



Bede Academy

Mathematics Curriculum Map





Mathematics Curriculum Map

Mathematics provides universal language for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and cultivates curiosity. We want all students to master the subject as it is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment.

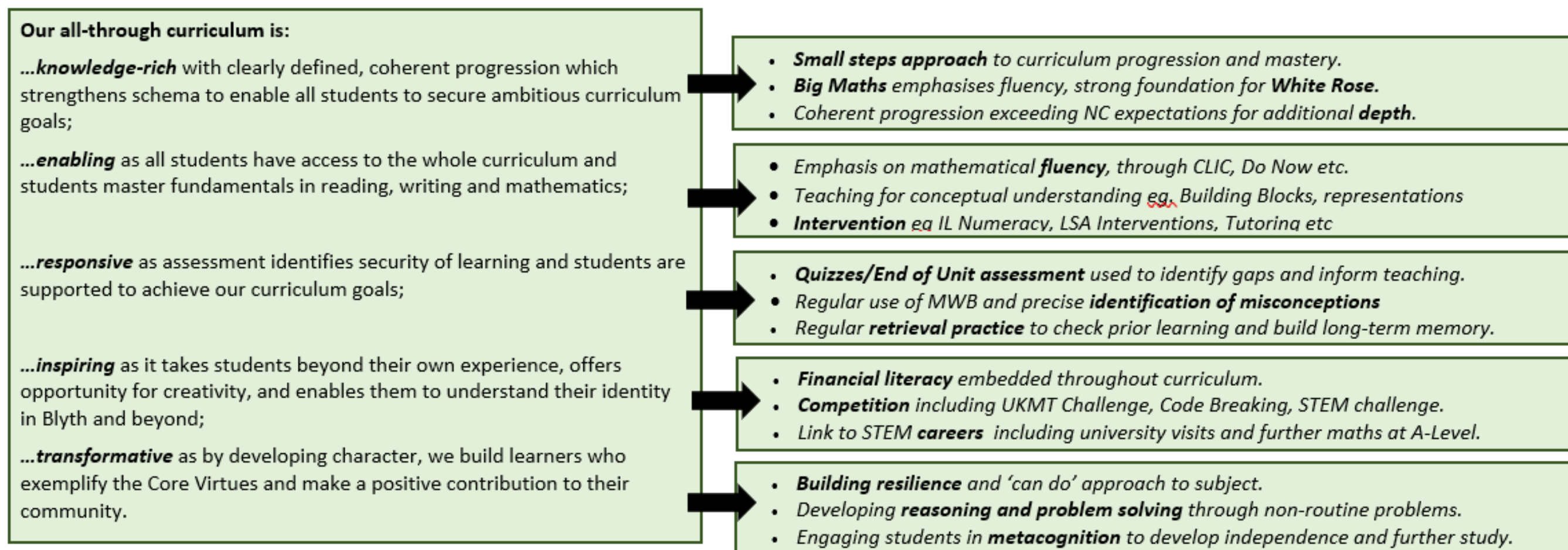
As we identify the key knowledge students should master in **mathematics**, we think carefully about *how* we want students to think as **mathematicians**. We want **all** students to:

- develop confidence **and fluency in the fundamentals of mathematics** so that **they develop conceptual understanding** and are therefore able to apply their mathematics to a variety of problems and unfamiliar contexts, as well as real life scenarios.
- **ask questions and reason mathematically** by following a line of enquiry and develop and present a justification, argument or proof using mathematical language. We want them to understand that there are often many different routes and methods to solving the same problem, but mathematicians look for the most efficient and accurate of these.
- experience the **satisfaction and enjoyment** that comes from studying mathematics. Recognised as one of the most challenging subjects, mathematics requires students to **‘think hard’**, maintain resilience and courage when faced with challenging concepts. Therefore the reward when we overcome a challenge, master a new skill or make a new connection which deepens our understanding is greatly satisfying.

The **mathematics** curriculum is sequenced around the following key concepts*:

Number	Algebra	Ratio, proportion and rates of change	Geometry	Probability	Statistics
Understand and represent number Calculations Understand fractions and decimals Percentages	Equivalence and Proof Solve Equations and Inequalities Linear Graphs Non-linear Graphs Sequences Understand Notation and Substitute	Multiplicative Relationships Ratio & Rates	Perimeter, Area and Volume Construct and Transform Geometric Figures Shape properties Angles Pythagoras and Trigonometry Geometrical Proof	Probability	Represent and Interpret Data Statistical Measures Bivariate Data

*additional key concepts introduced in advanced level study include *Calculus* and *Applied Mathematics*.





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Yr	Autumn 1				Autumn 2				Spring 1				Spring 2					Summer 1				Summer 2														
1	Place Value (within 10)				Addition and Subtraction (within 10)		Geometry: Shape	Consolidation	Place Value (within 20)				Addition and Subtraction (within 20)	Place Value (within 50)	Measurement: Length and Height	Measurement: Mass and Capacity	Multiplication and division	Fractions			Geometry: Position and direction	Place Value (within 100)			Money	Time	Consolidation									
2	Place Value				Addition and Subtraction			Geometry: Shape	Money			Multiplication and division		Measurement: Length and Height		Measurement: Mass, capacity, temperature	Fractions			Time		Statistics			Geometry: Position and direction			Consolidation								
3	Place Value			Addition and Subtraction			Multiplication and division		Multiplication and division			Length and perimeter		Fractions		Measurement: Mass and Capacity	Fractions		Money	Time			Geometry: Shape		Statistics		Consolidation									
4	Place Value			Addition and Subtraction		Area	Multiplication and division		Consolidation	Multiplication and division		Length and perimeter	Fractions		Decimals		Decimals	Money	Time	Consolidation	Geometry: Shape			Statistics	Geometry: Position and Direction											
5	Place Value			Addition and Subtraction	Multiplication and division		Fractions			Multiplication and division		Fractions	Decimals and percentages	Perimeter and area		Statistics	Geometry: Shape		Geometry: Position and Direction		Decimals			Negative numbers	Converting units		Volume									
6	Place Value	Addition and Subtraction, Multiplication and division			Fractions			Converting units		Ration	Algebra		Decimals	Fractions, decimals and percentages	Perimeter, area and volume	Statistics		Geometry: Shape		Geometry: Position and Direction	Investigation, consolidation and transition															
7	Sequences Algebraic Notation and Substitution Expressions and Equations					Place Value, Ordering and Rounding Four Operations Averages and Range Rounding and Estimation			Graphing Data Fractions, Decimals and Percentages			Directed Number Fractions and Percentages of Amounts Perimeter and Area			Speed, Distance and Time Properties of Number			Add and Subtract Fractions Angles and Polygons			Prime numbers and proof															
8	Ratio and Scale				Working in the Cartesian plane	Representing data		Tables and Probability		Brackets, equations and inequalities	Sequences	Indices		Fractions and percentages		Standard index form	Number sense		Angles in parallel lines and polygons		Area of trapezia and circles					Line symmetry and reflections		The data handling cycle	Measures of location							
9	Straight line graphs				Three-dimensional shapes		Construction and congruency		Numbers		Using percentages		Maths and money	Deduction	Rotation and translation		Pythagoras' Theorem		Enlargement and Similarity		Solving ratio and proportion problems		Rates		Probability	Algebraic representation										
10	Algebraic Manipulation Equations, Inequalities and Formulae Quadratic Expressions and Equations					Percentages Ratio and Scale Work with Fractions					Non-Calculator Methods Straight-Line Graphs Probability		Perimeter, Area and Volume Interpret and Represent Data Non-Linear Graphs			Angles Graphs and Diagrams Vectors						Manipulating expressions														
11	More Complex Percentages					Circles, Cylinders, Cones and Spheres	Forming and Solving Equations		Sequences		Plans and Elevations		Construction and Loci		Congruence/ Similarity		Pythagoras Revision and Trig		Vectors	Simultaneous Equations																
11	Surds		Sequences		Coordinate Geometry			Transformations		Simultaneous Equations (inc linear inequalities)			Direct/Inverse Proportion		Similarity in 2D and 3D	Graphs of Trig Functions		Further Trig	Cumulative Frequency, Boxplots and Histograms			Using Graphs of Circles, Cubes and Quadratics		Gradient and Area under Graphs	Circle Geometry - gradients/tangents		Circle Theorems	Algebraic Fractions		Functions	Algebraic Proof and Congruence		Vectors			
12	Algebraic Expressions	Quadratics	Equations and inequalities	Graphs and transformations	Straight Line Graphs	Algebraic Methods	Circles	The Binomial Expansion	Trigonometric Ratios		Trigonometric Identities and Equations	Differentiation	Exponentials and Logarithms	Integration	Data Collection	Vectors	Measures of Location and Spread		Statistical Distributions	Probability	SUVAT	Hypothesis Testing	Forces and Motion	Representation of Data	Correlation	Variable Acceleration	Algebraic Methods 2	Binomial Expansion 2	Radians	Functions and Graphs	Trigonometric Functions	Trigonometry and Modelling				
13	Functions and graphs		Sequences and Series			Algebraic Methods		Differentiation		Parametric Equations		Numerical Methods	Vectors	Integration		Regression, Correlation and Hypothesis Testing		Probability	The Normal Distribution	Moments	Forces and Friction	Projectiles		Applications of Forces	Further Kinematics	Revision			Final Exams							



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Early Years		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Nursery	Number Becoming familiar and joining in singing simple number rhymes and counting songs. Numerical Pattern To recognise numicon shapes and the number they represent Shape, Spatial Reasoning and Measure To recognise colours To begin to match objects which are the same To copy a simple AB pattern To sort items into groups To think about how they sort items	Number To subitise 1 and 2 To practise accurately counting 1 and 2 To recognise numerals 1 and 2 Numerical Pattern To recognise 1 object To recognise 2 in a range of dot arrangements To know that the amount stays the same even if objects are different sizes. To match numerals 1 and 2 to the correct amounts. To recognise 1 and 2 when represented in different ways Shape, Spatial Reasoning and Measure To describe an AB pattern To predict what comes next in an AB pattern To continue an AB pattern To notice and describe an ABC pattern To predict what comes next in an ABC pattern To sort objects that are 2 or 3 different colours	Number To subitise 3, 4, 5 To practise accurately counting 3, 4, 5 To recognise numerals 3, 4, 5 Numerical Pattern To recognise 3, 4, 5 objects To explore the composition of 3, 4, 5 To recognise 3, 4, 5 in a range of dot arrangements To know that the amount stays the same even if objects are different sizes. To match numerals 3, 4, 5 to the correct amounts. To recognise 3, 4, 5 when represented in different ways Shape, Spatial Reasoning and Measure To recognise triangles, squares, rectangles and pentagons To count the side of 2D shapes	Number To practise accurately counting up to 6 objects To recognise numerals and numbers in different contexts Numerical Pattern To explore the composition of 5 To become familiar with a tens frame To explore how 6 can be represented on a tens frame. Shape, Spatial Reasoning and Measure To compare heights of 2 objects To compare lengths of 3 objects To use the language tall, short, long, short To explore balance scales and investigate objects which are heavier or lighter. To explore capacity, noticing full and empty containers	Number To practise accurately counting up to 6 objects To recognise numerals and numbers in different contexts Numerical Pattern To see 2 groups and say which has more. To see 2 groups and say which has fewer. Shape, Spatial Reasoning and Measure To sequence pictures related to well known routines and stories. To explore positional language, on and under, in and out, in front or behind. To identify circles. To know some properties of a circle. To begin to identify cubes, cuboids, cylinders and spheres and talk about some of their properties.	Number To explore ways of making 5 To become familiar with a number line To begin to understand the number before and after To count verbally forwards and backwards up to 5, then 10 Numerical Pattern To begin to share out objects (up to 5) and say if they have enough for everyone. To match numeral cards to the correct quantity (1-5) To say which group has more or fewer Shape, Spatial Reasoning and Measure To describe patterns made up of 2D and 3D shapes.
	Reception	Number To recognise numbers 1-3 To begin to subitise to 3 To explore the composition of 2 and 3 To link the quantity to the spoken number name, corresponding number of fingers and the numeral. To distinguish quantities up to 3 from each other To explore different structural arrangements of numbers; five frame, ten frame To match the number to quantity (0-3) Numerical Pattern To say which group has more To say which group has less To compare quantities to 3 Shape, Spatial Reasoning and Measure Pattern To become familiar with elements of the daily routine, such as days of the week and class calendar To identify same and different, talking about a range of criteria To copy, continue and create their own simple repeating patterns To explore AB patterns in a range of contexts Measure To learn that objects can be compared and ordered according to height and length To use measuring language To use non standard measures (cooking) To compare and order objects according to height and length and use vocabulary to explain what they notice	Number To recognise numbers 0-5 To begin to subitise to 5 To explore the composition of 4 and 5 To link the 0-5 quantity to the spoken number name, corresponding number of fingers and the numeral. To distinguish quantities up to 5 from each other To explore different structural arrangements of numbers; five frame, ten frame To match the number to quantity (0-5) To count accurately, holding numbers when objects can't be seen Numerical Pattern To compare quantities to 5 To identify and calculate 1 more and 1 less To compare equal and unequal groups To count to 10 To count backwards from 10 To begin to identify doubles, and use the vocabulary of equal and unequal Shape, Spatial Reasoning and Measure Shape & Spatial Reasoning To begin to recognise 2D and 3D shapes in everyday items To explore different sizes and orientations of 2D shapes To explore similarities and differences between 3D shapes To sort 3D shapes according to what they notice To use positional language to describe where objects are in relation to other items Measure To make direct weight comparisons To use weight vocabulary To use non standard measures (cooking)	Number To recognise numbers 0-10 To subitise to 10 using structured arrangements To explore the composition of 6, 7, 8, 9 and 10 To link quantities 6-10 to spoken number names, corresponding number of fingers and the written numeral To match the number to quantity (0-10) To recognise when one quantity is greater than, less than or the same as another quantity. Numerical Pattern To match groups which are the same To identify and calculate 1 more and 1 less To combine two groups of objects Begin to become familiar with number bonds to 10 To order numbers to 10 To orally count to 20 and beyond. To count backwards from 20 Shape, Spatial Reasoning and Measure Measure To make direct weight/length/- height comparisons To use weight/length/ height vocabulary To order and compare items in accordance to weight/length/ height To use non standard measures (cooking) Shape & Spatial Reasoning To create simple maps to represent a journey- using positional language accurately	Number To recognise numbers 0-20 To visualise missing numbers from a set To explore quantities within numbers To visualise and recall number bonds to 10 To deepen understanding of the composition of 10 To explore different structural arrangements of numbers; five frame, ten frame To match the number to quantity (0-10) Numerical Pattern To orally count to 20 and beyond. To count backwards from 20 To begin to estimate amounts To take away objects and count how many are left To find the missing number Shape, Spatial Reasoning and Measure Shape & Spatial Reasoning To combine sets of shapes in different ways To provide opportunities to fit shapes together and break apart To construct their own 3D shapes in a variety of Pattern To explore patterns which use items more than once (ABB, AAB, AABB, AABBB)	Number To explore odd and even structures To explore how quantities can be distributed equally To explore quantities within numbers To explore different ways numbers can be represented, composed and decomposed Numerical Pattern To begin to understand the difference between odd and even numbers To count beyond 20 To add numbers To subtract numbers To find the missing number To order numbers to 20 To find the missing number in an addition and subtraction sentence problems To recognise doubles Shape, Spatial Reasoning and Measure Measure To continue to order and sequence important times in their days To recognise regular events that happen on the same day each week To use time vocabulary To describe significant events in their lives and talk about events they are looking forward to	Number To identify even and odd numbers and amounts To know double facts and use this to help solve problems/calculations Numerical Pattern To count beyond 30 (100). To know that 1, 3, 5, 7 and 9 are odd To know that 2, 4, 6, 8, 10 are even To double numbers up to 10 To find half of numbers up to 10 To share quantities equally To combine groups of 2s, 5s and 10s Shape, Spatial Reasoning and Measure Measure To make direct weight comparisons and make estimations To use weight vocabulary To order and compare items in accordance to weight Shape & Spatial Reasoning To understand shapes can be combined and separated to make new shapes To investigate different shapes within shapes To create maps to represent simple journey



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			To order and compare items in accordance to weight. To explore capacity To investigate capacity using different shape and sized containers To use capacity language				
	Early Learning Goals	ELG: Number Children at the expected level of development will: • Have a deep understanding of numbers to 10, including the composition of each number. • Subitise (recognise quantities without counting) up to 5. • Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts. ELG: Numerical Patterns Children at the expected level of development will: • Verbally count beyond 20, recognising the pattern of the counting system. • Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity. • Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally. There are no early learning goals that directly relate to shape, space and measure objectives. However, children will have experienced rich opportunities to develop their spatial reasoning skills in shape, space and measure					



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Year 1	Key Knowledge	Understand and represent number	Calculation	Understand Fractions and Decimals (including Percentage)
		Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number. Count, read and write numbers to 100 in numerals, count in different multiples including ones, twos, fives and tens. Given a number, identify one more and one less. Identify and represent numbers using concrete objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least. Read and write numbers from 1 to 20 in digits and words.	Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs. Represent and use number bonds and related subtraction facts within 20. Add and subtract one-digit and two-digit numbers to 20, including zero. Solve simple one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = [] – 9. Solve one-step problems involving multiplication and division, calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	Recognise, find and name a half as one of two equal parts of an object, shape or quantity. Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity
		Geometry	Measurement	
		Recognise and name common 2-D and 3-D shapes, including: 2-D shapes [for example, rectangles (including squares), circles and triangles] 3-D shapes [for example, cuboids (including cubes), pyramids and spheres] Describe position, direction and movement, including whole, half, quarter and three-quarter turns.	Compare, describe and solve practical problems for: - Lengths and heights [for example, long/short, longer/shorter, tall/short, double/half] - Mass/weight [for example, heavy/light, heavier than, lighter than] - Capacity and volume [for example, full/empty, more than, less than, half, half full, quarter] - Time [for example, quicker, slower, earlier, later] Measure and begin to record the following: lengths and heights; mass/weight; capacity and volume; time (hours, minutes, seconds). Recognise and know the value of different denominations of coins and notes. Sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening. Recognise and use language relating to dates, including days of the week, weeks, months and years. Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.	



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Year 2	Key Knowledge	Understand and represent number	Calculation	Understand Fractions and Decimals (including Percentage)
		Count in steps of 2, 3, and 5 from 0, and count in tens from any number, forward or backward. Recognise the place value of each digit in a two-digit number (tens, ones). Identify, represent and estimate numbers using different representations, including the number line. Compare and order numbers from 0 up to 100; use and = signs. Read and write numbers to at least 100 in numerals and in words. Use place value and number facts to solve problems.	Solve problems with addition and subtraction: - Using concrete objects and pictorial representations, including those involving numbers, quantities and measures - Applying their increasing knowledge of mental and written methods Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100. Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones, a two-digit number and tens, two two-digit numbers, adding three one-digit numbers. Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot. Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems. Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers. Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ($\times$), division ($\div$) and equals (=) signs. Recognise and use the inverse relationship between multiplication and division in calculations. Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot. Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.	Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity. Write simple fractions for example, $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$.
Year 2	Key Knowledge	Geometry	Measurement	Statistics
		Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line. Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces. Identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]. Compare and sort common 2-D and 3-D shapes and everyday objects. Order and arrange combinations of mathematical objects in patterns and sequences. Use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anticlockwise).	Choose and use appropriate standard units to estimate and measure: length/height in any direction (m/cm); mass (kg/g); temperature ($^{\circ}\text{C}$); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels. Compare and order: lengths, mass, volume/capacity and record the results using $>$, $<$ and $=$. Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value. Find different combinations of coins that equal the same amounts of money. Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change. Compare and sequence intervals of time. Tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times. Know the number of minutes in an hour and the number of hours in a day.	Interpret and construct simple pictograms, tally charts, block diagrams and simple tables. Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity. Ask and answer questions about totalling and comparing categorical data.



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Year 3	Key Knowledge	Understand and represent number	Calculation	Understand Fractions and Decimals (including Percentage)
		Count from 0 in multiples of 4, 8, 50 and 100; finding 10 or 100 more or less than a given number. Recognise the place value of each digit in a three-digit number (hundreds, tens, ones). Compare and order numbers up to 1000. Identify, represent and estimate numbers using different representations. Read and write numbers to at least 1000 in numerals and in words. Solve number problems and practical problems involving these ideas.	Add and subtract numbers mentally, including: - A three-digit number and ones - A three-digit number and tens - A three-digit number and hundreds Add and subtract numbers with up to three digits, using the efficient written methods of columnar addition and subtraction. Estimate the answer to a calculation and use inverse operations to check answers. Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction. Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables. Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one digit numbers, using mental and progressing to efficient written methods. Solve problems, including missing number problems, involving multiplication and division, including integer scaling problems and correspondence problems in which n objects are connected to m objects.	Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10. Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators. Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators. Recognise and show, using diagrams, equivalent fractions with small denominators. Add and subtract fractions with the same denominator within one whole, for example, $5/7 + 1/7 = 6/7$. Compare and order unit fractions, and fractions with the same denominators. Solve problems that involve all of the above.
		Geometry	Measurement	Statistics
		Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them. Recognise angles as a property of shape or a description of a turn. Identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle. Identify horizontal and vertical lines and pairs of perpendicular and parallel lines.	Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml). Measure the perimeter of simple 2-d shapes. Add and subtract amounts of money to give change, using both £ and p in practical contexts. Tell and write the time from an analogue clock, including using roman numerals from i to xii, and 12-hour and 24-hour clocks. Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight. Know the number of seconds in a minute and the number of days in each month, year and leap year. Compare durations of events [for example to calculate the time taken by particular events or tasks].	Interpret and present data using bar charts, pictograms and tables. Solve one-step and two-step questions [for example, ‘how many more?’ and ‘how many fewer?’] using information presented in scaled bar charts and pictograms and tables.



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Year 4	Key Knowledge	Understand and represent number	Calculation	Understand Fractions and Decimals (including Percentage)
		Count in multiples of 6, 7, 9, 25 and 1000. Find 1000 more or less than a given number. Count backwards through zero to include negative numbers. Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones). Order and compare numbers beyond 1000. Identify, represent and estimate numbers using different representations. Round any number to the nearest 10, 100 or 1000. Solve number and practical problems that involve all of the above and with increasingly large positive numbers. Read roman numerals to 100 (i to c) and understand how, over time, the numeral system changed to include the concept of zero and place value.	Add and subtract numbers with up to 4 digits using the efficient written methods of columnar addition and subtraction where appropriate. Estimate and use inverse operations to check answers to a calculation. Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why. Recall multiplication and division facts for multiplication tables up to 12 × 12. Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers. Recognise and use factor pairs and commutativity in mental calculations. Multiply two-digit and three-digit numbers by a one-digit number using formal written layout. Solve problems involving multiplying and adding, including using the distributive law and harder multiplication problems such as which n objects are connected to m objects.	Recognise and show, using diagrams, families of common equivalent fractions. Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten. Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including nonunit fractions where the answer is a whole number. Add and subtract fractions with the same denominator. Recognise and write decimal equivalents of any number of tenths or hundredths. Recognise and write decimal equivalents to ¼, ½, ¾. Find the effect of dividing a one- or twodigit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths. Round decimals with one decimal place to the nearest whole number. Compare numbers with the same number of decimal places up to two decimal places. Solve simple measure and money problems involving fractions and decimals to two decimal places.
		Geometry	Measurement	Statistics
		Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes. Identify acute and obtuse angles and compare and order angles up to two right angles by size. Identify lines of symmetry in 2-d shapes presented in different orientations. Complete a simple symmetric figure with respect to a specific line of symmetry. Describe positions on a 2-d grid as coordinates in the first quadrant. Describe movements between positions as translations of a given unit to the left/right and up/down. Plot specified points and draw sides to complete a given polygon.	Convert between different units of measure [for example, kilometre to metre; hour to minute. Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres. Find the area of rectilinear shapes by counting squares. Estimate, compare and calculate different measures, including money in pounds and pence. Read, write and convert time between analogue and digital 12- and 24-hour clocks. Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.	Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs. Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.



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Year 5	Key Knowledge	Understand and represent number	Calculation	Understand Fractions and Decimals (including Percentage)
		Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit. Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000. Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers through zero. Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000. Solve number problems and practical problems that involve all of the above. Read roman numerals to 1000 (m) and recognise years written in roman numerals.	Add and subtract whole numbers with more than 4 digits, including using efficient written methods (columnar addition and subtraction). Add and subtract numbers mentally with increasingly large numbers. Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy. Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. Identify multiples and factors, including finding all factor pairs. Solve problems involving multiplication and division where larger numbers are used by decomposing them into their factors. Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers. establish whether a number up to 100 is prime and recall prime numbers up to 19. Multiply numbers up to 4 digits by a one- or two-digit number using an efficient written method, including long multiplication for two-digit numbers. Multiply and divide numbers mentally drawing upon known facts. Divide numbers up to 4 digits by a one-digit number using the efficient written method of short division and interpret remainders appropriately for the context. Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000. Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3). Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.	Compare and order fractions whose denominators are all multiples of the same number. Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths. Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number, for example, $2/5 + 4/5 = 6/5 = 1 \frac{1}{5}$. Add and subtract fractions with the same denominator and denominators that are multiples of the same number. Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams. Read and write decimal numbers as fractions, for example, $0.71 = 71/100$. Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents. Round decimals with two decimal places to the nearest whole number and to one decimal place. Read, write, order and compare numbers with up to three decimal places. Solve problems involving number up to three decimal places. Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal. Solve problems which require knowing percentage and decimal equivalents of $1/2$, $1/4$, $1/5$, $2/5$, $4/5$ and those fractions with a denominator of a multiple of 10 or 25.
Year 5	Key Knowledge	Geometry	Measurement	Statistics
		Identify 3-D shapes, including cubes and other cuboids, from 2-D representations. Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles. Draw given angles, and measure them in degrees (o). Identify: - Angles at a point and one whole turn (total 360o) - Angles at a point on a straight line and $1/2$ a turn (total 180o) - Other multiples of 90o Use the properties of rectangles to deduce related facts and find missing lengths and angles. Distinguish between regular and irregular polygons based on reasoning about equal sides and angles. Identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.	Convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre). Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints. Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres. Calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes. Estimate volume [for example, using 1 cm³ blocks to build cuboids (including cubes)] and capacity [for example, using water]. Solve problems involving converting between units of time. Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.	Solve comparison, sum and difference problems using information presented in a line graph. Complete, read and interpret information in tables, including timetables.



Mathematics Curriculum Map

Year 6	Key Knowledge	Understand and represent number	Calculation	Understand Fractions and Decimals (including Percentage)
		Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit. Round any whole number to a required degree of accuracy. Use negative numbers in context and calculate intervals across zero. Solve number problems and practical problems that involve all of the above.	Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the efficient written method of long multiplication. Divide numbers up to 4 digits by a two-digit whole number using the efficient written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. Perform mental calculations, including with mixed operations and large numbers. Identify common factors, common multiples and prime numbers. Use their knowledge of the order of operations to carry out calculations involving the four operations. Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. Solve problems involving addition, subtraction, multiplication and division. Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.	Use common factors to simplify fractions; use common multiples to express fractions in the same denomination. Compare and order fractions, including fractions > 1 . Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions. Multiply simple pairs of proper fractions, writing the answer in its simplest form, for example, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$. Divide proper fractions by whole numbers, for example, $\frac{1}{3} \div 2 = \frac{1}{6}$. Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places. Multiply one-digit numbers with up to two decimal places by whole numbers. Use written division methods in cases where the answer has up to two decimal places. Solve problems which require answers to be rounded to specified degrees of accuracy. Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.
		Ratio, proportion and rates of change	Algebra	Measurement
		Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts. Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison. Solve problems involving similar shapes where the scale factor is known or can be found. Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.	Use simple formulae. Generate and describe linear number sequences. Express missing number problems algebraically. Find pairs of numbers that satisfy an equation with two unknowns. Enumerate possibilities of combinations of two variables.	Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate. Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places. Convert between miles and kilometres. Recognise that shapes with the same areas can have different perimeters and vice versa. Recognise when it is possible to use formulae for area and volume of shapes. Calculate the area of parallelograms and triangles. Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm ³) and cubic metres (m ³), and extending to other units [for example, mm ³ and km ³].
		Geometry		Statistics
		Draw 2-D shapes using given dimensions and angles. Recognise, describe and build simple 3-D shapes, including making nets. Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons. Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius. Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles. Describe positions on the full coordinate grid (all four quadrants). Draw and translate simple shapes on the coordinate plane and reflect them in the axes.		Interpret and construct pie charts and line graphs and use these to solve problems. Calculate and interpret the mean as an average.



Mathematics Curriculum Map

Key Stage 3 Curriculum Goals

Year 7	Year 8	Year 9
Students achieving at the expected standard will be able to: DISCIPLINARY KNOWLEDGE • Select and use appropriate calculation strategies to solve increasingly complex problems • Move freely between different numerical, algebraic, graphical and diagrammatic representations • "Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics." • Begin to reason deductively in geometry, number and algebra • Explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally • Begin to model situations mathematically and express the results using a range of formal mathematical representations • Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems SUBSTANTIVE KNOWLEDGE • Describe and continue sequences • Understand and use algebraic notation and substitution • Manipulate expressions and solve equations • Recognise and use place value to order different types of number • Solve problems using the four operations (add, subtract, multiply and divide) • Understand and use averages and range • Be able to round and estimate answers to calculations • Interpret and represent data using a variety of statistical diagrams • Understand and use fraction, decimal and percentage equivalence • Understand directed number • Know how to find basic fractions and percentages of amounts • Find perimeters and areas of a variety of 2-D shapes • Be able to calculate speed, distance or time • Recognise special types of numbers • Add and subtract fractions • Understand and use a variety of angle facts	Students achieving at the expected standard will be able to: DISCIPLINARY KNOWLEDGE • Select and use appropriate calculation strategies to solve increasingly complex problems • Move freely between different numerical, algebraic, graphical and diagrammatic representations • "Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics." • Begin to reason deductively in geometry, number and algebra • Explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally • Begin to model situations mathematically and express the results using a range of formal mathematical representations • Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems SUBSTANTIVE KNOWLEDGE • Understand and use ratio notation • Apply multiplicative change techniques to solve problems involving direct proportion • Multiply and divide fractions • Begin to understand how algebraic equations can be represented graphically in the Cartesian plane • Represent and interpret data in a variety of tables, graphs and charts • Use a range of tables and diagrams to find probabilities • Use and understand brackets, equations and Inequalities within algebraic contexts • Understand how sequences can be formed from algebraic expressions • Know and apply the addition and subtraction rules of indices • Solve more complex fraction and percentages problems, including the use of a multiplier • Understand and use standard index form • Be able to round and estimate calculations • Investigate angles in parallel lines and polygons • Discover area of trapezia and circles • Reflect in given lines, including equations of lines • Collect, interpret and represent data with a range of statistical diagrams • Use and understand the different measures of location	Students achieving at the expected standard will be able to: DISCIPLINARY KNOWLEDGE • Select and use appropriate calculation strategies to solve increasingly complex problems • Move freely between different numerical, algebraic, graphical and diagrammatic representations • "Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics." • Begin to reason deductively in geometry, number and algebra • Explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally • Begin to model situations mathematically and express the results using a range of formal mathematical representations • Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems SUBSTANTIVE KNOWLEDGE • Find and use the equation of a straight line • Form and solve equations and inequalities • Test conjectures in a range of contexts • Find volumes and surface areas of 3-D shapes • Use a pair of compasses to perform accurate constructions • Extend knowledge of number to include rational and HCF and LCM within contexts • Solve percentage problems involving finding percentages change and reverse percentages • Explore financial mathematics • Begin to understand proof, and be able to investigate and prove basic conjectures • Perform and describe a rotation and translation • Know and apply Pythagoras' Theorem • Recognise similarity and perform enlargements • "Solving ratio and proportion problems" • Use and understand compound units • Understand relative frequency and the difference between theoretical and experimental probability • Recognise, sketch and produce graphs of quadratic functions



Mathematics Curriculum Map

Year 7 Term 1	Unit	Sequences	Algebraic Notation and Substitution	Expressions and Equations	Place Value, Ordering and Rounding	Four Operations	Averages and Range	Rounding and Estimation
	Key Concepts	ALGEBRA	ALGEBRA	ALGEBRA	NUMBER	NUMBER	STATISTICS	NUMBER
	Prior Learning	Year 6: Generate and describe linear number sequences.	Year 6: Use simple formulae.	Year 6: Express missing number problems algebraically. Find pairs of numbers that satisfy an equation with two unknowns	Year 6: Round any whole number to a required degree of accuracy.	Year 6: Calculation	Year 6: Calculate and interpret the mean as an average	Year 7: Place Value, Ordering and Rounding
	Key Knowledge	Describe and continue sequences Find the next term(s) Linear and non-linear sequences Continue linear sequences Continue non-linear sequences Term-to-term rules Find missing terms (E)	1-step function machines (number) 1-step function machines (algebra) Find a function (one step) Substitution (one step) 2-step function machines (number) 2-step function machines (algebra) Find a function (two step) Substitution (two step)	Equality and equivalence Related facts Like and unlike terms Collect like terms Solve 1-step equations (+/-) Solve 1-step equations (x/÷) Solve 2-step equations	Write integers in numerals and words Intervals on a number line Compare and order integers Place value for decimals Decimals on a number line Compare and order decimals Round to powers of 10 Round to the nearest integer Round to decimal places Powers of 10 (E) Numbers greater than 1 in standard form (E) Negative powers of 10 (E) Numbers between 0 and 1 in standard form (E)	Add and subtract integers Add and subtract decimals Multiply and divide by 10, 100 and 1000 Multiply by 0.1 and 0.01 (E) Multiply integers Divide integers Multiply decimals Divide decimals by integers Divide by a decimal (E) Order of operations	Mode Mean Median Range Solve problems with averages and range	Round to 1 significant figure Round to 2 or more significant figures Estimate answers to calculations Solve problems with estimation Understand and use error interval notation (E)
	Next Steps	Year 8: Sequences	Year 8: Algebraic Manipulation	Year 8: Equations and Inequalities	Year 7: Rounding and Estimating	Year 7: Fractions, Decimals and Percentages	Year 8: Interpret and Represent Data	Year 10: Rounding and Estimation



Mathematics Curriculum Map

Year 7 Term 2	Unit	Graphing Data	Fractions, Decimals and Percentages	Directed Number	Fractions and Percentages of Amounts	Perimeter and Area
	Key Concepts	STATISTICS	NUMBER	NUMBER	NUMBER	GEOMETRY AND MEASURES
	Prior Learning	Year 4: Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs. Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.	Year 7: Four Operations	Year 6: Use negative numbers in context and calculate intervals across zero	Year 7: Fractions, Decimals and Percentages	Year 6: Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places. Recognise that shapes with the same areas can have different perimeters and vice versa. Calculate the area of parallelograms and triangles.
	Key Knowledge	Pictograms Bar Charts Dual bar charts Composite bar charts Coordinates in the first quadrant Scatter graphs Correlation Lines of best fit Time series graphs Non-Linear Relationships	Represent tenths and hundredths Number lines with fractions and decimals Tenths, hundredths, fifths and quarters Eighths and thousandths Understand percentages Convert simple fractions, decimals and percentages Fractions as diagrams Fractions on a number line Equivalent fractions Compare and order fractions Fractions as division Convert fractions, decimals and percentages Fractions, decimals and percentages greater than 1 (E)	Directed number and number lines Compare and order directed numbers Calculations that cross zero Directed number and zero pairs Add directed numbers Subtract directed numbers Multiply and divide directed numbers Order of operations with directed numbers Use a calculator with directed numbers	Fraction of an amount Use a fraction to find the whole Percentage of an amount (non-calculator) Percentage of an amount (calculator) Percentage increase and decrease Use a percentage to find the whole (E) Solve problems with fractions and percentages greater than 1 (E)	Convert metric units of length Perimeter of a polygon Perimeter of a compound shape Area of rectangles and parallelograms Area of a triangle Area of a trapezium Solve problems with perimeter and area Form expressions with perimeter and area (E)
	Next Steps	Year 8: Interpret and Represent Data	Year 7: Fractions and Percentages of Amounts		Year 8: Percentages	Year 8: Area, Volume and Density



Mathematics Curriculum Map

Year 7 Term 3	Unit	Speed, Distance and Time	Properties of Number	Add and Subtract Fractions	Angles and Polygons
	Key Concepts	NUMBER	NUMBER	NUMBER	GEOMETRY AND MEASURES
	Prior Learning	Year 5: Complete, read and interpret information in tables, including timetables. Year 4: Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.	Year 6: Identify common factors, common multiples and prime numbers.	Year 6: Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.	Year 6: Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.
	Key Knowledge	Convert between milliseconds, seconds, minutes and hours Convert between hours, days and years Fractions of time Solve problems with tables and timetables Solve problems with time and the calendar Calculate speed Calculate time and distance Solve problems with speed, distance and time Interpret distance-time graphs Draw distance-time graphs Calculate speed from a distance-time graph	Multiples Factors Prime numbers Write a number as a product of prime factors Square, cube and triangular numbers Square roots and cube roots Explore higher powers and roots (E) Highest common factor (HCF) Lowest common multiple (LCM) HCF and LCM from a Venn diagram (E) Use factors to simplify calculations	Simplify a fraction Convert between mixed numbers and improper fractions Add and subtract fractions with the same denominator Add and subtract fractions and integers Add and subtract fractions where denominators share a simple common multiple Add and subtract fractions with any denominator Add and subtract improper fractions and mixed numbers Use equivalence to add and subtract decimals and fractions (E) Add and subtract simple algebraic fractions (E) Substitution and solving equations with fractions (E)	Draw and measure lines and angles Understand and use geometric notation Angles around a point Angles on a straight line Vertically opposite angles Recognise and name polygons Angles in a triangle Angles in a quadrilateral Solve problems with angles Parallel and perpendicular lines Angles in parallel lines (E) Angles in a polygon (E) Simple proofs (E)
	Next Steps	Year 9: Rates	Year 9: Properties of Number	Year 8: Multiply and Divide Fractions	Year 8: Angles in Parallel Lines and Polygons



Mathematics Curriculum Map

Year 8 Term 1	Unit	Ratio and Scale	Multiplicative Change	Multiplying and dividing fractions	Working in the Cartesian plane	Representing data	Tables and probability
	Key Concepts	Ratio, Proportion, Rates of Change: Ratio & rates	Ratio, Proportion, Rates of Change: Multiplicative relationships	Number: Understand fractions and decimals	Algebra: Linear graphs	Statistics: Bivariate data	Probability
	Prior Learning	Year 6: Ratio	Year 7: Solving problems with multiplication & division Convert metric units Year 7: Developing number sense Use multiplicative relationships between facts	Year 7: Fraction, decimal, percentage equivalence Interchange between fractions and decimals. Year 7: Equality and equivalence Find fractions of an amount (up to 1).	Year 7: Use and understand algebra notation Representing functions graphically	Year 6: Coordinates	Year 7: Place value and ordering integers and decimals Position decimals on a number line
	Key Knowledge	Substantive Understand the meaning and representations of ratio. Understand and use ratio notation. Solve problems involving ratios on the form 1:n (or n:1). Solve proportional problems involving the ratio m:n. Divide a value into a given ratio. Express ratios in their simplest integer form. Express ratios in the form 1:n. Compare ratios and related fractions. Understand π as the ratio between a diameter and circumference. Understand the gradient of a line as a ratio. Disciplinary Make connections between number relationships, and their algebraic and graphical representations.	Substantive Solve problems involving direct proportion. Explore conversion graphs. Convert between currencies. Explore direct proportion graphs. Explore relationships between similar shapes. Understand scale factors as multiplicative representations. Draw and interpret scale diagrams. Interpret maps using scale factors and ratios. Disciplinary Interpret when the structure of a numerical problem requires additive or multiplicative or proportional reasoning. Move freely between different numerical, algebraic, graphical and diagrammatic representations.	Substantive Represent multiplication of fractions. Multiply a fraction by an integer. Find the product of a pair of unit fractions. Find the product of a pair of any fractions. Divide an integer by a unit fraction. Understand and use the reciprocal. Divide any pair of fractions. Multiply and divide improper and mixed fractions. Multiply and divide algebraic fractions. Disciplinary Select and use appropriate calculation strategies to solve increasingly complex problems. Interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning.	Substantive Identify and draw lines that are parallel to the axes. Recognise and use the line $y=x$. Recognise and use lines to the form $y=kx$. Link $y=kx$ to direct proportional problems. Recognise and use lines of the form $y=x+a$. Plot graphs of the form $y=mx+c$. Find the midpoint of a line segment. Disciplinary Move freely between different numerical, algebraic, graphical and diagrammatic representations.	Substantive Draw and interpret scatter graphs. Understand and describe linear correlation. Draw and use a line of best fit. Identify non linear relationships. Identify different types of data (discrete/continuous/qualitative/quantitative). Read and interpret ungrouped frequency tables. Represent and interpret grouped frequency tables. Represents grouped discrete data. Represent continuous data grouped into equal classes. Represent data in two-way tables. Disciplinary Use language and properties precisely to analyse statistics.	Substantive Construct sample spaces for one or more events. Find probabilities from a sample space. Find probabilities from two-way tables. Find probabilities from Venn diagrams. Use the product rule for finding the total number of possible outcomes. Disciplinary Use language and properties precisely to analyse probability.
	Next Steps	Year 9: Using percentages	Year 8: Number sense	Year 10: Ratio and fractions	Year 9: Straight line graphs	Year 10: Collecting, representing & interpreting data	Year 9: Probability



Mathematics Curriculum Map

Year 8 Term 2	Unit	Brackets, equations and inequalities	Sequences	Indices	Fractions and percentages	Standard index form	Number sense
	Key Concepts	Algebra: Solve equations and inequalities	Algebra: Sequences	Algebra: Use notation and substitute	Number: Percentages	Number: Understand and represent	Number: Understand and represent number Number: Calculations
	Prior Learning	Year 7: Equality and equivalence Form and solve two-step equations	Year 7: Sequences Recognise linear sequences and non-linear sequences Year 7 Understand and use algebraic notation Generate sequences from an algebraic rule	Year 8: Brackets, equations and inequalities Simplify expressions by collecting like terms	Year 7: Fractions and percentages of amounts Find fractions of an amount (up to 1) and fractions above 1 Find percentages of amounts using mental and calculator methods, up to 100% and over	Year 7: Place value and ordering integers and decimals Understand and use place value Compare and order numbers Round to powers of 10 and 1sf Write 1sf numbers in standard form (H)	Year 7: Developing Number Sense Use estimation as a method for checking mental calculations
	Key Knowledge	Substantive Form algebraic expressions Simplify expressions by collecting like terms Multiply out a single bracket Factorise into a single bracket Expand multiple single brackets and simplify Expand a pair of binomials (H) Solve equations, including with brackets Form and solve equations with brackets Understand and solve simple inequalities Form and solve inequalities Solve equations and inequalities with unknowns on both sides (H) Form and solve equations and inequalities with unknowns on both sides (H) Identify and use formulae, expressions, identities and equations Disciplinary <i>Begin to model situations mathematically and express results using a range of formal representations</i>	Substantive Generate sequences given a rule in words Generate sequences given a simple algebraic rule Generate sequences given a complex algebraic rule Find the rule for the nth term of a linear sequence (H) Disciplinary Use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships Move freely between different numerical, algebraic, graphical, and diagrammatic representations	Substantive Adding and subtracting expressions with indices Simplify algebraic expression by multiplying indices Simplify algebraic expression by dividing indices Use the addition law for indices Use the addition and subtractions laws for indices Explore powers of powers (H) Disciplinary <i>Use language and properties precisely to analyse algebraic expressions</i> <i>Begin to model situations mathematically and express the results using a range of formal mathematical representations</i>	Substantive Convert fluently between key fractions, decimals, and percentages (R) Calculate key fractions, decimals and percentages of an amount without a calculator (R) Calculate fractions, decimals and percentages of an amount using calculator methods (R) Convert between decimals and percentages greater than 100%. Percentage decrease with a multiplier Calculate percentage increase and decrease using a multiplier Express one number as a fraction or percentage of another without a calculator. Express one number as a fraction or percentage of another using calculator methods. Work with percentage change Choose appropriate methods to solve percentage problems Find the original amount given a percentage less than 100% (H) Find the original amount given a percentage greater than 100% (H) Choose appropriate methods to solve complex percentage problems (H) Disciplinary <i>Develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics</i>	Substantive Investigate positive powers of 10 Work with numbers greater than 1 in standard form Investigate negative powers of 10 Work with numbers between 0 and 1 in standard form Compare and order numbers in standard form Mentally calculate with numbers in standard form Add and subtract numbers in standard form Multiply and divide numbers in standard form Use a calculator to work with numbers in standard form Understand and use negative indices (H) Understand and use fractional indices (H) Disciplinary Select and use appropriate calculation strategies to solve increasingly complex problems.	Substantive Round numbers to powers of 10, and 1 significant figure Round numbers to a given number of decimal places Estimate the answer to a calculation Understand and use error interval notation Calculate using the order of operations Calculate with money Covert metric measures of length Convert metric units of weight and capacity Convert metric units of area Convert metric units of volume Solve problems involving time and the calendar Disciplinary Develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics Use a calculator and other technologies to calculate results accurately and then interpret them appropriately
	Next Steps	Year 9: Forming and solving equations and inequalities	Year 9: Testing conjectures	Year 9: Forming and solving equations and inequalities	Year 9: Using percentages	Year 9: Numbers	Year 9: Maths and money



Mathematics Curriculum Map

Year 8 Term 3

Unit	Angles in parallel lines and polygons	Area of trapezia and circles	Line symmetry and reflections	The data handling cycle	Measures of location
Key Concepts	Geometry and Measures: Shape properties Geometry and Measures: Angles	Geometry and Measures: Shape properties Geometry and Measures: Perimeter, area and volume	Geometry and Measures: Shape properties	Statistics: Represent and Interpret Data	Statistics: Statistical measures
Prior Learning	Year 7: Developing geometric reasoning Understand and use the equality of vertically opposite angles Solve angle problems using properties of triangles and quadrilaterals	Year 7: Solving problems with multiplication and division Solve problems using the area of rectangles and parallelograms Solve problems using the area of triangles	Year 8: Working in the Cartesian plane Identify and draw lines that are parallel to the axes. Recognise and use the line $y=x$.	Year 8: Representing data Read and interpret ungrouped frequency tables Read and interpret grouped frequency tables	Year 7: Place value & ordering integers & decimals Find the range of a set of numbers Find the median of a set of numbers
Key Knowledge	Substantive Identify and calculate with alternate, corresponding and co-interior angles. Solve complex problems with parallel line angles. Identify and calculate the sides and angles in special quadrilaterals. Understand and use the properties of diagonals of quadrilaterals. Understand and use the sum of the exterior and interior angles of any polygon. Calculate missing interior angles in regular polygons. Prove simple geometric facts using angle properties Construct an angle bisector Construct a perpendicular bisector of a line segment. Disciplinary Use language and properties precisely to analyse 2D shapes. Begin to reason deductively in geometry, including using geometrical constructions.	Substantive Calculate the area of a trapezium. Calculate the perimeter and area of compound shapes. Calculate the area of a circle and parts with and without a calculator. Disciplinary Select and use appropriate formulae and calculations to solve increasingly complex problems.	Substantive Recognise line symmetry. Reflect a shape in a horizontal or vertical line (shapes both touching and not touching the line). Reflect a shape in a diagonal line (shapes both touching and not touching the line). Disciplinary Use language and properties precisely to analyse 2D shapes. Begin to reason deductively in geometry.	Substantive Design and criticise questionnaires. Draw and interpret multiple bar charts. Draw and interpret line graphs. Represent and interpret grouped quantitative data. Find and interpret the range. Compare distributions using charts. Identify misleading graphs. Disciplinary Set up a statistical enquiry. Choose the most appropriate diagram for a given set of data.	Substantive Understand and use the mean, median and mode. Find the mean from an ungrouped frequency table. Find the mean from a grouped frequency table. Identify outliers. Compare distributions using averages and the range. Disciplinary Choose the most appropriate average.
Next Steps	Year 10: Angles & bearings	Year 9: 3D shapes	Year 9: Rotation and translation	Year 10: Collecting, representing & interpreting data	Year 10: Collecting, representing & interpreting data



Mathematics Curriculum Map

Year 9 Term 1	Unit	Straight line graphs	Forming and solving equations and inequalities	Testing conjectures	Three-dimensional shapes	Construction and congruency
	Key Concepts	Algebra: Linear graphs	Algebra- forming and solving equations.	Algebra: Equivalence and Proof	Geometry and Measures: Perimeter, area and Volume	Geometry and Measures: Construct and transform Geometric Figures
	Prior Learning	Year 8: Working in the cartesian plane Plot graphs of the form $y=mx+c$.	Unit Year 8: Brackets, equations and inequalities Solving one-step equations and inequalities Solving two-step equations and inequalities	Year 8: Brackets, equations and inequalities Expand over a single bracket Simplify expressions involving brackets Identify and use formulae, expressions, identities and equations Expand a pair of binomials	Year 8: Area of trapezia & circles Area of a trapezium Area of a circle Area of compound shapes	Year 8: Line symmetry & reflection Recognise line symmetry Reflect shapes in a given line
	Key Knowledge	Substantive: Recognise and draw lines parallel to the axes, $y = x$ and $y = -x$ Complete a table of values Compare gradients Compare intercepts Understand and use $y = mx + c$ Write an equation in the form $y = mx + c$ Find the equation of a line from a graph Interpret gradient and intercepts of real-life graphs Model real-life graphs involving inverse proportion Explore perpendicular lines Disciplinary: Identify variables and express relations between variables algebraically and graphically.	Substantive: Solve one and two-step equations and inequalities Solve one and two-step equations and inequalities with brackets Inequalities with negative numbers Solve equations with an unknown on both sides Solving equations and inequalities in context Substituting into formulae and equations Rearranging formulae (one step) Rearrange formulae (two step) Rearrange complex formulae including brackets and squares Disciplinary: Identify variables and express relations between variables algebraically	Substantive: Factors, Multiples and Primes True or False? Always, Sometimes, Never true Show that Conjectures about number Expand a pair of binomials Conjectures with algebra Explore the 100 grid Expand three binomials Disciplinary: Make and test conjectures about patterns and relationships; look for proofs or counter-examples.	Substantive Know names of 2D and 3D shapes Recognise prisms (including language of edges and vertices) Accurate nets of cuboids and other 3D shapes Sketch and recognise nets of cuboids and other 3D shapes Plans and elevations Find area of 2D shapes (R) Surface area of cubes and cuboids Surface area of triangular prisms Surface area of a cylinder Volume of cubes and cuboids Volume of other 3D shapes - prisms and cylinders Explore volumes of cones, pyramids and spheres (H) Disciplinary Use language and properties precisely to analyse numbers, algebraic expression, 2D and 3D shapes Derive and apply formulae to calculate and solve problems	Substantive Draw and measure angles (R) Construct and interpret scale drawings (R) Locus of distance from a point Locus of distance from a straight line Locus equidistant from two points Construct a perpendicular bisector Construct a perpendicular from a point Construct a perpendicular to a point Locus of distance from two lines Construct an angle bisector Construct triangles from given information (R) Identify congruent figures Explore congruent triangles Identify congruent triangles Disciplinary Derive and use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle); recognise and use the perpendicular distance from a point to a line as the shortest distance to the line.
	Next Steps	Year 11: Perpendicular lines	Year 9: Algebraic Representation Represent Inequalities	Year 9: Algebraic Representation Revise algebraic representation	Year 10: Working with Circles Review area and circumference of a circle Arc length Area of a sector Surface area of circular type 3D shapes	Year 10: Congruence, similarity & enlargement Similarity and Enlargement
	Enrichment/ Career					



Mathematics Curriculum Map

Year 9 Term 2	Unit	Numbers	Using percentages	Maths and money	Deduction	Rotation and translation
	Key Concepts	Number: Understand and Represent	Number: Percentages	Number: Calculations, Number: Percentages	Geometry and Measures: Angles	Geometry and Measures: Construct and transform Geometric Figures
	Prior Learning	Year 8: Standard Index Form Write numbers of any size in Standard Form Use negative or fractional indices	Year 8: Fractions & Percentages Percentage Increase/Decrease Using Multipliers Express one quantity as a percentage of another, compare two quantities using percentages Work with percentages greater than 100% Reverse percentages	Year 8: Fractions & Percentages Percentage Increase/Decrease Using Multipliers Express one quantity as a percentage of another, compare two quantities using percentages Work with percentages greater than 100% Reverse percentages	Year 8: Angles in parallel lines and polygons Understand interior angles Understand exterior angles	Year 8: Line symmetry & reflection, Recognise line symmetry Reflect shapes in vertical, horizontal and diagonal lines.
	Key Knowledge	Substantive Integers, real and rational numbers Understand and use surds (H) Work with directed number (R) Solve problems with integers Solve problems with decimals HCF and LCM (R) Adding and subtracting fractions (R) Multiplying and dividing fractions (R) Solve problems with fractions Numbers in standard form (R) Disciplinary Appreciate the infinite nature of the sets of integers, real and irrational numbers	Substantive Use the equivalence of fractions, decimals and percentages (R) Calculate percentage increase and decrease (R) Express a change in a percentage(R) Solve ‘reverse’ percentage problems Recognise and solve percentage problems (non-calculator) Recognise and solve percentage problems (calculator) Solve problems with repeated percentage change (H) Disciplinary Develop the use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics	Substantive: Solve problems with bills and bank statements Calculate simple interest Calculate compound interest Solve problems with Value Added Tax Calculate wages and taxes Solve problems with exchange rates Solve unit pricing problems Disciplinary: Develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics. Select and use appropriate calculation strategies to solve increasingly complex problems.	Substantive: Angles in parallel lines Solve angle problems using chains of reasoning Angle problems with algebra Conjectures with angles Conjectures with shapes Link constructions and geometrical reasoning Disciplinary: Make and test conjectures about patterns and relationships; look for proofs and counterexamples Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems	Substantive: Identify the order of rotational symmetry of a shape Compare and contrast rotational symmetry with line symmetry Rotate a shape about a point on a shape Rotate a shape about a point not on a shape Translate points and shapes by a given vector Compare rotation and reflection of shapes Find the result of a series of transformations Disciplinary: Begin to reason deductively in geometry, number and algebra, including using geometrical constructions. Begin to model situations mathematically and express the results using a range of formal mathematical representations
	Next Steps	Year 10: Indices and Roots Revise and extend KS3 content including standard form.	Year 10: Percentages and Interest. Simple and compound interest Find the original values Repeated percentage change	Year 10: Percentages and Interest. Simple and compound interest Find the original values Repeated percentage change	Year 10: Angles and Bearings Understand and represent bearings Scale drawings	Year 10: Congruence, similarity & enlargement Enlarge shapes with a positive integer scale factor Enlarge shapes with a fractional scale factor Enlarge shapes with a negative scale factor Investigate areas of similar shapes Investigate angles in parallel lines



Mathematics Curriculum Map

Year 9 Term 3

Unit	Pythagoras’ Theorem	Enlargement and Similarity	Solving ratio and proportion problems	Rates	Probability	Algebraic representation
Key Concepts	Geometry and Measures: Pythagoras and Trigonometry	Geometry and Measures: Construct and transform Geometric Figures	Ratio, Proportion, Rates of Change: Multiplicative Relationships	Ratio, Proportion, Rates of Change: Ratio and Rates	Statistics: Represent and Interpret Data, Probability	Algebra: Non-Linear Graphs, Linear Graphs, Solve Equations and Inequalities, Equivalence and Proof, Understand Notation and Substitute
Prior Knowledge	Year 8 – Spring 1 – Brackets, Equations and Inequalities Algebraic Manipulation – Indices, rearranging formulae and substitution	Year 8 - Multiplicative Change Solve problems involving direct proportion. Explore relationships between similar shapes.	Year 8: Multiplicative Change Solve problems involving direct proportion. Explore relationships between similar shapes.	Year 8: Sequences Generate sequences given a rule in words Generate sequences given a simple algebraic rule Generate sequences given a complex algebraic rule	Year 8 – Summer Term 4: The data handling cycle Set up a statistical enquiry Choose the most appropriate diagram for given set of data Identify misleading graphs	Year 8: Indices Using the addition and subtraction law for indices Exploring powers of powers
Key Knowledge	Substantive: Squares and square roots Identify the hypotenuse of a right-angled triangle Determine whether a triangle is right-angled Calculate the hypotenuse of a right-angled triangle Calculate the missing sides in right-angled triangles Use Pythagoras theorem on coordinate axes Explore proofs of Pythagoras’ theorem Use Pythagoras’ theorem in 3-D shapes (H) Disciplinary: Develop the use of formal mathematical knowledge to interpret and solve problems, Recognising, when to use Pythagoras’ theorem in non-obvious situations, for instance when a diagram is not given in the question.	Substantive: Recognise enlargement and similarity Enlarge a shape by a positive integer scale factor Enlarge a shape by a positive integer scale factor from a point Enlarge a shape by a positive fractional scale factor Enlarge a shape by a negative scale factor Work out missing sides and angles in a pair of given similar shapes Solve problems with similar triangles (H) Explore ratios in right-angled triangles (H) Disciplinary: Move freely between different numerical and diagrammatic representations.	Substantive: Solve problems with direct proportion (R) Direct proportion and conversion graphs Solve problems with inverse proportion Graphs of inverse relationships Solve ratio problems given the whole or a part Solve ‘best buy’ problems Solve problems with ratio and algebra Disciplinary: Select and use appropriate calculation strategies to solve increasingly complex problems. Substitute values in expressions, rearrange and simplify expressions, and solve equations. Extend and formalise their knowledge of ratio and proportion in working with measures and geometry, and in formulating proportional relations algebraically. Identify variables and express relations between variables algebraically and graphically. Interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning.	Substantive: Solve speed, distance and time problems without a calculator Solve speed, distance and time problems with a calculator Use distance-time graphs Solve problems with density, mass and volume Solve flow problems and their graphs Rates of change and their units Covert compound units Disciplinary: Extend and formalise their knowledge of ratio and proportion in working with measures and geometry, and in formulating proportional relations algebraically Extend their understanding of the number system; make connections between number relationships, and their algebraic and graphical representations	Substantive: Single event probability Relative frequency – including convergence Expected outcomes Independent events Use tree diagrams Use tree diagrams to solve without replacement problems Use diagrams to work out probabilities Disciplinary: Interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning Explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally. Begin to model situations mathematically and express the results using a range of formal mathematical representations	Substantive: Draw and interpret quadratic graphs Interpret graphs, including reciprocal and piece-wise Investigate graphs of simultaneous equations Represent inequalities Disciplinary: Use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships Substitute values in expressions, rearrange and simplify expressions, and solve equations Move freely between different numerical, algebraic, graphical and diagrammatic representations Develop algebraic and graphical fluency, including understanding linear and simple quadratic functions
Next Steps	Year 10 : Trigonometry Finding missing sides and angles using the three trigonometric ratios. Selecting the most appropriate method for solving problems in right-angled triangles.	Year 9 : Solving Ratio and Proportion Problems Solve direct proportion problems Solve inverse proportion problems Solve best buy problems	Year 10 : Congruency, similarity, and enlargement Solve direct proportion problems Solve inverse proportion problems Solve best buy problems	Year 10: Ratios and Fractions Compare quantities using a ratio Share in a ratio (given total or one part) Solve best buy problems Mixed ratio problems	Year 10: Probability Find probabilities from a sample space Find probabilities from two-way tables Find probabilities from Venn diagrams	Year 10 – Autumn Term 3: Representing solutions of equations and inequalities Form and solve one-step and two-step equations Form and solve one-step and two-step inequalities Represent solutions to inequalities using set notation Form and solve equations with unknowns on both sides Solve quadratic equations by factorisation



Mathematics Curriculum Map

Year 10 Term 1	Unit	Algebraic Manipulation	Equations, Inequalities and Formulae	Quadratic Expressions and Equations	Percentages	Ratio and Scale	Work with Fractions
	Key Concepts	Algebra	Algebra	Algebra	Number	Ratio, Proportion and Rates of Change	Number
	Prior Learning	Year 9: Algebraic Manipulation	Year 10: Algebraic Manipulation	Year 10: Algebraic Manipulation	Year 9: Percentages	Year 9: Ratio and Proportion	Year 9: Fractions
	Key Knowledge	Substitution Collect like terms Simplify expressions <u>Addition and subtraction laws for indices</u> <u>Powers of powers</u> <u>Expand a single bracket</u> <u>Factorise into a single bracket</u>	<u>Solve equations</u> <u>Solve fractional equations</u> <u>Solve equations with unknowns on both sides</u> <u>Understand inequalities</u> <u>Solve inequalities</u> Represent solutions to inequalities using set notation <u>Change the subject of a simple formula</u> <u>Change the subject of a known formula</u> <u>Change the subject of a complex formula</u> Change the subject where the subject appears more than once	<u>Expand double brackets</u> Expand triple brackets Factorise quadratic expressions (positive only) <u>Factorise quadratic expressions</u> Factorise more complex quadratic expressions <u>Difference of two squares</u> <u>Solve quadratic equations equal to 0</u> <u>Solve quadratic equations by factorisation</u> Solve more complex quadratic equations by factorisation Complete the square Complete the square with more complex quadratic expressions Solve quadratic equations by completing the square Solve quadratic equations using the quadratic formula Quadratic graphs of the form x^2+a	<u>Percentage of an amount</u> <u>Percentage increase and decrease</u> <u>Repeated percentage change</u> <u>Express one number as a fraction or a percentage of another</u> <u>Express a change as a percentage</u> <u>Find the original value after a percentage change</u> <u>Simple interest</u> <u>Compound interest</u> <u>Choose appropriate methods to solve percentage problems</u>	<u>Equivalent ratios</u> <u>Share in a ratio (total given)</u> <u>Share in a ratio (part or difference given)</u> <u>Link ratios and fractions</u> <u>Combine a set of ratios</u> <u>Share in a ratio (algebraically)</u> Solve problems with ratio and algebra <u>Ratios and scales</u>	Fraction of an amount Increase or decrease an amount by a fraction Use a fraction to find the whole Equivalent fractions and mixed numbers <u>Add and subtract fractions</u> <u>Multiply fractions</u> <u>Divide fractions</u> <u>Solve problems with fractions</u> Add and subtract algebraic fractions Multiply and divide algebraic fractions Simplify algebraic fractions Add and subtract more complex algebraic fractions Multiply and divide more complex algebraic fractions Solve equations with algebraic fractions
	Next Steps	Year 10: Equations, Inequalities and Formula Year 10: Quadratic Expressions and Equations	Year 10: Quadratic Expressions and Equations	Year 10: Non-Linear Graphs	Year 11: Revision	Year 11: Ratio and Proportion	Year 10: Non-Calculator Methods



Mathematics Curriculum Map

Year 10 Term 2

Unit	Non-Calculator Methods	Straight Line Graphs	Probability	Rounding and Estimation	Perimeter, Area and Volume	Interpret and Represent Data	Non-Linear Graphs
Key Concepts	Number	Algebra	Probability	Number	Geometry and Measures	Statistics	Algebra
Prior Learning	Year 10: Work with Fractions	Year 9: Straight Line Graphs	Year 9: Sets and Probability	Year 7: Rounding and Estimation	Year 9: Area and Volume		Year 10: Straight-Line Graphs
Key Knowledge	Place value for integers and decimals Compare and order numbers Add and subtract integers and decimals Multiply and divide integers and decimals Four operations with directed number <u>Order of operations</u> <u>Related calculations</u> <u>Solve multi-step problems</u> Convert recurring decimals to fractions Convert more complex recurring decimals to fractions	<u>Plot straight line graphs</u> Find solutions to equations using straight line graphs Explore gradients $y=mx+c$ <u>Find the equation of a line from a graph</u> Represent solutions to single inequalities on a graph Represent solutions to multiple inequalities on a graph <u>Find the midpoint of a line segment</u> <u>Equation of a straight-line graph given one point and a gradient</u> <u>Equation of a straight-line graph given two points</u> Equations of perpendicular lines Real-life straight-line graphs	<u>Find the probability of a single event</u> <u>Use the property that probabilities sum to 1</u> <u>List and count outcomes</u> Relative frequency <u>Sample spaces for 1 or more events</u> <u>Two-way tables</u> <u>Frequency trees</u> <u>Independent events</u> <u>Tree diagrams for independent events</u> <u>Tree diagrams for dependent events</u>	<u>Round to decimal places</u> <u>Round to significant figures</u> <u>Estimate answers to calculations</u> <u>Use a calculator</u> <u>Error intervals (including truncation)</u> Upper and lower bounds	Name 2-D and 3-D shapes <u>Perimeter of a 2-D shape</u> <u>Area of a 2-D shape</u> Arc length and perimeter Area of a sector Area of a compound shape Recognise and label parts of a circle <u>Circumference of a circle</u> <u>Area of a circle</u> <u>Volume of a prism</u> Volume of a cylinder <u>Nets</u> <u>Surface area of a prism</u> Surface area of a cylinder	<u>Averages and range</u> <u>Averages from an ungrouped frequency table</u> <u>Mean from a grouped frequency table</u> <u>Averages from a grouped frequency table</u> <u>Use data to compare distributions</u> <u>Types of data</u> <u>Sampling</u> <u>Scatter graphs</u> <u>Interpolation and extrapolation</u>	<u>Quadratic graphs</u> <u>Intercept and roots of quadratic graphs</u> Turning points <u>Cubic graphs</u> <u>Approximate solutions to equation using graphs</u> Equation of the tangent to a curve Estimate the area under a curve Equation of a circle Equation of a tangent to a circle
Next Steps	Year 11: Standard Form	Year 10: Non-Linear Graphs	Year 11: Set Notation and Venn Diagrams	Year 11: Revision	Year 11: Area and Volume	Year 10: Graphs and Diagrams	Year 11: Functions and Graphs



Mathematics Curriculum Map

Year 10 Term 3	Unit	Angles	Graphs and Diagrams	Vectors	Factors, Powers (and Surds H)	Pythagoras' Theorem and Trigonometry	Simultaneous Equations
	Key Concepts	Geometry and Measures	Statistics	Geometry and Measures	Number	Geometry and Measures	Algebra
	Prior Learning	Year 8: Angles in Parallel Lines and Polygons	Year 10: Interpret and Represent Data	Year 9: Transformations	Yer 9: Properties of Number	Year 9: Pythagoras' Theorem	Year 10: Equations, Inequalities and Formulae
	Key Knowledge	<u>Angles around a point, on a straight line and vertically opposite</u> <u>Angles in a triangle</u> <u>Angles in a quadrilateral</u> <u>Exterior angles of a polygon</u> <u>Interior angles of a polygon</u> <u>Solve problems with angles in polygons</u> <u>Alternate and corresponding angles</u> <u>Alternate, corresponding and co-interior angles</u> <u>Solve problems with angles I parallel lines</u> <u>Solve problems with angles and algebra</u> <u>Prove geometric facts</u>	Pictograms Line and bar charts Dual and composite bar charts <u>Draw pie charts</u> <u>Interpret pie charts</u> <u>Time series graphs</u> Draw histograms Interpret histograms Draw cumulative frequency graphs Interpret cumulative frequency graphs Box plots Compare distributions using box plots	<u>Understand and represent vectors</u> <u>Vector notation</u> Translate by a vector <u>Vectors multiplied by a scalar</u> <u>Add vectors</u> <u>Add and subtract vectors</u> Vector journeys in shapes Vectors in quadrilaterals Parallel Vectors Solve problems with vectors	Factors, multiples and primes <u>Prime factorisation</u> <u>HCF and LCM</u> Square and cube numbers <u>Powers and roots</u> <u>Negative indices</u> Fractional indices Irrational numbers and surds Simplify expressions with surds Expand brackets with surds Expand double brackets with surds Rationalise the denominator Solve problems with surds	Pythagoras' Theorem (find the hypotenuse) <u>Pythagoras' Theorem (find any side)</u> <u>Identify hypotenuse, opposite and adjacent sides</u> <u>Ratios in right-angled triangles</u> <u>Use the tangent ratio to find unknown side length</u> <u>Use the sine and cosine ratio to find unknown side length</u> <u>Use trigonometric ratios to find an unknown angle</u> <u>Exact trigonometric values</u> Trigonometry in 3-D shapes Area of a non-right-angled triangle Use the sine rule to find an unknown length Use the sine rule to find an unknown angle Use the cosine rule to find an unknown length Use the cosine rule to find an unknown angle	Use one value to find another <u>Introduction to simultaneous equations</u> <u>Solve simultaneous equations using graphs</u> <u>Solve simultaneous equations (no adjustments)</u> <u>Manipulating equations</u> <u>Solve simultaneous equations (adjust one)</u> <u>Solve simultaneous equations (adjust both)</u> <u>Solve simultaneous equations by substitution</u> Solve problems with simultaneous equations Solve simultaneous equations (one linear, one non-linear) using graphs Solve simultaneous equations (one linear, one non-linear) by equating expressions Solve simultaneous equations (one linear, one non-linear) using substitution
	Next Steps	Year 11: Angles, Bearings and Trigonometry	Year 11: Revision	Year 11: Transformations	Year 11: Revision	Year 11: Angles, Bearings and Trigonometry	Year 11: Equations and Formulae



Mathematics Curriculum Map

Year 11 Term 1

Unit	Gradients and Lines	Non-Linear Graphs	Using Graphs	Expanding and Factorising	Changing the Subject	Functions
Key Concepts	Algebra: Linear Graphs	Algebra: Non-Linear Graphs	Graphs Ratio, Proportion, Rates of Change: Ratio and Rates	Algebra: Equivalence and Proof and Solve Equations and Inequalities	Algebra: Equivalence and Proof	Algebra: Understand Notation and Substitute
Prior Learning	Year 9: Percentages (there may be gaps– see above) Find a percentage of a quantity or measurement Calculate percentage increase and decrease Use percentages in real-life situations, including percentages greater than 100%: Price after VAT (not price before VAT) Value of profit or loss Income tax calculations Use decimals as multipliers and use a multiplier to increase or decrease by a percentage in any scenario where percentages are used Express a given number as a percentage of another number in more complex situations	Year 9: Mensuration and Properties of 2D shapes Recognise reflection symmetry Identify and draw lines of symmetry Understand rotational symmetry Year 10: Straight Line Graphs Plot and draw graphs of $y = a$, $x = a$, $y = x$ and $y = -x$, drawing and recognising lines parallel to axes, plus $y = x$ and $y = -x$	Year 9: Perimeter and area, Simple angle facts, 3D forms Know the formula for calculating the area of a rectangle, triangle, trapezium, parallelogram Sketch nets of cuboids and prisms Know the terms face, edge and vertex	Year 9: Mensuration and Properties of 2D shapes Draw circles and arcs to a given radius or diameter Recall the definition of a circle Identify, name and draw parts of a circle including tangent, chord and segment	Year 10: Solving Equations Be able to solve linear equations. Know the difference between equations, expressions etc.	Year 9: Expressions and substitution into simple formulae Substitute into simple algebraic expressions
Key Knowledge	Substantive Make calculations involving repeated percentage change Set up, solve and interpret the answers in simple interest/depreciation problems Set up, solve and interpret the answers in compound interest/depreciation problems Find the original amount with and without a calculator given the final amount after a percentage increase or decrease the amount of the increase or decrease Disciplinary Interpret when the structure of a numerical problem requires additive, multiplicative, or proportional reasoning Develop their use of formal mathematical knowledge to interpret and solve problems, including in financial contexts	Substantive Perform and describe rotations, including on a coordinate grid Perform and describe reflection, including on a coordinate grid, using equations of lines where relevant Perform and describe translations, including on a coordinate grid and use vector notation where relevant Perform and describe enlargements with positive and fractional scale factors, including on a coordinate grid Disciplinary Use mathematical language and properties precisely Extend and formalise their knowledge of ratio and proportion in working with measures and geometry	Substantive Calculate the area of compound shapes made from triangles, rectangles, trapezia and parallelograms using a variety of metric measures Find the surface area of prisms using the formulae for triangles and rectangles, and other (simple) shapes with and without a diagram Convert between metric area measures Find the volume of a prism, including a triangular prism, cube and cuboid Estimate areas and volumes etc by rounding measurements to 1 significant figure Convert between metric volume measures Convert between metric measures of volume and capacity e.g. 1ml = 1cm ³ Use the formula for volume of pyramid Find the surface area of a pyramid Find the surface area and volumes of compound solids constructed from cubes, cuboids, pyramids Disciplinary Use mathematical language and properties precisely Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem	Substantive Recall and use formulae for the circumference of a circle and the area enclosed by a circle circumference of a circle = $2\pi r = \pi d$, area of a circle = πr^2 Give an answer to a question involving the circumference or area of a circle in terms of π Find radius or diameter, given area or perimeter of a circles Calculate perimeters and areas of composite shapes made from circles and parts of circles (including semicircles, quarter-circles, combinations of these, incorporating other polygons) Calculate arc lengths, angles and areas of sectors of circles Find the surface area and volume of a cylinder Use the formulae for volume and surface area of spheres and cones and pyramids Disciplinary Select and use appropriate calculation strategies to solve increasingly complex problems, including exact calculations involving multiples of π Use mathematical language and properties precisely Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem	Substantive Write expressions to solve problems representing a situation. Write expressions and set up simple equations. Answer ‘show that’ questions using consecutive integers (n, n + 1), squares a ² , b ² , even numbers 2n, and odd numbers 2n +1. Form and solve equations in various contexts such as; -Time / ages / Number of items / Costs -Perimeter -Area (including compound shapes and those that result in quadratic expressions) -Probability -Interior / exterior angles Be able to form and solve equations including terms that include brackets and unknowns on both sides. Disciplinary Select appropriate concepts, methods and techniques to apply to unfamiliar and nonroutine problems; interpret their solution in the context of the given problem	Substantive Recognise sequences of odd and even numbers, and other sequences including Fibonacci sequences Use function machines to find terms of a sequence Write the term-to-term definition of a sequence in words Find a specific term in the sequence using position-to-term or term-to-term rules Generate arithmetic sequences of numbers, triangular number, square and cube integers and sequences derived from diagrams Recognise such sequences from diagrams and draw the next term in a pattern sequence Find the next term in a sequence, including negative values Use the nth term of an arithmetic sequence to generate terms Use the nth term of an arithmetic sequence to decide if a given number is a term in the sequence, or find the first term over a certain number Continue a quadratic sequence and use the nth term to generate terms Distinguish between arithmetic and geometric sequences. Disciplinary Make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples; begin to use algebra to support and construct arguments (and proofs
Next Step	N/A	Year 11: Congruence/Similarity Year 11: Vectors	Year 11: Circles		Year 11: Simultaneous Equations	N/A



Mathematics Curriculum Map

Year 11 Term 2

Unit	Multiplicative Reasoning	Geometric Reasoning	Algebraic Reasoning	Transforming and Constructing	Listing and Describing	Show that...
Key Concepts	Ratio, Proportion, Rates of Change: Multiplicative Relationships	Geometry and Measures	Algebra: Equivalence and Proof	Geometry and Measures	Statistics	Number and Algebra
Prior Learning	Year 9: Perimeter and area, Simple angle facts, 3D forms Draw sketches of 3D solids Know the terms face, edge and vertex Identify and sketch planes of symmetry of 3D solid Make accurate drawings of triangles and other 2D shapes using a ruler and a protractor Construct diagrams of everyday 2D situations involving rectangles, triangles, perpendicular and parallel lines.	Year 9: Mensuration and Properties of 2D Shapes Measure and draw lines and be able to use a pair of compasses Draw circles and arcs to a given radius or diameter	Year 10: Transformations Recognise and enlarge shapes and calculate scale factors Calculate area and volume in various metric measures	Year 10: Solving Equations Year 10: Changing the Subject Rearrange simple formulae and equations, as preparation for rearranging trigonometric formulae	Year 11: Transformations Use column vectors when dealing with translations	
Key Knowledge	Substantive Understand and draw front and side elevations and plans of shapes made from simple solids Given the front and side elevations and the plan of a solid, draw a sketch of the 3D solid Disciplinary Use mathematical language and properties precisely	Substantive Construct ASA, SAS and SSS triangles accurately Use straight edge and a pair of compasses to do standard constructions: the perpendicular bisector of a given line, the perpendicular from a point to a line, the bisector of a given angle, construct angles of 90°, 45°; Draw and construct diagrams from given instructions, including the following: a region bounded by a circle and an intersecting line, a given distance from a point and a given distance from a line, equal distances from two points or two line-segments, regions may be defined by ‘nearer to’ or ‘greater than’; Find and describe regions satisfying a combination of loci Use constructions to solve loci problems (2D only) Use constructions to solve loci problems including with bearings Know that the perpendicular distance from a point to a line is the shortest distance to the line. Disciplinary Use mathematical language and properties precisely Reason deductively in geometry, including using geometrical construction	Substantive Understand congruence, as two shapes that are the same size and shape Visually identify shapes which are congruent Use the basic congruence criteria for triangles (SSS, SAS, ASA and RHS) Identify shapes which are similar; including all circles or all regular polygons with equal number of sides Identify the scale factor of an enlargement of a shape as the ratio of the lengths of two corresponding sides Prove that two shapes are similar by showing that all corresponding angles are equal in size and/or lengths of sides are in the same ratio/one is an enlargement of the other, giving the scale factor Understand the effect of enlargement on angles and perimeter of shapes Solve problems to find missing lengths in similar shapes Disciplinary Use mathematical language and properties precisely Reason deductively in geometry, including using geometrical construction Understand similarity of triangles and of other plane shapes, use this to make geometric inferences, and solve angle problems using similarity Extend and formalise their knowledge of ratio and proportion, in working with measures and geometry	Substantive Understand, recall and use Pythagoras’ Theorem in 2D, including decimal lengths a range of units and leaving answers in surd form Given 3 sides of a triangle, justify if it is right-angled or not Apply Pythagoras’ Theorem with a triangle drawn on a coordinate grid Understand, use and recall the trigonometric ratios sine, cosine and tan, and apply them to find angles and lengths in general triangles in 2D figures Find angles of elevation and depression Know the exact values of $\sin \vartheta$ and $\cos \vartheta$ for $\vartheta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° ; know the exact value of $\tan \vartheta$ for $\vartheta = 0^\circ, 30^\circ, 45^\circ$ and 60° Solve multi-step problems that require the use of both Pythagoras and trigonometry with other topics such as bearings. Disciplinary Round answers to appropriate degree of accuracy, either to a given number of significant figures or decimal places, or make a sensible decision on rounding in context of question Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem.	Substantive Understand and use column notation in relation to vectors Be able to represent information graphically given column vectors Identify two column vectors which are parallel Calculate using column vectors, and represent graphically, the sum of two vectors, the difference of two vectors and a scalar multiple of a vector. Disciplinary Reason deductively in geometry, number and algebra, including using geometrical constructions	
Next Step	Year 11: Construction and Loci	N/A	Year 11: Pythagoras and Trigonometry	N/A	Year 11: Pythagoras and Trigonometry	
Enrichment/Career						



Mathematics Curriculum Map

Year 12 - Half term 1

Unit	Algebraic Expressions	Quadratics	Equations and inequalities	Graphs and transformations	Straight line graphs
Key Concepts	Algebra	Algebra	Algebra: Solving Equations and Inequalities	Algebra: Graphs	Algebra: Linear Graphs
Prior Learning	Year 11: Surds Simplify and be able to do the 4 operations with surds Year 11: Quadratics including the formula and iteration Expand single, double and triple brackets Factorise linear and quadratic expressions	Year 12: Algebraic Expressions Factorise linear, quadratic and simple cubic expressions	Year 12: Quadratics Solve problems involving quadratic equations, factorisation, the quadratic formula and completing the square. Year 11: Simultaneous Equations involving inequalities Solve pairs of simultaneous equations, both linear and one non-linear. Be able to solve inequalities and represent them with regions on graphs	Year 12: Equations and Inequalities Solve linear simultaneous equations using eliminations or substitution. Solve simultaneous equations: one linear and one quadratic. Interpret algebraic solutions of equations graphically.	Year 11: Coordinate Geometry Understand $y=mx+c$ Be able to find the gradient of a line, given two points. Find the equation of a line. Know the relationship between parallel and perpendicular lines
Key Knowledge	Substantive Multiply and divide integer powers. Expand a single term over brackets and collect like terms. Expand the product of two or three expressions. Factorise linear, quadratic and simple cubic expressions. Know and use the laws of indices. Simplify and use the rules of surds. Rationalise the denominators. Disciplinary Recognise the underlying mathematical structure in a situation and simplify and abstract appropriately to enable problems to be solved. Construct extended arguments to solve problems presented in an unstructured form, including problems in context. Interpret and communicate solutions in the context of the original problem.	Substantive Solve problems involving quadratic equations, factorisation, the quadratic formula and completing the square. Read and use $f(x)$ notation when working with functions. Sketch the graph and find the turning point of a quadratic function. Find and interpret the discriminant of a quadratic expression. Disciplinary Use and apply models that involve quadratic functions. Recognise the underlying mathematical structure in a situation and simplify and abstract appropriately to enable problems to be solved. Construct extended arguments to solve problems presented in an unstructured form, including problems in context. Interpret and communicate solutions in the context of the original problem.	Substantive Solve linear simultaneous equations using eliminations or substitution. Solve simultaneous equations: one linear and one quadratic. Interpret algebraic solutions of equations graphically. Solve linear inequalities. Solve quadratic inequalities. Interpret inequalities graphically. Represent linear and quadratic inequalities graphically Disciplinary Understand and use language and symbols associated with set theory, as set out in the content. Apply to solutions of inequalities. Use and apply models that involve quadratic functions. Recognise the underlying mathematical structure in a situation and simplify and abstract appropriately to enable problems to be solved. Construct extended arguments to solve problems presented in an unstructured form, including problems in context. Interpret and communicate solutions in the context of the original problem.	Substantive Sketch cubic graphs. Sketch quartic graphs. Sketch reciprocal graphs of the form $y=a/x$ and y/ax^2 Use intersection points of graphs to solve equations. Translate graphs. Stretch graphs. Transform graphs of unfamiliar functions. (Transformations to be covered are: $y=af(x)$, $y=f(x)+a$, $y=f(x+a)$ and $y=f(ax)$). Disciplinary Construct and present mathematical arguments through appropriate use of diagrams and sketching graphs	Substantive Calculate the gradient of a line joining a pair of points. Understand the link between the equation of a line, and its gradient and intercept. Find the equation of a line given (i) the gradient and one point on the line or (ii) two points on the line. Find the point of intersection for a pair of straight lines. Know and use the rules for parallel and perpendicular gradients. Solve length and area problems on coordinate braids. Use straight line graphs to construct mathematical models. Disciplinary Understand, interpret and extract information from diagrams and construct mathematical diagrams to solve problems
Next Step	Year 12: Quadratics	Year 12: Equations and Inequalities	Year 12: Graphs and Transformations	Year 12: Straight Line Graphs	Year 12: Circles



Mathematics Curriculum Map

Year 12 - Half term 2

Unit	Algebraic methods	Circles	The binomial expansion	Trigonometric ratios	Trigonometric Identities and Equations
Key Concepts	Algebra: Understand Notation and Substitute	Algebra: Graphs	Algebra	Geometry and Measure: Pythagoras and Trigonometry	Geometry and Measure: Pythagoras and Trigonometry
Prior Learning	Year 12: Algebraic Expressions Factorise quadratics. Expand brackets and simplify. Substitute into algebraic expressions and formulae.	Year 12: Straight Line Graphs Find the equation of a line Find the point of intersection for a pair of straight lines. Know and use the rules for parallel and perpendicular gradients	Year 12: Algebraic Expressions Expand brackets and simplify. Substitute into algebraic expressions and formulae.	Year 11: Further Trigonometry Use and apply Trigonometry in right-angled triangles and in the sine rule, the cosine rule and the area of a triangle.	Year 11: Further Trigonometry Year 12: Trigonometric Ratios
Key Knowledge	Substantive Cancel factors in algebraic fractions. Divide a polynomial by a linear expression. Use the factor theorem to factorise a cubic expression. Construct mathematical proofs using algebra. Use proof by exhaustion and disproof by counter-example. Disciplinary Construct and present mathematical arguments through appropriate use logical deduction; precise statements involving correct use of symbols and connecting language, including: constant, coefficient, expression, equation, function, identity, index, term, variable. Understand and use mathematical language and syntax as set out in the content. Comprehend and critique mathematical arguments, proofs and justifications of methods and formulae, including those relating to applications of mathematics.	Substantive Find the midpoint of a line segment. Find the equation of a perpendicular bisector to a line segment. Know how to find the equation of a circle. Solve geometric problems involving straight lines and circles. Use circle properties to solve problems on coordinate grids. Find the angle in a semicircle and solve other problems involving circles and triangles. Disciplinary Understand, interpret and extract information from diagrams and construct mathematical diagrams to solve problems. Construct extended arguments to solve problems presented in an unstructured form, including problems in context	Substantive Use Pascal’s triangle to identify binomial coefficients and use them to expand simple binomial expressions. Use combinations and factorial notation. Use the binomial expansion to expand brackets. Find individual coefficients in a binomial expansion. Make approximations using the binomial expansion. Disciplinary Understand that many mathematical problems cannot be solved analytically, but numerical methods permit solutions to a required level of accuracy. Evaluate, including by making reasoned estimates, the accuracy or limitations of solutions, including those obtained using numerical methods.	Substantive Use the cosine rule to find a missing side or angle. Use the sine rule to find a missing side or angle. Find the area of a triangle using an appropriate formula. Solve problems involving trigonometry and triangles. Sketch the graphs of the sine, cosine and tangent functions. Sketch simple transformations of these graphs. Disciplinary Recognise the underlying mathematical structure in a situation and simplify and abstract appropriately to enable problems to be solved. Understand the concept of a mathematical problem-solving cycle, including specifying the problem, collecting information, processing and representing information and interpreting results, which may identify the need to repeat the cycle.	Substantive Extending the definitions of angles: Students begin by learning about angles in all four quadrants moving beyond the acute angles used in right-angled triangles. Standard values: They learn the exact values of trigonometrical ratios. Identities: The chapter introduces trigonometric identities, which are standard equalities involving trigonometric functions. Solving equations: Students apply these concepts first to simple trigonometric equations Disciplinary Deductive Reasoning and Proof Mathematical Abstraction and Generalisation The chapter moves students away from concrete geometry into abstract coordinate systems. "Angles in all four quadrants" requires the skill of generalisation. Students must extend their understanding of sine, cosine, and tangent from the physical sides of a right-angled triangle (0°–90°) to a periodic function on a coordinate grid (0°–360° and beyond). This involves mastering the "CAST" diagram or graphs to determine the sign (positive/negative) of ratios in different regions, a key skill for handling abstract mathematical space. Precision and Exactness The section on "Exact values of trigonometrical ratios" disciplines students to work without approximation. Rather than relying on calculator decimals, students learn to manipulate surds and precise constants. This reinforces the disciplinary standard that mathematical solutions should be exact whenever possible. Managing Multiple Solutions (Periodic Problem Solving)
Next Step	Year 12: Differentiation	Year 12: Differentiation	Year 12: Statistical Distributions	Year 12: Trigonometric Identities and Equations	Year 13: Radians



Mathematics Curriculum Map

Year 12 - Half term 3

Unit	Exponentials & Logarithms	Integration	Data Collection	Vectors	Measures of location and spread
Key Concepts	Algebra	Algebra: Calculus	Statistics	Geometry and Measure	Statistics
Prior Learning	Year 12: Algebraic Expressions Multiply and divide integer powers Know and use the laws of indices	Year 12: Differentiation Find the derivative, $f'(x)$ of dy/dx , of a simple function.	Year 10: Sampling Infer properties of populations or distributions from a sample, while knowing the limitations of sampling. Apply statistics to describe a population	Year 12: Trigonometric Ratios Use the cosine rule to find a missing side or angle. Use the sine rule to find a missing side or angle. Year 11: Vectors Understand and use vector notation Calculate the sum of two vectors, the difference of two vectors and a scalar multiple of a vector using column vectors (including algebraic terms). Find the length of a vector using Pythagoras' Theorem.	Year 11: Sampling, Cumulative, Frequency, Histograms Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers), quartiles and interquartile range.
Key Knowledge	Substantive Sketch graphs of the form $y=ax$, $y=ex$, and transformations of these graphs. Differentiate ekx and understand why this result is important. Use and interpret models that use exponential functions. Recognise the relationship between exponents and logarithms. Recall and apply the laws of logarithms., Solve equations of the form $ax=b$. Describe and use the natural logarithm function. Use logarithms to estimate the values of constant in non-linear models. Disciplinary Understand that a mathematical model can be refined by considering its outputs and simplifying assumptions; evaluate whether the model is appropriate. Recognise the underlying mathematical structure in a situation and simplify and abstract appropriately to enable problems to be solved. Understand and use mathematical language and syntax as set out in the content	Substantive Find y given dy/dx for xn . Integrate polynomials. Find $f(x)$, given $f'(x)$ and a point on the curve. Evaluate a definite integral. Find the area bounded by a curve and the x -axis. Find areas bounded by curves and straight lines. Disciplinary Understand and use mathematical language and syntax as set out in the content. Interpret and communicate solutions in the context of the original problem. Translate a situation in context into a mathematical model, making simplifying assumptions into a mathematical model, making simplifying assumptions.	Substantive Understand and be able to use the terms 'population', 'sample' and 'census' and comment on the advantages and disadvantages of each. Understand the advantages and disadvantages of simple random sampling, systematic sampling, stratified sampling, quota sampling and opportunity sampling. Define qualitative, quantitative, discrete and continuous data, and understand grouped data. Understand the large data set and how to collect data from it, identify types of data and calculate simple statistics. Disciplinary Be able to select or critique sampling techniques in the context of solving a statistical problem. Understand that different samples can lead to different conclusions about the population. Know how to use samples to make informal inferences about the population.	Substantive Use vectors in two dimensions. Use column vectors and carry out arithmetic operations on vectors. Calculate the magnitude and direction of a vector. Understand and use position vectors. Use vectors to solve geometric problems. Understand vector magnitude and use vectors in speed and distance calculations. Use vectors to solve problems in context. Disciplinary Comprehend and critique mathematical arguments, proofs and justifications of methods and formulae, including those relating to applications of mathematics. Recognise the underlying mathematical structure in a situation and simplify and abstract appropriately to enable problems to be solved.	Substantive Be able to calculate measures of central tendency such as the, mean, median and mode. Be able to calculate measures of location such as percentiles and deciles. Be able to calculate measures of spread such as range, interquartile range and interpercentile range. Be able to calculate variance and standard deviations. Understand and use coding. Disciplinary Be able to interpret and draw inferences from summary statistics.
Next Steps	Year 13: Differentiation	Year 12: Variable Acceleration	Year 12: Measures of Location and Spread	Year 12: Forces and Motion	Year 12: Representation of Data



Mathematics Curriculum Map

Year 12 - Half term 4

Unit	Statistical distributions	Probability	Constant acceleration/SUVAT	Hypothesis testing	Forces and motion
Key Concepts	Probability	Probability	Mechanics	Statistics	Mechanics
Prior Learning	Year 12: Probability Calculate probabilities for single events. Understand mutually exclusive and independent events, and determine whether two events are independent.	Year 10: Probability/Trees Calculate probabilities for single events. Understand mutually exclusive and independent events, and determine whether two events are independent.	Year 11: Gradient and Area under Graphs Plot and interpret graphs (including reciprocal graphs and exponential graphs) and graphs of non-standard functions in real contexts to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration. Calculate or estimate gradients of graphs and area under graphs (including quadratic and non-linear graphs), and interpret results in cases such as distance-time graphs, velocity-time graphs and graphs in financial contexts	Year 12: Statistical Distributions Calculate individual probabilities for the binomial distribution. Calculator cumulative probabilities for the binomial distribution.	Year 12: Vectors Use vectors in two dimensions. Use column vectors and carry out arithmetic operations on vectors. Calculate the magnitude and direction of a vector
Key Knowledge	Substantive Understand and use simple discrete probability distributions including the discrete uniform distribution. Understand the binomial distribution as a model and comment on appropriateness. Calculate individual probabilities for the binomial distribution. Calculator cumulative probabilities for the binomial distribution. Disciplinary Translate a situation in context into a mathematical model, making simplifying assumptions. Understand and use modelling assumptions.	Substantive Calculate probabilities for single events. Draw and interpret Venn diagrams. Understand mutually exclusive and independent events, and determine whether two events are independent. Use and understand tree diagrams Disciplinary Be able to make links to discrete and continuous distributions.	Substantive Understand and use the language of kinematics: position; displacement; distance travelled; velocity; speed; acceleration. Understand and interpret displacement-time graphs. Understand and interpret velocity-time graphs. Derive the constant acceleration formulae and use them to solve problems. Use the constant acceleration formulae to solve problems involving vertical motion under gravity. Disciplinary Translate a situation in context into a mathematical model, making simplifying assumptions. Understand and use modelling assumptions. Interpret and communicate solutions in the context of the original problem.	Substantive Understand the language and concept of hypothesis testing. Understand that a sample is used to make an inference about a population. Find critical values of a binomial distribution using tables. Carry out a one-tailed test for the proportion of the binomial distribution and interpret the results. Carry out a two-tailed test for the proportion of the binomial distribution and interpret the results. Disciplinary Translate a situation in context into a mathematical model, making simplifying assumptions. Understand and use modelling assumptions.	Substantive Draw force diagrams and calculate resultant forces. Understand and use Newton's first law. Calculate resultant forces by adding vectors. Understand and use Newton's second law, $F=ma$. Apply Newton's second law to vector forces and acceleration. Understand and use Newton's third law. Solve problems involving connected particles, including pulleys. Disciplinary Translate a situation in context into a mathematical model, making simplifying assumptions. Understand and use modelling assumptions. Interpret and communicate solutions in the context of the original problem. Understand, interpret and extract information from diagrams and construct mathematical diagrams to solve problems, including in mechanics.
Next Steps	Year 12: Hypothesis Testing	Year 12: Statistical Distributions	Year 12: Forces and Motions	Year 13: Regression, Correlation and Hypothesis Testing	Year 12: Variable Acceleration



Mathematics Curriculum Map

Year 12 - Half term 5	Unit	Representations of data	Correlation	Variable acceleration
	Key Concepts	Statistics	Statistics	Mechanics
	Prior Learning	Year 11: Sampling, Cumulative, Frequency, Histograms Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers), quartiles and interquartile range.	Year 12: Representations of Data Identify outliers in data sets.	Year 12: Differentiation/Integration Differentiation and integration of polynomials
	Key Knowledge	Substantive Identify outliers in data sets. Draw and interpret box plots. Draw and interpret cumulative frequency diagrams. Draw and interpret histograms. Compare two data sets. Disciplinary Be able to select or critique data presentation techniques in the context of a statistical problem.	Substantive Draw and interpret scatter diagrams for bivariate data. Interpret correlation and understand that it does not imply causation. Interpret the coefficients of a regression line equation for bivariate data. Understand when you can use a regression line to make predictions. Disciplinary Recognise and interpret possible outliers in data sets and statistical diagrams. Select or critique data presentation techniques in the context of a statistical problem Be able to clean data, including dealing with missing data, errors and outliers.	Substantive Understand that displacement, velocity and acceleration may be given as functions of time. Use differentiation to solve kinematics problems. Use calculus to solve problems involving maxima and minima. Use integration to solve kinematics problems. Use calculus to derive constant acceleration formulae. Disciplinary Interpret and communicate solutions in the context of the original problem. Understand, interpret and extract information from diagrams and construct mathematical diagrams to solve problems, including in mechanics.
	Next Steps	Year 12: Correlation	Year 12: Correlation	Year 13: Further Kinematics



Mathematics Curriculum Map

Year 12 - Half term 6	Unit	Binomial expansion	Radians	Functions and graphs	Trigonometric functions	Trigonometry modelling
	Key Concepts	Algebra	Geometry	Algebra	Geometry	Geometry
	Prior Learning	Year 12 – Autumn – Binomial Expansion Year 12 – Summer – Algebraic Methods Be able to use partial fractions, algebraic division and the factor theorem. Understand binomial expansion of the form $(a+bx)^n$, where n is a positive integer.	Year 12 - Circles Year 12 – Trigonometric Ratios Year 12 – Trigonometric Identities and Equations Year 12 – Quadratic Equations	Year 11 – Spring Term – Functions Know how to combine two functions to find an expression for a composite function Know how to find the inverse function by rearranging formulae Year 12 – Autumn – 04. Graphs and Transformations Know the key transformations of functions, translating, transforming and reflecting	Year 12 – Spring – 10. Trigonometric Identities and Equations Solve trigonometric equations. Know that $\sin^2 x + \cos^2 x = 1$ and $(\sin x)/(\cos x) = \tan x$. Know the key properties of graphs of $y = \sin x, y = \cos x$ and $y = \tan x$.	Year 13 – Autumn – 06. Trigonometric Functions Solve trigonometric equations. Know that $\sin^2 x + \cos^2 x = 1$ and $(\sin x)/(\cos x) = \tan x$. Know the key properties of graphs of $y = \sin x, y = \cos x$ and $y = \tan x$.
	Key Knowledge	Substantive: Expand $(1 + x)^n$ for any rational constant n and determine the range of values of x for which the expansion is valid. Expand $(a + bx)^n$ for any rational constant n and determine the range of values of x for which the expansion is valid. Use partial fractions to expand fractional expressions. Disciplinary: Use a mathematical model with suitable inputs to engage with and explore situations.	Substantive Defining and Converting the Unit Measuring Arc Length Calculating Areas of Sectors and Segments Solving Trigonometric Equations Small Angle Approximations Disciplinary Geometric Decomposition and Reconstruction Mathematical Modelling and Approximation Abstracting Coordinate Systems (Unit Fluency) Rigour in Exactness	Substantive: Understand and use the modulus function. Understand mappings and functions, and use domain and range. Combine two or more functions to make a composite function. Know how to find the inverse of a function graphically and algebraically. Sketch the graphs of the modulus functions $y = f(x) $ and $y = f(x)$. Apply a combination of two (or more) transformations to the same curve. Transform the modulus function. Disciplinary: Understand and use the definition of a function; domain and range of functions. Understand the use of functions in modelling, including consideration of limitations and refinements of the models.	Substantive: Understand the definition of secant, cosecant and cotangent and their relationship to cosine, sine and tangent. Understand the graphs of secant, cosecant and cotangent and their domain and range. Simplify expressions, prove simple identities and solve equations involving secant, cosecant and cotangent. Prove and use $\sec^2 x \equiv 1 + \tan^2 x$ and $\operatorname{cosec}^2 x \equiv 1 + \cot^2 x$. Understand and use the inverse trigonometric functions and their domain and ranges. Disciplinary: Understand and use the definition of a function; domain and range of functions. Construct and present mathematical arguments through appropriate use of logical deduction; precise statements involving correct use of symbols and connecting language.	Substantive: Prove and use the addition formulae. Understand and use the double-angle formulae. Solve trigonometric equations using the double-angle and addition formulae. Write expressions of the form $a \cos \theta \mp b \sin \theta$ in the forms $R \cos(\theta \mp \alpha)$ or $R \sin(\theta \mp \alpha)$. Prove trigonometric identities using a variety of identities. Use trigonometric functions to model real-life situations. Disciplinary: Construct and present mathematical arguments through appropriate use of logical deduction; precise statements involving correct use of symbols and connecting language. Translate a situation in context into a mathematical model, making simplifying assumptions. Understand and use modelling assumptions.
	Next Steps	N/A	Year 13 – Trigonometry chapters, mechanics	N/A	Year 13 – Autumn – Trigonometry Modelling	Year 13 – Autumn – 08. Parametric Equations



Mathematics Curriculum Map

Year 13 - Half term 1	Unit	Functions and graphs	Sequences and Series	Algebraic Methods
	Key Concepts	Algebra	Algebra	Algebra
	Prior Learning	Year 11 – Spring Term – Functions Know how to combine two functions to find an expression for a composite function Know how to find the inverse function by rearranging formulae Year 12 – Autumn – 04. Graphs and Transformations Know the key transformations of functions, translating, transforming and reflecting	Equations and Inequalities – Year 12 - Autumn Exponentials and Logarithms -Year 12 – Spring Trigonometric Ratios – Year 12 - Autumn	Algebraic Expressions- Year 12 – Autumn Algebraic Methods – Year 12 – Autumn Proof – Year 12
	Key Knowledge	Substantive: Understand and use the modulus function. Understand mappings and functions, and use domain and range. Combine two or more functions to make a composite function. Know how to find the inverse of a function graphically and algebraically. Sketch the graphs of the modulus functions $y= f(x) $ and $y=f(x)$. Apply a combination of two (or more) transformations to the same curve. Transform the modulus function. Disciplinary: Understand and use the definition of a function; domain and range of functions. Understand the use of functions in modelling, including consideration of limitations and refinements of the models.	Substantive Arithmetic Sequences and Series - defining an arithmetic sequence as one where the common difference between consecutive terms is constant. Find the nth term using the formula and to prove and apply the formulae for the sum of an arithmetic series. Geometric Sequences and Series - Students distinguish geometric sequences by a common ratio between terms. They learn the nth term formula and are required to prove and use the formula for the sum of the first n terms of a geometric series. Convergence and Sum to Infinity - A critical step is understanding the condition for a geometric series to be convergent, which is that the modulus of the ratio must be less than 1. Students then deduce and apply the formula for the sum to infinity. Sigma Notation - Students learn to interpret and use the Greek capital letter sigma (Σ) to write sums of series, understanding how to apply limits on the top and bottom of the symbol. Recurrence Relations: Modelling - Students apply these concepts to model real-life situations, such as population growth, financial compound interest, or physical decay, using both arithmetic and geometric models Disciplinary Formal Proof and Derivation - Students learn the disciplinary skill of establishing mathematical truth through derivation rather than empirical observation. This reinforces that formulas are not magic rules to be memorised, but logical consequences of algebraic definitions that must be constructed and verified step-by-step. Modelling and Critical Evaluation - Students learn the skill of validity checking. They must explicitly state assumptions and identify limitations. Analysis of Convergence (Handling Infinity) Students develop the conceptual skill of managing infinity within a finite framework. They learn to determine the strict algebraic conditions for stability (specifically $ r <1$) and apply this to distinguish between systems that spiral out of control and those that settle at a specific value.	Substantive Proof by Contradiction - Students learn a new method of proof where they start by assuming the original statement is false (the negation). They then use logical steps to show that this assumption leads to a contradiction (a disagreement with the assumption or a known fact), thereby concluding the original statement must be true. Simplifying Algebraic Fractions - Students refine skills in multiplying and dividing algebraic fractions by factorising numerators and denominators to cancel common terms. They also practice adding and subtracting fractions by finding common denominators to combine them into a single expression. Partial Fractions (Distinct Factors) - Students learn to decompose a single fraction with distinct linear factors in the denominator into the sum of two separate fractions with constant numerators. They use methods like substitution or equating coefficients to find the values of these constants. Partial Fractions (Repeated Factors): The method is extended to denominators containing repeated linear factors. Students learn that this requires three separate fractions in the decomposition: one for the distinct factor, one for the linear factor, and one for the squared factor. Algebraic Division Disciplinary Indirect Reasoning (Proof by Contradiction) Students learn the disciplinary skill of indirect proof, moving beyond the direct derivations used in Year 1. This develops the ability to construct rigorous logical arguments based on validity and consistency rather than just calculation. Structural Decomposition (Partial Fractions) Students acquire the skill of decomposition—breaking complex mathematical objects into simpler, independent components. This disciplines the student to look for the underlying "primitive" structures that make up a complex expression. This is a critical preparatory skill for Calculus, where integrating a complex fraction is often impossible without first decomposing it into simpler parts. Algorithmic Transformation (Polynomial Division) The chapter reinforces the skill of applying algebraic algorithms to transform expressions into more useful formats. This teaches students to classify algebraic objects by their "degree" and apply a systematic process to reduce them.
	Next Steps	N/A	N/A	Calculus – Differentiation and Integration



Mathematics Curriculum Map

Year 13 - Half term 2	Unit	Differentiation	Parametric equations	Numerical methods	Vectors
	Key Concepts	Calculus	Algebra Geometry	Algebra Calculus	Algebra
	Prior Learning	Year 12 – Spring – 12. Differentiation Year 13 – Autumn – 06. Trigonometric Functions Year 13 – Spring – 08. Parametric Equations Know and use trigonometric identities. Be able to differentiate functions of the form ax^n Be familiar with parametric equations	Year 13 – Autumn – 06. Trigonometric Functions Solve trigonometric equations. Know that $\sin^2 x + \cos^2 x = 1$ and $(\sin x)/(\cos x) = \tan x$. Know the key properties of graphs of $y = \sin x$, $y = \cos x$ and $y = \tan x$.	Year 13 – Autumn – 03. Sequences and Series Knowledge of series, sequences and recurrence relations. Year 13 – Spring – 09. Differentiation Be able to differentiate more complex functions Year 12 – 13. Integration Apply integration techniques from Year 1.	Year 12 – Spring – Vectors Working with 2D vectors Year 12 – Autumn 2 – Trigonometric Ratios
	Key Knowledge	Substantive: Differentiate trigonometric functions. Differentiate exponentials and logarithms. Differentiate functions using the chain, product and quotient rules. Differentiate parametric equations. Differentiate functions which are defined implicitly. Use the second derivative to describe the behaviour of a function. Solve problems involving connected rates of change and construct simple differential equations. Disciplinary: Understand and use mathematical language and syntax as set out in the content. Recognise the underlying mathematical structure in a situation and simplify and abstract appropriately to enable problems to be solved. Interpret and communicate solutions in the context of the original problem.	Substantive: Convert parametric equations into Cartesian form by substitution. Convert parametric equations into Cartesian form using trigonometric identities. Understand and use parametric equations of curves and sketch parametric curves. Solve coordinate geometry problems involving parametric equations. Use parametric equations in modelling in a variety of contexts. Disciplinary: Understand and use the definition of a function; domain and range of functions. Understand, interpret and extract information from diagrams and construct mathematical diagrams to solve problems, including in mechanics. Translate a situation in context into a mathematical model, making simplifying assumptions.	Substantive: Locate roots of $f(x)=0$ by considering changes of sign. Use iteration to find an approximation to the root of the equation $f(x)=0$. Use the Newton-Raphson procedure to find approximations to the solutions of equations of the form $f(x)=0$. Use numerical methods to solve problems in context. Disciplinary: Understand that many mathematical problems cannot be solved analytically, but numerical methods permit solution to a required level of accuracy. Evaluate, including by making reasoned estimates, the accuracy or limitations of solutions, including those obtained using numerical methods.	Substantive 3D Coordinates - Students begin by extending the Cartesian coordinate system from two axes to three axes. This establishes the spatial framework necessary for working in three dimensions. Vectors in 3D - Students learn to represent vector quantities in 3D. This section introduces the unit vector allowing for the manipulation of column vectors with three components. Solving Geometric Problems - Students apply vector rules to abstract geometry. This involves using 3D vectors to determine properties of geometric shapes, lines, and points within 3D space, covering concepts such as collinearity and position vectors. Application to Mechanics Disciplinary Spatial Generalisation (Extending Dimensions) Students must move beyond the "flat" geometry of the page (x,y) to visualise and manipulate objects in three-dimensional space (x,y,z). This reinforces the concept that algebraic structures hold true regardless of the number of dimensions involved. Geometric Deduction and Argument - Students learn to prove geometric facts (such as whether lines are parallel, intersect, or are collinear) using vector arithmetic rather than visual measurement or scale drawing. This disciplines the mind to rely on logical algebraic definition rather than visual intuition. Interdisciplinary Modelling This requires students to translate physical scenarios (likely involving forces, velocity, or acceleration) into vector notation, solve the problem mathematically in 3D, and then interpret the result back into the physical context (e.g., speed or distance).
	Next Step	Year 13 - Spring – 10. Numerical Methods	Year 13 – Spring - 09. Differentiation	Year 13 - Spring – 11. Integration	Year 13 – Spring – Mechanics – 08. Further Kinematics



Mathematics Curriculum Map

Year 13 - Half term 3	Unit	Integration	Regression, correlation and hypothesis testing	Conditional Probability
	Key Concepts	Calculus	Statistics	Statistics
	Prior Learning	Year 13 – Spring – 09. Differentiation Be able to differentiate more complex functions Knowledge of trigonometry functions and their derivatives. Year 12 – Spring - 13. Integration Apply integration techniques from Year 1.	Year 12 – Autumn – Statistics – 04. Correlation Draw and interpret scatter diagrams for bivariate data. Interpret correlation and understand that it does not imply causation. Interpret the coefficients of a regression line equation for bivariate data. Understand when you can use a regression line to make predictions. Year 12 – Spring - Statistics – 07. Hypothesis Testing Understand the language and concept of hypothesis testing. Find critical values of a binomial distribution using tables. Carry out a one-tailed test for the proportion of the binomial distribution and interpret the results. Carry out a two-tailed test for the proportion of the binomial distribution and interpret the results.	Year 12: Probability Calculate probabilities for single events. Draw and interpret Venn diagrams. Understand mutually exclusive and independent events, and determine whether two events are independent. Use and understand tree diagrams
	Key Knowledge	Substantive: Integrate standard mathematical functions including trigonometric and exponential functions and use the reverse of the chain rule to integrate functions of the form $f(ax+b)$. Use trigonometric identities in integration. Use the reverse of the chain rule to integrate more complex functions. Integrate functions by making a substitution, using integration by parts and using partial fractions. Use integrations to find the area under a curve. Solve simple differential equations and model real-life situations with differential equations. Disciplinary: Be able to select the correct method for integration and justify their choices. Be able to select the correct substitution and justify their choices. Appreciate the trapezium rule is an approximation and realise when it gives an overestimate or underestimate.	Substantive: Understand exponential models in bivariate data. Use a change of variable to estimate coefficients in an exponential model. Understand and calculate the product moment correlation coefficient. Carry out a hypothesis test for zero correlation. Disciplinary: Translate a situation in context into a mathematical model, making simplifying assumptions. Use and interpret a mathematical model with suitable inputs to engage with and explore situations. Understand that a mathematical model can be refined by considering its outputs and simplifying assumptions; evaluate whether the model is appropriate.	Substantive: Understand set notation in probability. Understand conditional probability. Solve conditional probability problems using two-way tables and Venn diagrams. Use probability formulae to solve problems. Solve conditional probability using tree diagrams. Disciplinary: Understand and use language and symbols associated with set theory, as set out in the content. Apply to solutions of inequalities and probability. Be able to critique assumptions made and the likely effect of more realistic assumptions.
	Next Steps	NA	Year 13 – Spring – Statistics – 03. The Normal Distribution	NA



Mathematics Curriculum Map

Year 13 - Half term 4	Unit	The normal distribution	Moments	Forces and friction	Projectiles	Applications of forces
	Key Concepts	Statistics	Mechanics	Mechanics	Mechanics	Mechanics
	Prior Learning	Year 13 – Spring – Statistics – 01. Hypothesis Testing Use appropriate language of statistical hypothesis testing. Be able to apply a hypothesis test to the binomial distribution.	Year 12 – Spring – Mechanics – 10. Forces and motion Knowledge of types of forces and force diagrams. Understanding the assumptions made throughout Mechanics in Year 1 - (e.g. particle, rigid, light, etc.) Use of Weight = mass × gravity ($W = mg$) and S.I. units.	Year 12 – Spring – Pure – 10. Trigonometric Ratios Understand and apply 2D trigonometry from GCSE, including Cosine and sine rules. Knowledge of the identity $(\sin x)/(\cos x) = \tan x$ (to find the angle of the resultant). Year 12 – Spring – Mechanics – 10. Forces and Motion Understand basic vectors, magnitude and direction (kinematics) and i, j vectors. Use force diagrams and related assumptions.	Year 12 – Spring – Pure – 10. Trigonometric Ratios Know and apply Trigonometry to solve problems. Know and use the $\sec^2 x = 1 + \tan^2 x$ identity and solve trigonometric equations. Year 12 – Autumn – Mechanics – 9. Constant Acceleration Know and apply 'suvat' formulae. Solve problems involving vertical motion under gravity. Solve problems involving i, j (2D) vectors, including magnitude and direction.	Year 13 – Autumn – Mechanics – 05. Forces and Friction Know the different types of forces and force diagrams from Year 1. Knowledge of S.I. units. Solve problems involving moments and frictional forces. Know how to resolve forces.
	Key Knowledge	Substantive: Understand the normal distribution and the characteristics of a normal distribution curve. Find percentage points on a standard normal curve. Find unknown means and/or standard deviations for a normal distribution. Approximate a binomial distribution using a normal distribution. Carry out a hypothesis test for the mean of a normal distribution. Disciplinary: Select an appropriate probability distribution for a context, with appropriate reasoning, including recognising when the binomial or the Normal model may not be appropriate. Translate a situation in context into a mathematical model, making simplifying assumptions. Understand that a mathematical model can be refined by considering its outputs and simplifying assumptions; evaluate whether the model is appropriate.	Substantive: Calculate the turning effect of a force applied to a rigid body. Calculate the resultant moment of a set of forces acting on a rigid body. Solve problems involving uniform rods and equilibrium. Solve problems involving non-uniform rods. Solve problems involving rods on the point of tilting. Disciplinary: Understand, interpret and extract information from diagrams and construct mathematical diagrams to solve problems, including in mechanics. Translate a situation in context into a mathematical model, making simplifying assumptions. Understand that a mathematical model can be refined by considering its outputs and simplifying assumptions; evaluate whether the model is appropriate.	Substantive: Resolve forces into components. Use the triangle law to find a resultant force. Solve problems involving smooth or rough inclined planes. Understand friction and the coefficient of friction. Use $F \leq \mu R$ Disciplinary: Understand, interpret and extract information from diagrams and construct mathematical diagrams to solve problems, including in mechanics. Translate a situation in context into a mathematical model, making simplifying assumptions. Understand that a mathematical model can be refined by considering its outputs and simplifying assumptions; evaluate whether the model is appropriate.	Substantive: Model motion under gravity for an object projected horizontally. Resolve velocity into components. Solve problems involving particles projected at an angle. Derive the formulae for the time of flight, range and greatest height, and the equation of the path of the projectile. Disciplinary: Understand, interpret and extract information from diagrams and construct mathematical diagrams to solve problems, including in mechanics. Translate a situation in context into a mathematical model, making simplifying assumptions. Understand that a mathematical model can be refined by considering its outputs and simplifying assumptions; evaluate whether the model is appropriate.	Substantive: Find an unknown force when a system is in equilibrium. Solve statics problems involving weight, tensions and pulleys. Understand and solve problems involving limiting equilibrium. Solve problems involving motions on rough or smooth inclined planes. Solve problems involving connected particles that require the resolution of forces. Disciplinary: Understand, interpret and extract information from diagrams and construct mathematical diagrams to solve problems, including in mechanics. Translate a situation in context into a mathematical model, making simplifying assumptions. Understand that a mathematical model can be refined by considering its outputs and simplifying assumptions; evaluate whether the model is appropriate.
	N	NA	N/A	Year 13 – Autumn – Mechanics - 06. Projectiles	Year 13 – Spring – Mechanics – 08. Further Kinematics	Year 13 – Spring – Mechanics – 08. Further Kinematics



Mathematics Curriculum Map

Year 13 - Half term 5	Unit	Further kinematics
	Key Concepts	Mechanics
	Prior Learning	Year 13 – Autumn – Mechanics – 07. Application of Forces Solve problems involving variable forces.
	Key Knowledge	Substantive: Work with vectors for displacement, velocity and acceleration when using the vector equations of motion. Use calculation with harder functions of time involving variable acceleration. Differentiate and integrate vectors with respect to time. Disciplinary: Understand, interpret and extract information from diagrams and construct mathematical diagrams to solve problems, including in mechanics. Translate a situation in context into a mathematical model, making simplifying assumptions. Understand that a mathematical model can be refined by considering its outputs and simplifying assumptions; evaluate whether the model is appropriate.
	Next Steps	N/A