1}{2}ab \sin C$ to calculate the area of a triangle.			
		Plot or sketch the graphs of $y = \sin x$, $y = \cos x$, and $y = \tan x$, where x is measured in degrees.						
		Convert any fraction into a decimal, with or without a calculator.	Recognise geometric sequences whose common ratio is positive, and work out an expression for the n th term.	Use straight-edge and compasses to construct angles of 30° , 45° and 60° .	Calculate lengths and angles in 3D shapes by identifying right-angled triangles.	Understand and calculate frequency density, and draw and interpret histograms with unequal class widths.		
Express any simple recurring decimal as a fraction in its simplest form.	Manipulate algebraic expressions involving surds.							
Rationalise the denominator of any fraction where the denominator is expressed in terms of surds.	Express quadratic functions in the form $(x + a)^2 + b$.	Solve problems using the ratio of areas and volumes of similar shapes in 2D and 3D.	Know the formal conditions for triangles to be congruent, and use them in conditional proofs.					
Calculate with a range of expressions involving surds.	Solve quadratic equations by completing the square.							
Appreciate the infinite nature of the set of rational numbers (e.g. that there are an infinite number of rationals between any two rationals).	Solve quadratic equations by using the quadratic formula.							
Express surds as multiples of simpler surds (for example, $\sqrt{18} = 3\sqrt{2}$).	Simplify algebraic fractions by cancelling common factors.							
Understand the relationship between negative indices and roots.	Understand the effect of translating the graph of a quadratic function, or reflecting it in the coordinate axes, on its equation.							
Work out the co-ordinates of the turning point of the graph of a quadratic function.								
Understand the uniqueness of prime decomposition, and use it to solve problems (including working out HCFs and LCMs).	Work out an expression for the area of a quadratic sequence.	Understand sin, cos and tan as the ratios of sides of right-angled triangles, and the link with similar triangles.	Work with combinations of transformations in 2D, knowing the properties that are invariant and those that are not.	Use Venn diagrams and two-way tables, along with expected frequencies, to work out conditional probabilities.	Use a range of information, including measures of central tendency, measures of spread, consideration of outliers and graphical representations (including box plots), to describe a population and compare distributions.			
Express the infinite nature of the set of rational numbers (e.g. that there are an infinite number of rationals between any two rationals).	Work with sequences which involve surds.	Solve problems of direct and inverse proportion by forming and solving an equation.	Enlarge shapes by a negative scale factor from a centre of enlargement, with or without a co-ordinates grid.	Calculate the probability of two or more combined events in a wide range of contexts.	Understand and use the addition law in the form $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.			
Express surds as multiples of simpler surds (for example, $\sqrt{18} = 3\sqrt{2}$).	Change the subject of an equation or formula, where the new subject appears twice.							
Manipulate and simplify expressions involving surds.	Factorise quadratic expressions of the form $ax^2 + bx + c$.							
Understand the relationship between negative indices and roots.	Solve quadratic equations of the form $ax^2 + bx + c = 0$ by factorisation, including those which require rearrangement.							
Work out the upper and lower bounds of calculations involving a single operation, where the numbers involved are expressed to a known degree of accuracy.	Find the solution of two simultaneous equations, one of which is linear and the other quadratic.							
Use a graph to find approximate solutions to simultaneous equations, one of which is quadratic.	Use a graph to find approximate solutions to simultaneous equations, one of which is quadratic.							
Solve quadratic inequalities in one variable, expressing the solution on a number line or using set notation.	Solve quadratic inequalities in one variable, expressing the solution on a number line or using set notation.							
Use the x or y planes to represent the solution to one or more inequalities in two variables.	Identify perpendicular lines, given their equations, rearranging them into gradient-intercept form where necessary.							
Plot exponential graphs, including those arising from a given context, and interpret the key features.	Plot exponential graphs, including those arising from a given context, and interpret the key features.							
Prove results using algebra.								
Know how to add, subtract, multiply and divide numbers expressed in standard form, without a calculator.	Recognise simple quadratic sequences and find a general expression for the n th term by inspection.	Appreciate that the gradient represents the rate of change of a function, and apply this in context where required.	Work out the volume and surface area of spheres, pyramids, cylinders, cones and composite 3D shapes.	Understand the idea of 'independent' events, and use the multiplication law to calculate the probability of a succession of independent events.	Use and understand terminology relating to samples and populations.			

Term 1 - 56hrs

Term 2 - 46hrs

NUMBER	ALGEBRA	RATIO AND PROPORTION	SHAPE AND SPACE	DATA - PROBABILITY	DATA - STATISTICS
Understand the reciprocal function and its use in evaluating numerical expressions.	Manipulate and simplify the product of two binomial expressions.	Understand and use the relationship between fractions and ratios.	Use Pythagoras' Theorem to calculate lengths in right-angled triangles in 2D.	Use relative frequency to estimate probability where theoretical probabilities cannot be calculated.	Draw lines of best fit on scatter diagrams, know how to use them to make predictions, and when it is valid to do so, and know that correlation does not imply cause.
Appreciate that there are an infinite number of integers.	Understand the laws of indices and simplify expressions involving powers.	Perform calculations relating to distance, speed and time, using standard units (e.g. mph, litres per hour, metres per second).	Solve problems involving the area of bearings.	Appreciate the relative frequency distributions appropriate to the number of trials increases.	Work with time series data and their associated line graphs.
Understand the rationale behind standard index form, and how it can be used to express and compare large and small numbers.	Manipulate and simplify a wide range of expressions involving terms, products and differences, including simple examples involving surds.	Use numerical methods to solve problems involving inverse proportion.	Calculate the area of a circle and simple fractions of a circle, representing the answer in terms of π when required.	Calculate the mean of a frequency distribution for grouped or ungrouped data, and identify the modal class.	
Use approximations to estimate answers to calculations involving one operation (for example, $31.8 \times 0.023 \approx 32 \times 0.02 = 1.5$).	Solve linear equations with integer coefficients where the unknown appears on both sides of the equation.	Solve simple problems involving compound interest and depreciation.	Calculate the area of trapeziums and compound plane shapes.		
Recognise arithmetic sequences and know how to find an expression for the n th term.	Recognise and use Fibonacci sequences.	Work out the sum of the interior and exterior angles in any polygon, and deduce angle facts about regular polygons.	Use diagrams, corresponding and supplementary angles to solve problems involving parallel lines.		
Draw graphs of simple linear functions, expressed in the form $y = mx + c$ or $ax + by = c$.	Draw and interpret graphs arising from real-life situations, such as distance-time graphs.	Construct the perpendicular bisector of two points and bisect a given angle, using straight edge and compass only.	Work out the area of cylinders and of prisms with more complex cross sections (e.g. compound shapes).		
Convert fluently, without a calculator, between terminating decimals and fractions (for example, $2.24 = 2 \frac{3}{25}$).	Understand how sequences can be generated from a term-to-term rule.	Convert fluently between standard units (e.g. m and cm, tons and millitons, hours and minutes).	Use and understand 3D representations of 3D shapes, including planes and elevations.	List the equally likely, mutually exclusive outcomes of a combination of events using a tree diagram or sample space diagram and use them to calculate probabilities.	Construct and interpret pie charts.
Round to a degree of accuracy appropriate to the context, using significant figures.	Recognise the sequence of squares, square and cube numbers.	Interpret and work with scale diagrams and maps.	Relate, create and translate shapes on a Cartesian grid (including the use of vector notation).	Construct and interpret scatter diagrams and use them to help describe the correlation, if any, between two quantities.	Construct and interpret scatter diagrams and use them to help describe the correlation, if any, between two quantities.
Estimate powers and roots of positive numbers.	Simplify expressions by reflecting like terms.	Understand and use simple scale factors to draw similar shapes.	Use a given positive integer scale factor to draw similar shapes on a square grid.	Understand the meaning of the terms 'vector' and use it appropriately in describing distributions.	
Express any fraction into a decimal, with or without a calculator.	Multiply a bracket by a single term, realising that the resulting expression is equivalent.	Understand and use the word 'factor' in the context of algebra, and factorise expressions by taking out a 'common factor'.	Understand and use ratios to describe unequal sharing in a variety of contexts, using part:part or part:whole form as appropriate.		
Express any simple recurring decimal as a fraction in its simplest form.	Understand and use the word 'factor' in the context of algebra, and factorise expressions by taking out a 'common factor'.	Use 'function machines' as a means of representing simple operations.	Express one quantity as a fraction of another, where the fraction is greater than 1.		
Rationalise the denominator of any fraction where the denominator is expressed in terms of surds.	Understand the idea of an 'equation', and solve linear equations in one variable where the unknown appears once only.	Understand the idea of an 'equation', and solve linear equations in one variable where the unknown appears once only.	Express any percentage change as a fraction, decimal or percentage (for example, a 40% increase can be expressed using $\frac{2}{5}$, 0.4 or 75%).		
Calculate with a range of expressions involving surds.	Understand the effect of translating the graph of a quadratic function, or reflecting it in the coordinate axes, on its equation.	Understand the effect of translating the graph of a quadratic function, or reflecting it in the coordinate axes, on its equation.	Express a quantity by a fraction or percentage, with or without a calculator as appropriate.		
Appreciate the infinite nature of the set of rational numbers (e.g. that there are an infinite number of rationals between any two rationals).	Work with sequences which involve surds.	Solve problems of direct and inverse proportion by forming and solving an equation.	Solve problems involving simple interest.		
Express surds as multiples of simpler surds (for example, $\sqrt{18} = 3\sqrt{2}$).	Change the subject of an equation or formula, where the new subject appears twice.		Use numerical methods to solve problems involving proportion.		
Manipulate and simplify expressions involving surds.	Factorise quadratic expressions of the form $ax^2 + bx + c$.				
Understand the relationship between negative indices and roots.	Solve quadratic equations of the form $ax^2 + bx + c = 0$ by factorisation, including those which require rearrangement.				
Work out the upper and lower bounds of calculations involving a single operation, where the numbers involved are expressed to a known degree of accuracy.	Find the solution of two simultaneous equations, one of which is linear and the other quadratic.				
Use a graph to find approximate solutions to simultaneous equations, one of which is quadratic.	Use a graph to find approximate solutions to simultaneous equations, one of which is quadratic.				
Solve quadratic inequalities in one variable, expressing the solution on a number line or using set notation.	Solve quadratic inequalities in one variable, expressing the solution on a number line or using set notation.				
Use the x or y planes to represent the solution to one or more inequalities in two variables.	Identify perpendicular lines, given their equations, rearranging them into gradient-intercept form where necessary.				
Plot exponential graphs, including those arising from a given context, and interpret the key features.	Plot exponential graphs, including those arising from a given context, and interpret the key features.				
Prove results using algebra.					
Know how to add, subtract, multiply and divide numbers expressed in standard form, without a calculator.	Recognise simple quadratic sequences and find a general expression for the n th term by inspection.	Appreciate that the gradient represents the rate of change of a function, and apply this in context where required.	Work out the volume and surface area of spheres, pyramids, cylinders, cones and composite 3D shapes.	Understand the idea of 'independent' events, and use the multiplication law to calculate the probability of a succession of independent events.	Use and understand terminology relating to samples and populations.

Term 1 - 56hrs

Term 2 - 46hrs

<ul style="list-style-type: none"> Use a calculator to calculate with numbers in standard form, where the numbers are more difficult. 	<ul style="list-style-type: none"> Solve linear equations in one variable involving fractions. 	<ul style="list-style-type: none"> Work with the graphs of two quantities which are in direct proportion, and realise that there is a linear relationship between them. 	<ul style="list-style-type: none"> Calculate the length of a circular arc and the area of a sector. 	<ul style="list-style-type: none"> Understand and use the term 'mutually exclusive', and use the addition law to calculate the probability of a combination of mutually exclusive events. 	<ul style="list-style-type: none"> Understand the practicalities of sampling and the reliability of the results.
<ul style="list-style-type: none"> Use approximations to estimate answers to calculations involving more than one operation. 	<ul style="list-style-type: none"> Solve linear equations in one variable and represent the solution on a number line, using conventional symbols for the inequalities. 	<ul style="list-style-type: none"> Work with the graphs of two quantities which are in inverse proportion, and realise that there is a reciprocal relationship between them. 	<ul style="list-style-type: none"> Know the exact values of \sin, \cos and \tan θ for $\theta = 30^\circ, 45^\circ, 60^\circ$ and 90°. 	<ul style="list-style-type: none"> Use tree diagrams and other methods to calculate the probability of combined independent events. 	<ul style="list-style-type: none"> Work out the quartiles and interquartile range of a sample data set.
<ul style="list-style-type: none"> Understand the lower and upper bounds of numbers represented to a particular degree of accuracy (for example, if $x = 4.5$ to 1 d.p., this means that $4.45 \leq x < 4.55$). 	<ul style="list-style-type: none"> Find the solution of two linear simultaneous equations. 	<ul style="list-style-type: none"> Given the result of a percentage or fractional change, calculate the original value of the quantity. 	<ul style="list-style-type: none"> Recognise similar shapes, identify equal ratios and use these to solve problems. 	<ul style="list-style-type: none"> Use the multiplication law for dependent events, using the idea of conditional probability. 	<ul style="list-style-type: none"> Draw a cumulative frequency graph, and use it to work out the median, quartiles and interquartile range for continuous data.
	<ul style="list-style-type: none"> Interpret the solution of three simultaneous equations as the intersection of two straight lines. 	<ul style="list-style-type: none"> Use index notation to solve problems involving compound interest and depreciation. 	<ul style="list-style-type: none"> Use similar shapes to prove geometrical results, including Pythagoras' Theorem. 	<ul style="list-style-type: none"> Use tree diagrams to calculate the probability of combined dependent events. 	
	<ul style="list-style-type: none"> Factorise quadratic expressions of the form $x^2 + bx + c$ and $x^2 - a^2$. 	<ul style="list-style-type: none"> Solve problems involving compound units (e.g. density, cost per 100 grams). 	<ul style="list-style-type: none"> Use trigonometry to calculate lengths and angles in right-angled triangles in 2D. 		
			<ul style="list-style-type: none"> Realise that the shortest distance from a point to a given line is the perpendicular from that line to the point, and construct the perpendicular using straight-edge and compasses only. 		
	<ul style="list-style-type: none"> Change the subject of an equation or formula, where the new subject appears once. 		<ul style="list-style-type: none"> Enlarge shapes by a positive fractional scale factor from a centre of enlargement, with or without a co-ordinate grid. 		
	<ul style="list-style-type: none"> Use and understand the word 'identical', and prove whether algebraic expressions are identically equal. 		<ul style="list-style-type: none"> Understand the use of vectors to describe displacements. 		
	<ul style="list-style-type: none"> Work out the gradient of a straight line, and understand the equation $y = mx + c$ as the standard form of a straight line graph. 				
	<ul style="list-style-type: none"> Identify parallel lines, given their equations, rearranging them into gradient-intercept form where necessary. 				
	<ul style="list-style-type: none"> Work out the equation of a line, given two points on the line, or given its gradient and one point on the line. 				
	<ul style="list-style-type: none"> Plot the graph of a quadratic, cubic or reciprocal function, and locate and interpret the roots, intercepts and turning-point of a quadratic function. 				
	<ul style="list-style-type: none"> Distinguish between linear, quadratic, cubic and reciprocal graphs, and recognise the key features of these types of graph. 				
	<ul style="list-style-type: none"> Model a range of different situations algebraically, and use algebra to solve mathematically. 				
	<ul style="list-style-type: none"> Use graphs to solve problems set in a range of contexts, including kinematic problems involving speed and acceleration. 				

<ul style="list-style-type: none"> Compare and order positive and negative integers. 	<ul style="list-style-type: none"> Understand how algebraic notation works, including that used for multiplication and division, squaring and cubing, and brackets. 	<ul style="list-style-type: none"> Understand and use ratio as a means of describing patterns, rates, scales, as approximations. 	<ul style="list-style-type: none"> Understand and use the angle sum around a point, the angle sum at a point on a straight line, the angle sum in a triangle, and that vertically opposite angles are equal. 	<ul style="list-style-type: none"> Know the types of process which have random outcomes and understand the notion of fairness. 	<ul style="list-style-type: none"> Summarise information in tables, including grouping of data into frequency tables.
<ul style="list-style-type: none"> Compare and order decimals (positive and negative). 	<ul style="list-style-type: none"> Understand the equivalence between expressions such as $p + q = p + q$ and $4p$; and between $\frac{1}{2}a$ and $a/2$. 	<ul style="list-style-type: none"> Use the unitary method to solve simple problems of direct proportion. 	<ul style="list-style-type: none"> Understand and use standard vocabulary when describing angles: 'acute', 'obtuse', 'reflex', 'right angle'. 	<ul style="list-style-type: none"> Use the probability scale from 0 to 1, and use appropriate terminology connected with probability. 	<ul style="list-style-type: none"> Present grouped, ungrouped and categorical data in simple charts and diagrams, including bar charts, pie charts and vertical line charts.
<ul style="list-style-type: none"> Use and understand the vocabulary of multiples, factors and prime numbers. 	<ul style="list-style-type: none"> Work with co-ordinates, including those involving negative numbers. 	<ul style="list-style-type: none"> Understand the idea of percentages as hundredths, and their use in making comparisons. 	<ul style="list-style-type: none"> Measure and draw angles, including reflex angles, to the nearest degree. 	<ul style="list-style-type: none"> Distinguish between cases when outcomes are equally likely and those where they are not, and develop the notion of fairness. 	
<ul style="list-style-type: none"> Use common units of measurement in simple contexts (e.g. x and p, minutes and seconds, m and cm), including those involving decimals. 			<ul style="list-style-type: none"> Understand how to reflect shapes in a mirror line, and identify reflection symmetry. 	<ul style="list-style-type: none"> Use equally likely outcomes to determine the probability of an event as a fraction. 	
<ul style="list-style-type: none"> Know when it is appropriate to use a calculator, and how to use it accurately. 				<ul style="list-style-type: none"> Use the fact that the sum of probabilities of all possible outcomes of an event is 1. 	
<ul style="list-style-type: none"> Compare and order fractions (positive and negative). 					
<ul style="list-style-type: none"> Compare and order different fractions (positive and negative). 					
<ul style="list-style-type: none"> Understand the concept of equivalent fractions. 					
<ul style="list-style-type: none"> Appreciate the equivalence between percentages, fractions and decimals, and convert between them, using a calculator where necessary. 					