KS3 Delta

Year 7							
Autumn Term 1A		**Autumn Term 1A**		**Autumn Term 1B**		**Autumn Term 1B**	
TOPIC TITLE: **Analysing and displaying data**		**TOPIC TITLE:** **Number skills**		**TOPIC TITLE:** **Equations, functions and formulae**		**TOPIC TITLE:** **Fractions**	
Topics	**Domains (Core knowledge and skills)**	**Topics**	**Domains (Core knowledge and skills)**	**Topics**	**Domains (Core knowledge and skills)**	**Topics**	**Domains (Core knowledge and skills)**
1.1 Two-way tables and bar charts 1.2 Averages and range 1.3 Grouped data 1.4 More graphs 1.5 Pie charts 1.6 STEM: Scatter graphs and correlation charts	• Use two-way tables. • Interpret and draw dual bar charts and compound bar charts. • Choose the most appropriate average for a set of data. • Find the mode, median, mean and range for a set of data. • Compare sets of data using averages and the range. • Group discrete and continuous data. • Draw and interpret grouped frequency diagrams. • Interpret and draw line graphs. • Recognise when a graph is misleading. • Draw and interpret pie charts. • Graph paper and draw scatter graphs. • Describe the correlation between two sets of data. • Draw a line of best fit and use it to estimate values.tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data and know their appropriate use	2.1 Factors, primes and multiples 2.2 Using negative numbers 2.3 Multiplying and dividing 2.4 Squares and square roots 2.5 More powers and roots 2.6 Calculations	• Understand the difference between multiples, factors and primes. • Find all the factor pairs of any whole number. • Find the HCF and LCM of two numbers. • Add, subtract, multiply and divide positive and negative numbers. • Use mental and written strategies for multiplication. • Divide a 3-digit integer by a single or 2-digit integer. • Use index notation for squares and square roots. • Calculate with squares and square roots. • Carry out calculations involving squares, cubes, square roots and cube roots. • Use factorising to work out square roots and cube roots. • Solve word problems using square roots and cube roots. • Estimate answers to complex calculations. • Carry out calculations involving brackets.	3.1 Simplifying algebraic expressions 3.2 Writing algebraic expressions 3.3 STEM: Using formulae 3.4 Writing formulae 3.5 Brackets and powers 3.6 Factorising expressions	• Simplify expressions by collecting like terms. • Construct expressions using four operations. • Substitute into formulae. • Derive formulae from a description. • Expand expressions involving brackets. • Substitute into expressions involving powers. • Factorise an algebraic expression.	4.1 Working with fractions 4.2 Adding and subtracting fractions 4.3 Fractions, decimals, and percentages 4.4 Multiplying and dividing fractions 4.5 Working with mixed numbers	• Compare and simplify fractions. • Write one number as a fraction of another. • Work out simple fractions of amounts. • Write an improper fraction as a mixed number. • Add and subtract fractions. • Work with equivalent fractions, decimals and percentages. • Use division to write a fraction as a decimal. • Work out fractions of amounts. • Divide an integer and a fraction by a fraction. • Multiply a fraction by a fraction. • Add and subtract mixed numbers. • Enter time as a mixed number into a calculator. • Multiply and divide a mixed number.

Prior Domains:	Prior Domains:	Prior Domains:	Prior Domains:
• Continue scale numbers in equal steps. • Read and interpret a simple bar chart. • Calculate the mode, range and median of a set of whole numbers. • Calculate the mean, median, mode and range for two simple sets of data. • Values of a discrete class. • Determine the mode from a frequency diagram. • Tally a set of values into a grouped frequency table. • Read and interpret a line graph. • Interpret the trend of a graph from its shape. • The total angle of a circle is 360° • Identify fractions of a diagram. • Calculate a fraction of an amount. • Use a ruler and protractor to draw an acute or obtuse angle. • Understand scales of axes drawn on graph paper. • Read and plot coordinates in the first quadrant.	• Find missing numbers in multiplications. • Identifying multiples and factors. • Completing a Venn diagram. • Compare positive and negative numbers. • Complete a number line with negative integers. • Calculate new temperature after a fall and rise. • Compare negative and positive numbers. • Round to the nearest 10. • Calculate using BIDMAS. • Divide by a single-digit number. • Multiply two 2-digit numbers. • Multiply integers and 1-place decimals. • Recognise square numbers. • Multiply two negative numbers. • Recall squares and square roots. • Multiply positive and negative numbers. • Order of operations. • Use index notation. • Recall square and cube numbers. • Round to the nearest whole number. • Order of operations. • Recall square roots and cube roots.	• Writing repeated addition as multiplications. • Writing repeated multiplications in index form. • Calculating the value of positive numbers raised to a positive power. • Simplify expressions by collecting like terms. • Simplify expressions multiplying and dividing algebraic terms. • Calculations involving the priority of operations. • Substitute positive integers into simple formula written in words. • Substitute positive integers into algebraic expressions. • Priority of operations. • Write simple algebraic expressions. • Substitute integers into algebraic expressions. • Calculating following the order of operations. • Simplify algebraic expressions. • Recognise the distributive law. • Finding the common factors of a pair of numbers. • Expand brackets. • Find the common and HCF of pairs of terms.	• Identifying fractions from a diagram. • Finding the HCF of two numbers. • Comparing unit fractions or non-unit fractions with the same denominator. • Identifying equivalent fractions. • Simplifying fractions. • Finding the LCM of two numbers. • Dividing by an integer (with remainders). • Identifying simple equivalent fractions, decimals and percentages. • Completing equivalent fractions with a denominator of 10. • Division (with remainders). • Writing a number of minutes as a fraction of an hour. • Knowing that the order of multiplication does not matter. • Finding a fraction of a quantity. • Simplifying fractions. • Multiplying a fraction by an integer (whole-number answers). • Writing times as a fraction of an hour. • Adding and subtracting fractions. • Multiplying and dividing fractions. • Writing improper fractions as mixed numbers.

Spring Term 2A		Spring Term 2A		Spring Term 2B	
TOPIC TITLE: **Angles and shapes**		**TOPIC TITLE:** **Decimals**		**TOPIC TITLE:** **Equations**	
Topics 5.1 Angles and parallel lines 5.2 Triangles 5.3 Quadrilaterals 5.4 Polygons	**Domains (Core knowledge and skills)** • Work out unknown angles when two or more lines meet or cross at a point. • Work out unknown angles involving parallel lines. • Describe the line and rotational symmetry of triangles. • Understand how to prove that a result is true. • Use properties of a triangle to work out unknown angles.	**Topics** 6.1 Ordering decimals 6.2 Rounding decimals 6.3 Adding and subtracting decimals 6.4 Multiplying decimals 6.5 Dividing decimals 6.6 Fractions, decimals and percentages 6.7 FINANCE: Working with percentages	**Domains (Core knowledge and skills)** • Write decimals in ascending and descending order. • Round to decimal places. • Add and subtract decimals. • Multiply a decimal by an integer. • Use place value to multiply decimals. • Divide a decimal by a whole number. • Divide a number by a decimal.	**Topics** 7.1 Solving one-step equations 7.2 Solving two-step equations 7.3 More complex equations 7.4 Trial and improvement	**Domains (Core knowledge and skills)** • Write and solve simple equations. • Solve problems using equations. • Write and solve two-step equations. • Write and solve equations that have brackets. • Write and solve equations with letters on both sides. • Solve equations that include x^2 and x3 • Use trial and improvement to find solutions to 1 decimal place.

	• Use the properties of isosceles and equilateral triangles to solve problems. • Describe the line and rotational symmetry of quadrilaterals. • Describe the properties of quadrilaterals. • Solve problems involving quadrilaterals. • Work out the interior and exterior angles of a polygon.		• Convert between fractions decimals and percentages. • Compare different proportions using percentages. • Calculate percentages with and without a calculator. • Calculate percentage increases and decreases. • Work backwards to solve a percentage problem.)		
Prior Domains: • Angles on a straight line. • Angles around a point. • Subtracting integers from 90, 180 and 360. • Name acute, obtuse and reflex angles. • Estimate and measure acute, obtuse and reflex angles. • Identify parallel and perpendicular lines and use the correct notation to mark them on a diagram. • Angles on a straight line. • Subtracting integers from 180. • Identify equilateral, isosceles and scalene triangles. • Know the equal angles of equilateral and isosceles triangles. • Angle sum of a triangle. • Definition of a quadrilateral. • Identify corresponding angles. • Write the coordinates of points in the first quadrant. • Identify a square. • Subtract integers from 180. • Divide 360 by an integer. • Know what the interior angle of a shape is. • Angles on a straight line. • Angles around a point. • Exterior angle of a triangle.		**Prior Domains:** • Place a set of integers in order. • Identify place value up to hundredths. • Order numbers. • Use < and > signs. • Rounding numbers to the nearest 10. • Identify different digits after a decimal point. • Round to the nearest whole number. • Write a number in millions to 1 decimal place. • Basic addition and subtraction or whole numbers. • Subtraction of whole numbers that requires borrowing. • Working out the missing number in an addition. • Multiplying and dividing by powers of 10. • Practice of column multiplication. • Using partitioning to multiply a 1 digit number by a 2 digit number. • Rounding to the nearest 10 to approximate a 2 digit multiplication. • Multiplying by 10 and 100. • Review of division. • Converting times in minutes into fractions of an hour. • Identifying tenths and hundredths. • Converting simple fractions to decimals. • Calculating 10% of a number. • Calculating 50% of a number. • Calculating 10% and multiples and factors of 10% of a number.		**Prior Domains:** • Four operations with negative numbers. • Substituting into expressions. Check students remember how to substitute into e.g. xx/3 and mnmn. • Writing simple expressions. • Substituting into expressions, including with brackets and squares, to check students are using correct order of operations. • Solve one-step equations, including with negative solutions. • Expand brackets. • Using alternate and corresponding angles. • Write expressions for 'think of a number' problems. • Solve two-step equations, including with negative solution. • Finding both square roots of square numbers, and cube roots of positive and negative cube numbers. • Find the values that a square or cube root lies between. • Use a calculator to work out the value of expressions involving xx^2 and xx^3 for integer and decimal values. • Decide which of a pair of values is closer to 12.	

Summer Term 3A	Summer Term 3A	Summer Term 3B
TOPIC TITLE:	**TOPIC TITLE:**	**TOPIC TITLE:**

Multiplicative reasoning		Perimeter, area and volume		Sequences and graphs	
Topics 8.1 STEM: Metric and imperial units 8.2 Writing ratios 8.3 Sharing in a given ratio 8.4 Proportion 8.5 Proportional reasoning 8.6 Using the unitary method	• **Convert between metric and imperial units.** • **Use metric units.** • **Write a ratio in its simplest form.** • **Simplify a ratio expressed in fractions or decimals.** • **Share a quantity in 2 or more parts in a given ratio.** • **Understand the relationship between ratio and proportion.** • **Solve simple word problems involving ratio and direct proportion.** • **Solve simple word problems involving ratio and inverse proportion.** • **Solve problems involving ratio and proportion using the unitary method.** • **Write ratios in the form 1 : n** • **Solve best buy problems.**	**Topics** 9.1 Triangles, parallelograms, and trapeziums 9.2 Perimeter and area of compound shapes 9.3 Properties of 3D solids 9.4 Surface area 9.5 Volume 9.6 STEM: Measures of area and volume	**Domains (Core knowledge and skills)** • Calculate the area of triangles. • Calculate the area of parallelograms. • Calculate the area of trapeziums. • Calculate the perimeter of shapes made from rectangles and triangles. • Calculate the area of shapes made from rectangles and triangles. • Identify nets of different 3D shapes. • Know the properties of 3D shapes. • Calculate the surface area of a cube. • Calculate the surface area of a cuboid. • Calculate the volume of a cube. • Calculate the volume of a cuboid. • Convert between different units of volume: cm^3, ml and litres. • Convert between metric measures for area and volume.	**Topics** 10.1 Sequences 10.2 The nth term 10.3 Pattern sequences 10.4 Coordinates and line segments 10.5 Graphs	**Domains (Core knowledge and skills)** • Work out the terms of an arithmetic sequence using the term-to-term rule. • Work out a given term in a simple arithmetic sequence. • Work out and use expressions for the nth term in an arithmetic sequence. • Generate sequences and predict how they will continue. • Recognise geometric sequences and work out the term-to-term rule. • Use positive and negative coordinates. • Work out the midpoint of a line segment. • Draw straight-line graphs. • Recognise straight-line graphs parallel to the axes. • Recognise graphs of y = x and y = −x
Prior Domains: • Asks students to complete conversions between different metrics. • Identify the most suitable metric units to be used in measuring length and capacity. • Convert between different metric units of length, mass and capacity. • Students practise short division, which are skills needed for reducing ratios to their simplest form. • Recap on prior knowledge in order to prepare them for the content of the unit. • Remind students of the definition of highest common factor. Students find the highest common factors of pairs of numbers. • Practise writing ratios. • Recap on common metric conversions. • Students practise writing equivalent ratios to 4 : 3. • Practise finding equivalent ratios and simplifying ratios. • Students practise converting simple fractions to percentages and vice versa.		**Prior Domains:** • Asks students to perform simple multiplications, similar to the type they will be using in the lesson. • Asks about the meaning of perpendicular. • Finding the area of squares and rectangles. • Using the area of squares and rectangles to find a side length. • Substituting values into expressions. • Reviews order of operations and previews the type of calculation necessary for calculating a compound area. • Review of calculating the area of a rectangle. • Review of the work learnt in 9.1 – calculating the area of a triangle, parallelogram and trapezoid. • Reviews the names of common 2D shapes. • Reviews the meaning of the word parallel. • Asks students to name some common 3D solids and the 2D shapes that form the faces. • Working out missing numbers in multiplication problems – the types of multiplications students will encounter during the lesson.		**Prior Domains:** • Multiples. • Finding a value halfway between two others. • Find the next three terms in linear sequences. • Find missing terms in simple sequences. • Finding the 10th term of sequences of multiples. • Identify the term-to-term rule for an arithmetic sequence. • Substitute positive values into linear algebraic expressions. • Solve one- and two-step equations. • Finding terms in the sequence of multiples of 2 and identifying an arithmetic sequence. • Substitution. • Draw the next term in a sequence of simple patterns. • Triangular and square numbers. • Halving whole numbers, adding a negative to a positive, order of operations. • Coordinates in the first quadrant.

• Practise converting fractions to percentages and writing fractions in their simplest form. • Practise doubling and halving numbers. • Students are given the value of one item then asked to find the cost of different numbers of items. • Draw out the fact that students are using multiplication. • Practise multiplication and division facts by completing a multiplication square. • Practise multiplying and dividing. • Practise simplifying ratios where they may have to convert to the same unit.	• Sketching a net of a cube and a cuboid. • Working out the area of one face of a cuboid. • Calculating the area of a rectangle and a square. • Multiplication problems similar to the types of multiplication that will be required to find the volume of a cuboid. • An introduction to volume as the number of 1 cm cubes. Assume in part (b) that there are 2 cubes underneath the 2 on top. • There are 10 000 m^2 in 1 hectare. • There is also practice here multiplying by 100. • Tests students only multiplying and dividing by powers of 10. • Asks students to work out the missing number in a question involving multiplying or dividing by powers of 10.	• Order of operations including negative numbers. • Calculate missing values in 2-step function machines. • Substitute value of xx into simple linear equations.

Year 8							
Autumn Term 1A		**Autumn Term 1A**		**Autumn Term 1B**		**Autumn Term 1B**	
TOPIC TITLE: **Factors and powers**		**TOPIC TITLE:** **Working with powers**		**TOPIC TITLE:** **2D shapes and 3D solids**		**TOPIC TITLE:** **Real life graphs**	
Topics 1.1 Prime factor decomposition 1.2 Laws of indices 1.3 STEM: Powers of 10 1.4 Calculating and estimating	**Domains (Core knowledge and skills)** • Write the prime factor decomposition of a number. • Use prime factor decomposition to find the HCF or LCM or two numbers. • Work out the laws of indices for positive powers. • Show that any number to the power of zero is 1. • Use the laws of indices for multiplying and dividing. • Use and understand powers of 10. • Use the prefixes associated with powers of 10. • Understand the effect of multiplying and dividing by any integer power of 10. • Calculate with powers. • Round to a number of significant figures.	**Topics** 2.1 simplifying expressions 2.2 More simplifying 2.3 Expanding and simplifying 2.4 Substituting and solving	**Domains (Core knowledge and skills)** • Simplify expressions involving powers and brackets. • Understand the meaning of an identity. • Use the index laws in algebraic calculations and expressions. • Simplify expressions with powers. • Write and simplify expressions involving brackets and powers. • Factorise an algebraic expression. • Substitute integers into expressions. • Construct and solve equations.	**Topics** 3.1 Plans and elevations 3.2 Surface area of prisms 3.3 Volume of prisms 3.4 Circumference of a circle 3.5 Area of a circle 3.6 Cylinders 3.7 Pythagoras' theorem	**Domains (Core knowledge and skills)** • Use 2D representations of 3D solids. • Sketch nets of 3D solids. • Calculate the surface area of prisms. • Calculate the volume of right prisms. • Name the different parts of a circle. • Calculate the circumference. • Calculate the radius or diameter when you know the circumference. • Calculate the area of a circle. • Calculate the radius or diameter when you know the area. • Calculate the volume and surface area of a cylinder. • Use Pythagoras' theorem in right-angled triangles.	**Topics** **4.1 Direct proportion** **4.2 FINANCE: Interpreting financial graphs** **4.3 Distance-time graphs** **4.4 Rates of change** **4.5 Misleading graphs**	**Domains (Core knowledge and skills)** **Recognise when values are in direct proportion.** **Plot graphs and read values to solve problems.** **Interpret graphs from different sources.** **Understand financial graphs.** **Draw and interpret distance–time graphs.** **Use distance–time graphs to solve problems.** **Interpret graphs that are curved.** **Interpret real-life graphs.** **Understand when graphs are misleading.**

Prior Domains:	Prior Domains:	Prior Domains:	Prior Domains:
• Recognising primes. • Writing a product using index notation. • Finding a product of three numbers. • Finding the HCF of two numbers. • Finding the LCM of two numbers. • Writing a product using index notation. • Recognising square and cube numbers. • Multiplication and division. • Multiplying simple powers. • Using the x^yxy calculator key. • Multiplying and dividing powers of 10 using the laws of indices. • Recognising positive powers of 10. • Multiplying and dividing by 10, 100, 1000. • Recalling or finding powers of 2. • Using the laws of indices. • Multiplying negative numbers. • Using rounding to estimate answers.	• Simplifying expressions. • Collect like terms. • Add expressions. • Expand brackets. • Multiply algebraic terms. • Recalling the value of numbers raised to power 0 or 1. • Use the index laws for multiplication and division of small positive integer powers. • Simplify simple algebraic expressions. • Identifying like terms. • Finding the HCF. • Simplify simple algebraic expressions. • Multiply a single term over a bracket. • Factorise a linear expression. • Constructing a simple linear expression. • Substitute into simple expressions. • Solve simple linear equations.	• Drawing shapes with set dimensions accurately. • Writing down the names of 2D shapes that appear on 3D objects. • Visualising the 3D shapes formed by nets. • Sketching nets for 3D shapes. • Students will need to describe the faces on a triangular prism. Encourage accuracy. Two right-angled triangles the same size (congruent) and three rectangles that have different widths but the same length. • Calculating the area of 2D shapes. • Drawing the net of a cube and cuboid. • Calculating the surface area of a cube and a cuboid. • Reminds students of units of capacity – converting between cm^3 and millilitres and litres. • Recaps finding the volume of a cuboid from KS3 Maths Delta 1. • Asks about different units of volume (as opposed to area or surface area). • Calculate the area of 2D shapes, including compound shapes. • Calculating the perimeter. • Practicing rounding. Most questions in the next few sections will require students to round their answer. • Substituting into a formula, similar to the type of equation students will use in the main lesson. • Working out the square and square root of a number. • Identifying units that are used for area (as opposed to length or volume). • Substituting into formulae. These questions mimic the type of skills students will need to solve area questions during the exercise. • Using the pi button on the calculator. • Working out square numbers. • Converting between units of capacity. • Calculating the area and circumference of a circle given the radius or the diameter. • Substituting numbers into a formula that will mimic the formula for the volume of a cylinder. • Calculating the volume of a right prism.	• Converting between yards and metres given the fact that 1 yard ≈ 0.9 metres. • Using direct proportion in a written question. • Drawing a simple direct proportion graph. • Using phrases like ‘at least’ and ‘no more than’. • Writing down coordinates from a grid as a way of practicing reading data from a graph. • Understanding that 60 km/h means the car travels 60 km every hour. • Adding and subtracting times together. • Working out decimals of 1 hour. • The fluency reviews the steepness of the line from the last lesson by asking students who is travelling the fastest. • Students are asked to read from a graph as in previous sections, but the graph is non-linear. • Asking students what is misleading about a blank pie chart. The chart has no title and no labels. • The first question shows students the same data in a dual bar chart and a 3D dual bar chart. The 3D dual bar chart is much harder to read. • The pie chart in the second question is not correct as the percentages add up to more than 100%. Also there are no labels and no title. The fact that it is 3D makes the 75% section look as big as the 89% section. Also the 34% section is removed from the chart, which is confusing.

		• Working out square numbers. • Identifying the longest side of a triangle. • Working out the value of square and square roots (using the skills necessary when working with Pythagoras' theorem).	

Spring Term 2A		Spring Term 2A		Spring Term 2B	
TOPIC TITLE: **Transformations**		**TOPIC TITLE:** **Fractions, decimals, and percentages**		**TOPIC TITLE:** **Constructions and loci**	
Topics 5.1 Reflection and translation 5.2 Rotation 5.3 Enlargement 5.4 More enlargement 5.5 STEM: Combining transformations 5.6 2D shapes and 3D solids	**Domains (Core knowledge and skills)** • Describe and carry out translations. • Describe and carry out reflections. • Describe and carry out rotations. • Enlarge a shape. • Describe an enlargement. • Enlarge a shape using negative scale factors. • Enlarge a shape using fractional scale factors. • Transform 2D shapes using a combination of reflection, rotation, enlargement and translation.	**Topics** 6.1 Recurring decimals 6.2 Using percentages 6.3 Percentage change 6.4 FINANCE: Repeated percentage change	**Domains (Core knowledge and skills)** • Recognise fractional equivalents to important recurring decimals • Recognise which denominators of simple fractions produce recurring decimals • Change a recurring decimal into a fraction. • Calculate percentages • Work out an original quantity before a percentage increase or decrease • Calculate percentage change. • Calculate the effect of repeated percentage changes.	**Topics** 7.1 Accurate drawings 7.2 Constructing shapes 7.3 Constructions 1 7.4 Constructions 2 7.5 Loci	**Domains (Core knowledge and skills)** • Draw triangles accurately using a ruler and protractor. • Draw diagrams to scale. • Draw accurate nets of 3D solids. • Construct triangles using a ruler and compasses. • Construct nets of 3D solids using a ruler and compasses. • Bisect a line using a ruler and compasses. • Construct perpendicular lines using a ruler and compasses. • Bisect angles using a ruler and compasses. • Draw accurate diagrams to solve problems. • Draw a locus. • Use loci to solve problems.

	• Identify planes of reflection symmetry in 3D solids. • Find the perimeter and area of 2D shapes after enlargement. • Find the volume of 3D solids after enlargements.				
Prior Domains: • Matching simple equation to graphs. • Reflecting a shape in a mirror line. • Identifying the angle of a turn. • Identifying clockwise or anticlockwise. • Identifying rotations of 90°. • Describing turns giving angle and direction. • Simple multiplication (including unitary fractions and decimals.) • Identifying scale factor of enlargement. • Enlarging a shape by a whole number scale factor with centre of enlargement given. • Area and perimeter of a rectangle. • Describing reflection and translations. • Reflecting in the line yy = xx. • Identifying the names of 3D shapes. • Perimeter and area of square, rectangle and triangles. • Volume of cuboids. • Lines of symmetry of 2D shapes.		**Prior Domains:** • Round these decimals to 2 decimal places: 3.456, 12.607, 30.0067. • Teacher video 6.1. • Converting fractions to decimals. • Using correct dot notation. • Simplifying expressions. • Solving one-step equations. • 10% is £5. What is 100%? • 20% is £20. What is 100%? • 25% is £16? What is 100%? • Writing multipliers for percentage increases and decreases. • Original price before a discount. • What is £20 as a percentage of: a. £40 b. £80 c. £200? • Rewriting statements as percentages. • What is the multiplier for a percentage increase of: a. 8% b. 12% c. 0.6% d. 200%? • Working out increases using a decimal percentage. • Using indices with decimals.		**Prior Domains:** • Divide integers by 10 and 100. • Use a ruler to accurately draw lines. • Use a protractor to accurately draw acute and obtuse angles. • Use the correct notation to label a triangle. • Count the faces of a 3D solid. • Identify a 3D solid from its net. • Make an accurate drawing of a net using a ruler and protractor. • Know the meaning of: perpendicular, intersect, arc. • Make an accurate drawing of a triangle. • Know the properties of a rhombus. • Know the properties of a trapezium. • Calculate the area of a trapezium. • Construct a 60° angle. • Construct a triangle given SSS. • Drop a perpendicular from a point onto a line. • Use a scale to convert measurements. • Definition of parallel lines. • Definition of an angle bisector. • Draw a circle. • Construct a perpendicular bisector. • Construct an angle bisector.	

Summer Term 3A		**Summer Term 3A**		**Summer Term 3B**	
TOPIC TITLE: **Probability**		**TOPIC TITLE:** **Scale drawings and measures**		**TOPIC TITLE:** **Graphs**	
Topics 8.1 Comparing probabilities 8.2 Mutually exclusive events 8.3 Estimating probability 8.4 Experimental probability 8.5 Probability diagrams 8.6 Tree diagrams	**Domains (Core knowledge and skills)** Calculate and compare probabilities. Decide if a game is fair. Identify mutually exclusive outcomes and events. Find the probabilities of mutually exclusive outcomes and events.	**Topics** 9.1 Maps and scales 9.2 Bearings 9.3 Scales and ratio 9.4 Congruent and similar shapes 9.5 Solving geometry problems	**Domains (Core knowledge and skills)** • Use scales in maps and plans. • Use and interpret maps. • Measure and use bearings. • Draw diagrams to scale using bearings. • Draw diagrams to scale.	**Topics** 10.1 Plotting linear graphs 10.2 The gradient 10.3 y = mx + c 10.4 Parallel and perpendicular lines 10.5 Inverse functions 10.6 STEM: Non-linear graphs	**Domains (Core knowledge and skills)** • Plot straight-line graphs.

	Find the probability of an event not happening. Calculate the relative frequency of a value. Use relative frequency to make estimates. Use relative frequency to estimate the probability of an event. Use estimated probability to calculate expected frequencies. Carry out a probability experiment. Estimate probability using data from an experiment. Work out the expected results when an experiment is repeated. List all the possible outcomes of one or two events in sample space diagrams or Venn diagrams. Calculate probabilities of repeated events. Use tree diagrams to find the probabilities of two or more events.		• Use and interpret scale drawings. • Identify congruent and similar shapes. • Use congruence to solve problems in triangles and quadrilaterals. • Use similarity to solve problems in 2D shapes.		
Prior Domains: • Compare probabilities using diagrams. • Compare fractions. • Identify equivalent fractions, decimals and percentages. • Calculate probabilities based on equally likely outcomes. • Subtract fractions and decimals from 1. • Subtract percentages from 100%. • Draw a probability scale. • Express one number as a fraction or percentage of another. • Calculate a fraction of a quantity. • Convert fractions to percentages. • Calculate relative frequency and estimated probability. • Calculate theoretical probability based on equally likely outcomes. • Calculate theoretical probability based on equally likely outcomes. • Calculate expected frequency based on theoretical probability. • Calculate theoretical probability based on equally likely outcomes. • Calculate theoretical probability based on equally likely outcomes. • Calculate the probability of an event not happening. • Add and multiply fractions.		**Prior Domains:** • Asks students to find the scale factor of enlargement. • Convert between different metric units of length. • Use a simple scale of 1 cm to 5 cm to identify real lengths. • Asks students to find the angle turned using compass directions. • Drawing angles accurately using a protractor. • Finding missing angles on parallel lines. • Converting between scales on a map and in real life. • Simple conversions where 1 cm is 50 m. • Converting cm to m. • Writing ratios in the form 1 : nn. • Writing equivalent ratios. • Recap on transformations and identifying which transformations give congruent shapes and which give similar shapes. • Finding the missing angle in a triangle when two angles are given. • Finding the scale factor of enlargement. • Finding missing angles on straight lines crossing at a point. • Finding missing angles on parallel lines and explaining angle facts used. • Finding the missing numbers in equivalent ratios. • Explaining why two triangles are not similar. • Finding the missing side of two similar triangles by finding the scale factor.		**Prior Domains:** • Identifying coordinates of points in all four quadrants. • Substituting values into a linear equation. • Identifying graphs: yy = xx, yy = −xx, xx = aa and yy = bb. • Plotting a linear graph given the xx-coordinates. • The priority of operations. • Finding the yy-intercept of graphs in the form yy = mxmx + cc. • Finding the inverse function. • Drawing a line with a given gradient. • Substituting value in equations of graphs. • Understanding the value of mm and cc in yy = mxmx + cc. • Finding the product of 2 and −1212. • Identifying parallel and perpendicular lines. • Finding the gradient from the equation of a graph. • Knowing that parallel lines have equal gradients. • Priority of operations. • Finding missing input and output of function machines. • Drawing function machines. • Substituting value into a formula. • Distance−time graph.	

Year 9							
Autumn Term 1A		**Autumn Term 1A**		**Autumn Term 1B**		**Autumn Term 1B**	
TOPIC TITLE: **Powers and roots**		**TOPIC TITLE:** **Quadratics**		**TOPIC TITLE:** **Inequalities, equations, and formulae**		**TOPIC TITLE:** **Collecting and analysing data**	
Topics 1.1 Reciprocals 1.2 Indices 1.3 Standard form 1.4 STEM: Calculating with standard form 1.5 Fractional indices 1.6 Surds	**Domains (Core knowledge and skills)** • Find the reciprocal of a number. • Work with reciprocals. • Use negative indices. • Work out powers of fractions. • Write numbers using standard form. • Order numbers written in standard form. • Calculate with numbers written in standard form. • Calculate with fractional indices. • Use surds. • Understand the difference between rational and irrational numbers.	**Topics** 2.1 Sequences 2.2 Expanding 2.3 Factorising 2.4 Solving quadratic equations	**Domains (Core knowledge and skills)** • Generate sequences using quadratic expressions. • Find an expression for the nth term of a quadratic sequence. • Multiply pairs of brackets. • Square a linear expression. • Use quadratic identities. • Factorise quadratic expressions into two brackets. • Solve quadratic equations by factorising..	**Topics** 3.1 Inequalities 3.2 Using index laws 3.3 Solving equations 3.4 Changing the subject 3.5 Algebraic fractions	**Domains (Core knowledge and skills)** • Solve linear equations and represent the solution on a number line. • Multiply both sides of an inequality by a negative number. • Use index laws with zero and negative powers. • Explain the difference between equations, formulae and functions. • Construct and solve complex equations. • Change the subject of a formula • Change algebraic fractions to equivalent fractions. • Solve problems with fractions in formulae.	**Topics** **4.1 STEM: Data collection** **4.2 Presenting and comparing data** **4.3 Estimating statistics** **4.4 Box plots** **4.5 Cumulative frequency graphs** **4.6 Histograms**	**Domains (Core knowledge and skills)** • **Identify sources of primary and secondary data.** • **Choose a suitable sample size.** • **Understand how to reduce bias in sampling and questionnaires.** • **Identify a random sample.** • **Draw and interpret stem and leaf diagrams.** • **Construct and interpret frequency polygons.** • **Use frequency polygons to compare data.** • **Estimate the mean and range from a grouped frequency table.** • **Draw conclusions from tables and charts.** • **Interpret statistics.** • **Draw and interpret box plots.** • **Compare data using box plots.** • **Draw cumulative frequency graphs for grouped data.** • **Interpret cumulative frequency graphs.** • **Construct and interpret histograms..**
Prior Domains: • Comparing and ordering fractions. • Relating fractions and whole numbers. • Review fractions. *Which answers are greater than one? How can you tell? What is another way to write* 25162516*?* • Remind pupils about multiplying fractions. *Multiply numerators, then multiply denominators.* • Multiplying fractions. • Multiplying negative numbers.		**Prior Domains:** • Two-step calculations, multiplying and then adding. • Work out terms in a linear sequence. • Find the $n$nth term of a linear sequence. • Expand and factorise linear expressions. • Expand single brackets and simplify expressions. • Finding pairs of numbers with a given product and sum.		**Prior Domains:** • Using < and >. • Calculate with positive and negative numbers. • Solve equations. • Finding the value of a number to a given power (including a negative power and zero). • Substitute xx = 1 into linear expressions. • Simplify fractions. • Substituting a value into linear expressions. • Find the LCM of two numbers.		**Prior Domains:** • Rounding data. • Finding 10% • Choose appropriate units for measuring different distances. • Understand that more trials will give a more accurate outcome. • Finding the midpoint of a class interval. • Recognise the differences between discrete and continuous data.	

• Review the laws of indices. *Simplify $7^3 \times 7^2$. What do you divide 3^9 by to get 3^{11}? Is $(9^4)^5$ larger or smaller than $(9^3)^6$? How do you know?* • Multiplying and dividing by powers of 10. • Check students can multiply and divide by powers of ten and that they recognise different ways of expressing these calculations. *How many different ways can you write down 3 divided by 100?* Students might suggest $3 \div 100$, 31003100, 3×0.01, 3×10^{-2}, etc. • Using index laws to simplify expressions. • Write large and small numbers in standard form. • Use rules of indices to simplify expressions. • Recall square and cube numbers. • Simplify expressions using index laws. • Calculate square roots and cube roots. • Evaluating powers and roots. • Evaluate square roots, including of fractions. • Write numbers as products of their prime factors.	• Expand and simplify double brackets. • Factorise expressions into one bracket. • Solving simple linear equations. • Multiplying by 0. • Solve simple quadratic equations. • Factorise quadratic expressions.	• Identify expressions and formulae. • Solve simple equations involving brackets. • Matching factorised and unfactorised expressions. • Solve simple one- and two-step equations. • Factorise expressions. • Completing equivalent fractions. • Add and subtract fractions. • Rearrange formulae. • Expand brackets. • Solve equations involving simple fractions.	• Draw a frequency diagram (bar chart) and identify the modal class. • Calculating the range of a simple data set. • Calculate the mean from a frequency table. • Practice of the types of calculations students will use to identify the median or quartile term or to calculate a range. • Work out the mean, median, mode and range from a list of data. • Work out the median from a frequency table. • Working out which item would be the median – practice using the formula n+12n+12 • Draw a box plot for a simple data set. • Interpret a grouped frequency table. • Working out the area of a rectangle – a skill necessary for working out the frequency in a histogram. • Interpret a bar chart, including calculating the mean. • Draw a bar chart and consider the effect of an outlier.

Spring Term 2A		**Spring Term 2A**		**Spring Term 2B**	
TOPIC TITLE: **Multiplicative reasoning**		**TOPIC TITLE:** **Non-linear graphs**		**TOPIC TITLE:** **Accuracy and measures**	
Topics 5.1 Direct proportion 5.2 Solving problems using direct proportion 5.3 Non-linear proportion 5.4 Arcs and sectors of circles	**Domains (Core knowledge and skills)** • Describe and carry out translations. • Describe and carry out reflections. • Describe and carry out rotations. • Enlarge a shape. • Describe an enlargement. • Enlarge a shape using negative scale factors. • Enlarge a shape using fractional scale factors. • Transform 2D shapes using a combination of reflection, rotation, enlargement and translation.	**Topics** 6.1 Graphs of quadratic functions 6.2 Solving quadratic equations 6.3 Graphs of cubic functions 6.4 STEM: Graphs of reciprocal functions	**Domains (Core knowledge and skills)** • Understand and draw graphs of quadratic functions • Identify quadratic graphs and their features. • Solve problems using quadratic graphs. • Use quadratic graphs to solve equations. • Understand and draw graphs of cubic functions. • Identify cubic graphs and their features. • Identify and draw graphs of reciprocal functions • Solve problems using reciprocal graphs.	**Topics** 7.1 Rates of change 7.2 Density and pressure 7.3 Upper and lower bounds 7.4 Calculating with bounds 7.5 STEM: Accurate measures in real life	**Domains (Core knowledge and skills)** • Solve problems involving rates of change. • Convert units with compound measures. • Calculate density and pressure. • Solve problems involving compound measures. • Understand the effects of rounding. • Find upper and lower bounds. • Calculate the lower and upper bound of areas and volumes. • Calculate the lower and upper bounds of compound measures. • Use upper and lower bounds to solve complex problems..

	• Identify planes of reflection symmetry in 3D solids. • Find the perimeter and area of 2D shapes after enlargement. • Find the volume of 3D solids after enlargements.				
Prior Domains: • Identifying which graphs show direct proportion. • Recognise whether a worded problem describes a direct proportion relationship. • Practice using a direct proportion relationship to find other values by multiply and dividing. • Substituting values into a direct proportion equation. • Calculate the equation of a line from a graph. • Solve a direct proportion type of equation to find an unknown value. • Recall the last section by plotting data points to check for direct proportion. • Challenging students to find numbers that multiply together to make 20. Students will be seeing an inverse proportion relationship. • Solve problems involving direct proportion. • Solve equations to find the value of kk, the constant of proportionality. • Calculating fractions of 360° • Label an arc and sector of a circle. • Calculate the area and circumference of a circle.		**Prior Domains:** • Describing transformations. • Evaluate simple quadratic expressions. • Matching linear and quadratic graphs to their functions. • Factorise quadratic expressions. • Solve simple quadratic equations. • Solve quadratic equations using factorisation. • Recall cube numbers. • Calculate with cubes and cube roots. • Calculate cubes of integers. • Match quadratic graphs to their functions. • Calculating reciprocals. • Calculate reciprocals of different values.		**Prior Domains:** • Rearranging formulae • Calculating speeds from a distance-time graph. • Working with time. • Substituting into formulae. • Solving linear equations. • Calculating volumes of 3D shapes. • Converting units of area and volume. • Rearranging formulae. • Adding and subtracting. • Working with decimals. • Rounding to a given degree of accuracy. • Comparing rounded and unrounded values. • Rounding to a given degree of accuracy. • Calculating upper and lower bounds. • Finding areas of 2D shapes. • Calculating average speed. • Converting units of area. • Finding upper and lower bounds in area calculations. • Finding upper and lower bounds when substituting into complex expressions.	

Summer Term 3A		**Summer Term 3A**		**Summer Term 3B**	
TOPIC TITLE: **Graphical solutions**		**TOPIC TITLE:** **Trigonometry**		**TOPIC TITLE:** **Mathematical reasoning**	
Topics 8.1 Simultaneous equations 8.2 Using y = mx + c 8.3 More simultaneous equations 8.4 Graphs and simultaneous equations 8.5 Solving inequalities	**Domains (Core knowledge and skills)** • Solve a pair of simultaneous equations. • Rearrange equations of graphs to find the gradient and the y-intercept. • Find the equation of the line between two points.	**Topics** 9.1 The tangent ratio 9.2 The sine ratio 9.3 The cosine ratio 9.4 Using trigonometry to find angles 9.5 Solving problems using trigonometry	**Domains (Core knowledge and skills)** • Use conventions for naming sides of a right angled triangle. • Work out the tangent of any angle. • Use the tangent ratio to work out an unknown side of a right-angled triangle. • Work out the sine of any angle. • Use the sine ratio to work out an unknown side of a right-angled triangle. • Work out the cosine of any angle.	**Topics** 10.1 Explain, show and justify 10.2 MODELLING: Real-life situations 10.3 Proof 10.4 More proof	**Domains (Core knowledge and skills)** • Explain, show and justify a mathematical solution. • Draw graphs to solve mathematical problems. • Identify the difference between giving an example and proving a theory. • Understand how to use mathematical proof.

	• Solve more complex simultaneous equations. • Solve simultaneous equations by drawing graphs. • Solve inequalities by graphing straight lines. • Solve inequalities that involve quadratic graphs.	9.6 Trigonometric graphs	• Use the cosine ratio to work out an unknown side in a right-angled triangle. • Use the trigonometric ratios to work out an unknown angle in a right-angled triangle. • Use trigonometry to solve problems involving missing lengths and angles. • Plot and sketch graphs of the trigonometric functions. • Use the trigonometric ratios with any angle from 0 to 360°.		• Present a logical argument using algebra.
• Writing simple expressions in more than one variable. • Write equations in two variables to describe worded problems. • Practise substitution and solving equations. • Work out the gradient from a straight line graph. • Draw a graph that involves finding the xx- and yy-intercepts. • Identify parallel and perpendicular lines and lines with the same yy-intercept. • Rearrange simple equations to change the subject. • Reviewing whether adding or subtracting would eliminate a variable in a pair of equations. • Solve simultaneous equations by elimination. • Multiply all the terms in an equation by a number. • Substituting different values into a quadratic expression. • Complete a table of values by substituting into yy = xx^2 • Solve quadratic equations by factorising. • Plot graphs and identify the point where the graphs cross. • Finding numbers that satisfy an inequality. • Draw two straight line graphs and note the point of intersection. • Use the inequality or equals signs correctly.	**Prior Domains:** • Labelling the hypotenuse in a right-angled triangle. • Round numbers to one decimal place. • Convert fractions to decimals using a calculator. • Rearrange simple formulae. • Converting fractions to decimals using a calculator and rounding to one decimal place. • Label right-angled triangles with the hypotenuse, adjacent and opposite sides. • Rearrange simple formulae. • Labelling the opposite, adjacent and hypotenuse in a right-angled triangle. • Write sin θθ and tan θθ as a fraction for a right-angled triangle. • Rearrange simple formulae. • Finding inverses of simple functions. • Write sin θθ, cos θθ and tan θθ as a fraction for a right-angled triangle. • Use trigonometry to find unknown sides in right-angled triangles. • Using sin, cos and tan on a calculator. • Calculate missing lengths in right-angled triangles. • Identifying the trigonometric ratio to find an unknown side in a right-angled triangle. • Calculate sin, cos and tan of angles and round to one decimal place. • Complete a table of values for a quadratic function.		**Prior Domains:** • Calculate simple percentages of whole numbers. • Evaluate statements about adding and subtracting odd and even numbers. • Understand the difference between an example and a proof. • Solving a simple simultaneous equation. • Draw a scatter graph and line of best fit, read a value from the graph. • Discussing accuracy of line of best fit. • Finding the HCF of algebraic and numeric terms. • Factorise linear and quadratic expressions. • What is a counter example? • Calculate missing angles. • Give counter examples to disprove a statement.	