Shenley
ACADEMY

LONG TERM PLAN 2020-21

Unit progression and linked knowledge

| Number |
| Algebra |
| Geometry and Measures |
| Ratio and Proportion |
| Statistics and Probability |
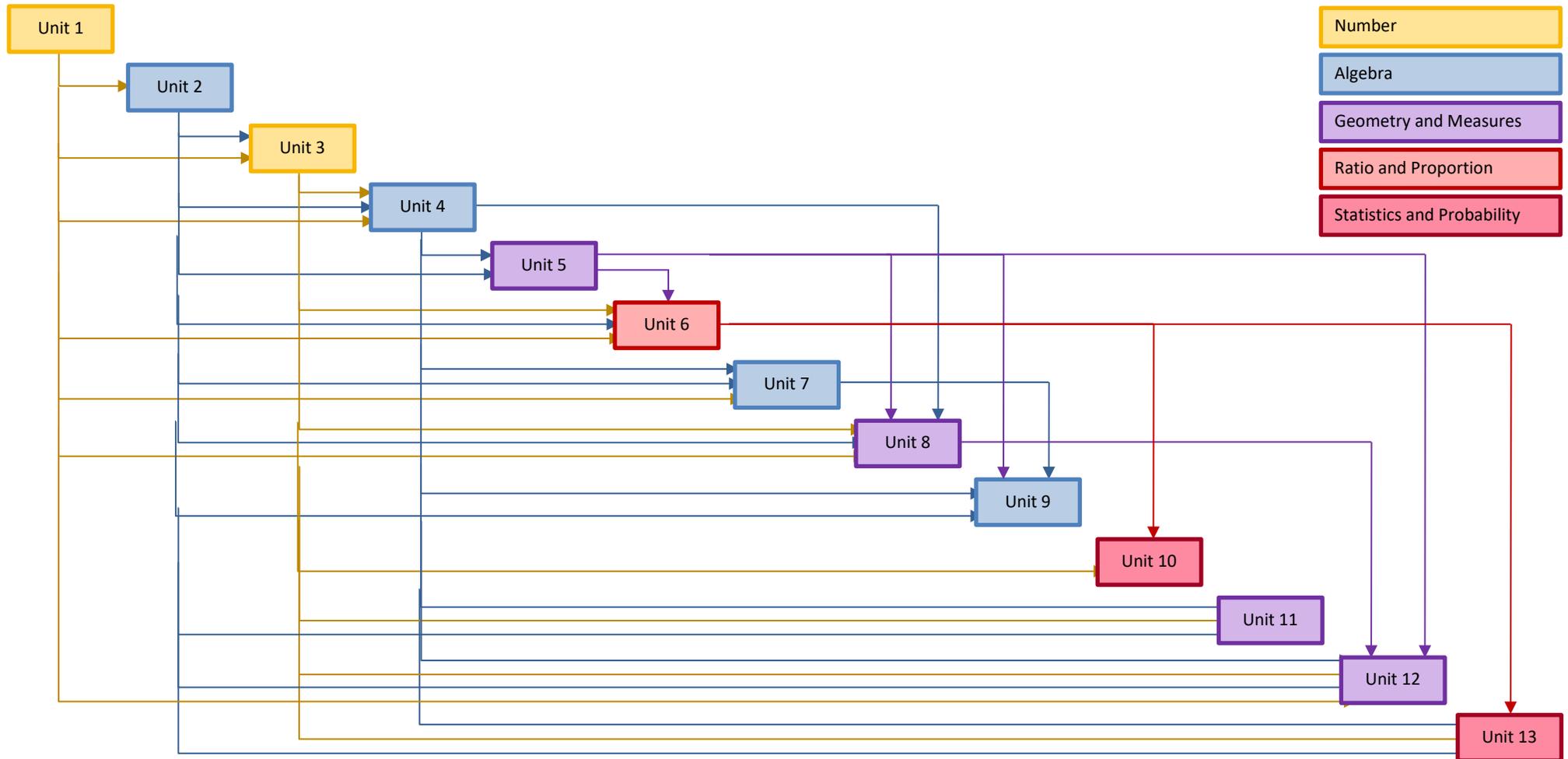
Units containing dependent knowledge (shown above) is also shown on each page.

Unit 1: Numbers and the number system

	Year 7	Year 8	Year 9		Year 10
Catch-up Programme	Order positive and negative numbers. Perform arithmetic accurately with directed numbers. Recall the squares, cubes, and their roots for specific numbers. List factors or multiples of a number. Identify common factors and multiples by listing. Round numbers to a given number of decimal places.	Calculate a number to the nth power. Calculate the nth root of a number. Express a number as a product of its prime factors. Use Venn Diagrams to identify the HCF or LCM of two or more numbers. Round a number to given significant figures. Estimate a calculation by estimation.	Find the product of prime factors of two numbers and sort them into a Venn Diagram. Identify the HCF and LCM of two numbers from a Venn Diagram of their prime factors. Express ordinary numbers in standard form. Express standard form numbers as ordinary numbers Order and compare numbers written in standard form. Use standard form with a calculator accurately.	**Foundation**	Find the HCF or LCM of two numbers using product of prime factors and a Venn Diagram. Ordering numbers written in standard form. Add and subtract numbers written in standard form (without a calculator) Solve problems with standard form values (with a calculator) Identify the upper and lower bound for a value rounded to x decimal places Identify the upper and lower bound for a value rounded to x significant figures Identify the upper and lower bound for a value rounded by truncation
Core Programme	Work out a number to the nth power. Work out a number to the nth root. Identify the LCM of two or more numbers. Identify the HCF of two or more numbers. Express a number as a product of its prime factors. Accurately use a calculator across a wide array of operations. Round a number to a given number of decimal	Find the product of prime factors of two numbers and sort them into a Venn Diagram. Identify the HCF and LCM of two numbers from a Venn Diagram of their prime factors. Estimate a calculation by rounding all values to 1.s.f (or another appropriate value depending on context). Convert between ordinary numbers and standard form Convert values that are written incorrectly in standard form (such as 42.3×10^{8}) to correct	Add and subtract numbers written in standard form. Multiply and divide numbers in standard form using laws of indices. Perform standard form calculations using a calculator. Identify the upper and lower bounds of a number rounded to decimal places, significant figures, or nearest n unit. Identify the upper and lower bound of a value that has been rounded through truncation.	**Intermediate**	Work with bounds for calculations that require addition and subtraction. Work with bounds for calculations that require multiplication and division. Simplify a surd. Perform calculations with surds (without a calculator)
				Higher	*Intermediate objectives and…* Give answers rounded with bounds to a **suitable degree of accuracy.** Rationalise the denominator of a fraction.

places. Round a number to a given number of significant figures.	standard form Order numbers written in standard form (or a mixture of standard form and ordinary numbers)		

Unit 2: Manipulating algebra

	Year 7	Year 8	Year 9		Year 10
Catch-up Programme	Simplify expressions. Substitute into expressions and evaluate the result. Multiply algebraic terms together. Multiply an expression by an integer (expanding the bracket) Simplify an expression that requires expanding brackets as part of the process.	Simplify any expression containing more than one variable (including powers). Multiply an expression by another term. Expanding and simplifying more complex expressions. Substitution into expressions using directed numbers. Change the subject of a formula.	Expand and simplify expression containing brackets (including negatives). Factorise an expression containing a single common factor or a composite common factor. Recall and apply the laws of indices for multiplication, division, and powers. Recall and apply the special cases of index laws (powers of 0). Change the subject of a formula (2-step or greater)	**Foundation**	Expand and simplify expressions of all types. Expand and simplify the product of two linear binomials. Factorise into a single bracket using a common factor Factorise a quadratic in the form $(x \pm p)(x \pm q)$ Factorise a perfect square or the difference of two squares. Change the subject of any formula where the subject appears only once.
Core Programme	Simplify expressions by collecting like terms. Multiply terms together. Simplify expressions that require expanding brackets, then collecting like terms. Substitute into expressions.	Factorise an expression by taking out common factors (single or composite terms). Expand the product of two linear expressions. Substitute into complex expressions. Recall and apply the laws of indices to simplify expressions. Change the subject of a formula (one or two-step rearrangements).	Expand and simplify the product of two linear expressions. Factorise a unit quadratic. Change the subject of more demanding formulae (including where the subject appears on the denominator of a fraction). Recall that a negative power means a reciprocal of the base to the value of the power. Simplify (or calculate) a value or term raised to a negative power.	**Intermediate**	Expand and simplify the product of three binomials. Factorise a quadratic. Change the subject of a formula (where the subject appears twice including situations where the subject appears exclusively on the denominators of fractions). Interpret statements of proof as algebraic expressions. Construct simple algebraic proof
				Higher	*Intermediate objectives and...* Complete the square for a quadratic (convert from $x^2 + bx + c$ to the form $(x \pm p)^2 \pm q$ where b is even)

Unit 3: Fractions, decimals and percentages

	Year 7	Year 8	Year 9		Year 10
Catch-up Programme	List fractions that are equivalent (in order) to produce "fraction chains". Identify fractions that have same denominators so that they can be compared, added, or subtracted. Work out a percentage of any quantity using a calculator. Work out simple percentage increases and decreases without a calculator.	Multiply and divide with fractions Add and subtract with fractions using common multiples Multiply a decimal or integer by a decimal. Increase or decrease a quantity by a percentage. Express one quantity as a percentage of another to compare proportions.	Multiply with decimal values Divide with decimal values Convert fractions into decimals (recurring digits) Convert decimals to fractions to allow for simpler calculations. Increase or decrease a value by a percentage using multipliers. Work out a percentage change that has occurred	**Foundation**	Add and subtract fractions of different denominations including with mixed numbers. Multiply and divide fractions including with mixed numbers. Increase or decrease by a percentage using multipliers. Calculate a reverse percentage with or without multipliers. Calculate compound interest using multipliers. Compare values after simple and compound interest is applied. Convert fluently between decimals and fraction to make calculations easier to perform without a calculator.
Core Programme	Add and subtract fractions using common denominators. Multiply and divide fractions. Calculate a percentage of a number/quantity. Increase or decrease a quantity by a percentage. Express one quantity as a percentage of another quantity.	Multiply a decimal or integer by a decimal. Divide a decimal or an integer by a decimal. Represent a percentage change as a decimal multiplier. Interpret a decimal multiplier as a percentage change. Increase or decrease a value by a percentage using "multipliers". Calculate simple interest.	Convert any fraction (terminating or non-terminating) to a decimal using division. Convert a recurring decimal in the form $0.\dot{x}$, $0.\dot{x}\dot{y}$, etc… into a fraction using algebraic methods. Calculate with recurring decimals (non-calculator) Calculate quantities before a percentage change using "reverse percentages". Calculate compound interest/depreciation.	**Intermediate**	Calculate compound interest using multipliers that use different rates of interest/depreciation. Calculate a missing percentage change from a compound interest problem. Convert any recurring decimal to a fraction using algebraic methods. Simplify algebraic fractions using factorisation. Multiply and divide algebraic fractions (simplifying when appropriate)
				Higher	*Intermediate objectives and…* Add and subtract algebraic fractions using common denominators.

| | | Calculate percentage change. | Compare compound interest vs. simple interest.

Calculate an overall percentage change. | | |
| --- | --- | --- | --- | --- | --- |

Unit 4: Solving equations

	Year 7	Year 8	Year 9		Year 10
Catch-up Programme	Solve a two-step equation where the solution is positive. Solve an equation where the solution is negative. Simplify an equation prior to solving it. Solve an equation where the solution is non-integer and to give the answer as a fraction. Form and solve an equation using properties of perimeter. Form and solve an equation using angle properties.	Solve multi-step equations where the coefficient of the variable is a fraction. Solve equations where expressions are given as numerators of a fraction. Form and solve equations using perimeter (to be removed in 2021 cycle) Solve an equation with the variable appearing on both sides of the equal sign. Solve an equation where expanding brackets is also required. Form and solve equations which require knowledge of additional geometric properties. Know the meaning of the symbols >,≥,< and ≤ Solve one or two-step inequalities.	Represent inequalities on a number line. Solve multi-step inequalities. Solve inequalities with the variable on both sides of the inequality. Form and solve linear inequalities in contexts or perimeter, angles, and other situations. Solve linear simultaneous equations where one of the two variables is consistent in both equations.	**Foundation**	Solve inequalities with the unknown on one or both sides of the inequality and represent the solutions to an inequality on a number line. Form and solve linear equations based on geometric properties or a given real-life context. Solve linear simultaneous equations.
Core Programme	Solve a two-step equation where the solution is positive. Solve an equation where the solution is negative. Solve an equation where the solution is non-integer and to give the answer as a fraction. Form and solve an equation using properties of perimeter. Form and solve an equation using angle properties.	Solve multi-step equations where the coefficient of the variable is a fraction. Solve equations where expressions are given as numerators of a fraction. Solve equations containing powers and roots (including knowing that square-rooting requires a ± solution) Solve an equation where the unknown appears on both sides of the equal sign (including where expanding brackets is also required).	Solve equations with the variable on both sides of the equal sign and cross multiplication is required to cancel out the denominators (variable can appear on the numerator or the denominator). Form and solve linear inequalities in contexts or perimeter, angles, and other situations. Solve linear simultaneous equations including in situations that require one or both equations to be scaled to allow for solving by elimination.	**Intermediate**	Solve linear simultaneous equations by substitution. Recognise, form, and solve linear simultaneous equations. Solve a quadratic by factorisation. Solve a quadratic using the formula. Form and solve a quadratic from a geometric context. Solve simultaneous equations of a linear and quadratic equation.
				Higher	*Intermediate objectives and…* Solve simultaneous equations of a linear and a non-linear function and identify if the linear function is a tangent to the curve.

	Know the meaning of the symbols >,≥,< and ≤ Solve one or two-step inequalities.	Form and solve equations which require knowledge of additional geometric properties. Solve multi-step inequalities. Represent inequalities on a number line. Solve inequalities bounded by two values. List integers that satisfy an inequality.		

Unit 5: Properties of shape (angles and Pythagoras' theorem)

	Year 7	Year 8	Year 9		Year 10
Catch-up Programme	Compare 2D shapes using their geometric properties. Accurately draw and measure angles. Work out angles around a point, in a triangle, and in a quadrilateral. Identify vertically opposite angles. Know that starting from a triangle (and the sum of interior angles is 180°), increasing the number of sides by 1 will increase the sum of interior angles by 180° Work out a missing angle inside a polygon (up to 6 sides).	Construct an SSS triangle using only a compass and a ruler. Work out missing angles in triangles and quadrilaterals in more demanding problems. Work out the sum of interior angles for a regular polygon using the formula. Work out the size on an interior angle of a regular polygon. Work out the size of an exterior angle of a regular polygon. Work out vertically opposite and alternate angles on parallel lines. Work out corresponding angles and co-interior angles on parallel lines.	Construct isosceles and equilateral triangles using compasses and a ruler. Work out angles on parallel lines in more demanding contexts (multiple overlapping parallel lines or shapes extending from or including parallel lines). Work out missing angles inside, outside or formed by multiple polygons. Use Pythagoras' theorem to work out missing lengths on a right-angled triangle.	**Foundation**	Use geometric properties of angles to work out missing angles on parallel lines and in (or around) polygons. Measure and construct bearings. Use angle properties to solve problems with bearings. Work out a missing length on a right-angled triangle using Pythagoras' Theorem. Work out a missing length or an angle using trigonometric ratios (SOHCAHTOA). Construct a perpendicular bisector or an angle bisector. Construct basic loci and shade basic regions.
				Intermediate	Work out angles using circle theorems (stating the correct reasons). Work out angles using tangent theorems (stating the correct reasons). Recall and apply non-calculator trig values for sin(x), cos(x) and tan (x) where x = 0°, 30°, 45°, 60° or 90°. Use sine rule to work out missing lengths and angles. Use cosine rule to work out missing lengths and angles.
Core Programme	Work out angles in triangles. Work out angles in quadrilaterals. Work out what the sum of interior angles in a polygon using patterns. Work out a missing angle in a polygon (up to 6 sides). Work out an interior angle from a given exterior angle. Construct a scalene triangle using a ruler and a compass.	Work out the sum of interior angles for a polygon using the formula. Work out the size of an interior angle for a regular polygon using the formula. Work out an exterior angle for a regular polygon. Work out the number of sides a regular polygon has from its exterior angle. Determine if an exterior angle is part of a regular polygon.	Construct bisectors (perpendicular and angle). Construct the locus of the points a fixed distance from a point or a line. Identify where points are equidistant from two points or two lines. Identify the region that is closer to one point than another point. Identify the region that is closer to one line than another line. Form trigonometric ratios using the mnemonic	**Higher**	*Intermediate objectives and…* Construct geometric proof for circle theorems.

Construct an equilateral triangle or an isosceles triangle. Construct the net for a triangle-based prism.	Work out angles on parallel lines using alternate, corresponding, or co-interior angles. Use Pythagoras' theorem to work out the length of a hypotenuse or shorter side by forming the equation and solving as required.	SOHCAHTOA. Find missing lengths or angles using SOHCAHTOA

Unit 6: Ratio and proportion

		Year 7	Year 8	Year 9		Year 10
Catch-up Programme		Compare two or more quantities (visual or text) using ratio. Simplify a ratio by cancelling common factors. Simplify a ratio where the units are not the same. Share a quantity into a ratio where the total is known. Compare two or more proportions.	Convert ratios to proportions and perform comparisons. Divide a quantity into a ratio where the value of one quantity is given. Exchange between units of currency. Work out required quantities for a recipe for a given amount of people / mixture using scaling or the unitary method. Plot a graph to represent two quantities in direct proportion and to perform conversions using the graph.	Solve ratio problems where the difference between two quantities has been given. Use scaling or the unitary method for solving problems where quantities are in direct proportion. Work out best value using a 1:n or n:1 method (unitary). Express to or more ratios that share common elements as a single common ratio. Solve inverse proportion problems (non-equation)	**Foundation**	Divide into a ratio. Work with ratio and proportion within the same question to solve a larger problem. Work with direct proportion (unitary method). Combine two or more ratios with common elements into a single common ratio. Solve inverse proportion problems (worded real-life contexts). Use graphs of situations that are in direct proportion to perform conversions and understand why (0,0) will always be a point to be plotted
Core Programme		Simplify a ratio where the units are not the same. Simplify a ratio containing decimals. Share a quantity into a ratio where the total is known. Share a quantity into a ratio where the value for one of the quantities is known. Compare proportions using fractions and/or percentages.	Share into a ratio where the value of the difference between two parts of the ratio is given. Apply ratio in geometric contexts to solve problems (angles and perimeter). Combine ratios that share a component into a single common ratio. Exchange between currencies Apply direct proportion to contexts such as recipes. Draw the graph of two variables that are	Find the express ratios in the form 1:n or n:1 and use this to compare ratios or solve problems such as best value. Plot a graph representing direct proportionality and use appropriate scaling to perform conversions not covered by the graph. Solve inverse proportion problems (non-equation). Set up direct proportion equations and solve for the constant of proportionality.	**Intermediate**	Solve problems that require common ratios / common total parts. Form and solve equations that represent direct or inverse proportion. Identify the proportionality for a table set of data or by its graph. Form and solve equations where one ratio of expressions is equal to another where linear or quadratics may result from the simplification.
					Higher	*Intermediate objectives and...* Further problem solving with application forming equations from equivalent ratios (such as links to trigonometry).

		linked by direct proportion. Convert between variables that are linked by direct proportion using its graph.	Solve equations derived from ratios.	

Unit 7: Sequences

		Year 7	Year 8	Year 9		Year 10
Catch-up Programme		Continue sequences by identifying the term-to-term rule (includes linear sequences, geometric sequences, and triangle numbers). Generate a sequence of 5 terms or more using a given description. Continue a pattern of shapes by recognising what the term-to-term change is. Generating more complex sequences with conditional rules that require knowledge of number properties such as multiple, factor, prime, square, etc… Generate terms in a sequence from its position-to-term rule.	Generate any term of a linear sequence by substitution into its position-to-term rule (nth term). Express a base sequence algebraically (such as 7n for the 7 times table). Work out the nth term of a linear sequence. Use algebraic arguments to determine if a value appears as a term in the sequence. Determine the nth term of a linear sequence that is made from a sequence of images.	Determine the nth term of a linear sequence (ascending or descending). Determine the nth term that represents a sequence of images (building on year 8). Generate Fibonacci type sequences (including algebraic Fibonacci sequences). Find the nth term of a sequence made up of fractions where the numerator and denominators are generated using independent linear nth terms. Form and solve inequalities with sequences and solve basic problems.	**Foundation**	Generate terms of a sequence given the position-to-term rule. Generate a specific term in a sequence recognising which number requires substituting into the position-to-term rule. Find the term-to-term rule for a linear sequence and use this to express the base sequence algebraically. Find the position-to-term rule (nth term) using the base sequence and comparing it to the given sequence. Identify the required linear sequence from a sequence of images and write this sequence numerically
Core Programme		Generate terms of a complex sequence (requiring knowledge or a wide range of numerical properties such as factor, multiple, prime, square, etc…). Generate terms from a position-to-term rule. Express a base sequence algebraically (such as 7n for the 7 times table). Work out the nth term of a linear sequence. Apply solving equation techniques to linear sequences.	Generate terms of any linear sequence (including descending sequences). Justify, through algebraic arguments, if a term will appear in a sequence. Determine the nth term of any linear sequence from its values or a sequence of images. Generate terms in a Fibonacci type sequence (values or expressions).	Find the nth term for a sequence containing fractions (where the numerators and denominators are independently generated linear sequences). Form and solve inequalities from linear sequences. Find the nth term of a quadratic sequences with simple comparisons to the sequence n^2. Generate terms of a quadratic sequence and understand the patterns in the differences that will occur due to the sequence being quadratic.	**Intermediate**	Determine (through algebraic argument) if a value appears in a sequence. Determine (through algebraic argument) the largest value in a sequence less than n or the smallest value in sequence greater than n. Find the nth term of any quadratic sequence. Recognise a geometric sequence and work out the common ratio. Use the common ratio to work out missing terms in a geometric sequence.
					Higher	*Intermediate objectives and…* Further problem solving with geometric sequences

		Find the nth term of simple quadratic sequences made from pictures.		

	Year 7	Year 8	Year 9		Year 10
Catch-up Programme	Convert between metric units for length, mass, and volume. Work out and problem solve with area of parallelograms, triangles, and composite shapes made from rectangles Work out and problem solve with perimeter of composite shapes.	Derive and work out the area of a trapezium. Work out the area of a kite or a rhombus by splitting the shape into two triangle and adding the areas together. Work out the area and circumference of a circle. Work out the area of a composite shape made using circles.	Calculate the area of a semi-circle or a quarter-circle. Calculate the perimeter of a semi-circle or a quarter-circle. Calculate the area or perimeter of a trapezium where Pythagoras' theorem is required to work out a missing length. Calculate the area of a composite shape made from complete circles or parts of a circle.	**Foundation**	Calculate perimeter and area of composite shapes. Problem solving with area and perimeter (given area or perimeter, work out a length) or incorporating other mathematical components such as ratio or percentages. Calculate the area and circumference of a circle. Calculate the area of semi-circles and quarter circles. Calculate the area of compound shapes containing parts or complete circles. Calculate the perimeter of semi or quarter circles. Calculate the area and perimeter of shapes (Pythagoras' theorem required)
				Intermediate	Find the area or perimeter of a shape (Pythagoras' theorem or trigonometry required to work out a missing length). Calculate the area of a sector. (to be removed in 2021 cycle pending review of 2020 cycle) Calculate an arc length. Calculate the size of an angle in a sector given its area or arc length. Calculate the area of any triangle. Calculate the area of a segment.
Core Programme	Derive the formulae (or explain the origins) for area of parallelogram and of a trapezium. Work out the area of a parallelogram, triangle and a trapezium using the formula. Work out the area of composite shapes made from rectangles to form 'L' shapes or other configurations through summing or the difference of areas. Work out the area of kites and rhombi by splitting them into triangles. Application of area to real-world contexts.	Work out the area and perimeter of a trapezium where Pythagoras' theorem is required to work out a missing length. Calculate the circumference of a circle. Calculate the area of a circle. Calculate the area of semi-circles or quarter-circles. Calculate the area of a compound shape that contains circles.	Work out the area of compound shapes made from parts of a circle or concentric circles. Calculate the perimeter of semi-circles or quarter-circles. Calculate the area of a sector. Calculate an arc length of a sector. Work out the area of composite shapes containing sectors. Work out the areas of shapes that require trigonometry to identify a missing length.	**Higher**	*Intermediate objectives and…* Calculate the perimeter of a segment.

Unit 9: Linear functions

		Year 7	Year 8	Year 9
Catch-up Programme		Use geometric properties to identify the coordinate for a vertex on a shape. Recognise and plot horizontal and vertical functions. Substitute into a function. Plot one and two-step functions	Plot linear functions with positive, negative and fraction gradients. Determine the equation of a line using their knowledge of sequences. Work out the midpoint of a line and solve problems using the midpoint of a line.	Plot linear functions with fraction in the form $y = mx + xc$ for integer or fraction coefficients of x. Plot linear functions in the form $x + y = p$ or $x + ay = p$. Plot linear functions where rearrangement is required. Work out the gradient of a line. Work out the distance between two points using Pythagoras' Theorem. Determine the equation of a linear function from its graph.
Core Programme		Plot and work out the equations of horizontal or vertical functions. Plot linear functions from an equation given in the form $y = mx + c$. Solve equations graphically. Determine the equation of a straight-line using knowledge of sequences.	Plot any linear function given in the form $y = mx + c$ Plot linear functions that require rearrangement to the form $y = mx + c$. Work out the mid-point of a line segment. Work out the gradient of a line. Draw a line of a specific gradient. Work out the distance between two points using Pythagoras' theorem.	Plot linear functions in the form $px + qy = r$ Solve linear simultaneous equations graphically. Work out the equation of a linear function $(y = mx + c)$ from its graph. Work out the equation of a linear function $(y = mx + c)$ from a given gradient and a single point Work out the equation of a linear function $(y = mx + c)$ from two given points.

		Year 10
Foundation		Plot and identify horizontal or vertical functions. Generate a table of points for a linear function. Plot a linear function. Calculate the gradient of a line from its graph. Determine the equation of a line from its graph, a gradient and a given point, and from two given points. Correctly identify an equation that represents a sketch of a linear function.
Intermediate		Identify the equation of a line from a given gradient and a single point, or from two given points. Determine the equation of a line that is parallel to another line and passes through a given point. Determine the equation of a line that is perpendicular to another line and passes through a given point. Identify the region defined by two or more inequalities.
Higher		Identify the equation of a line from a given gradient and a single point, or from two given points. Determine the equation of a line that is parallel to another line and passes through a given point. Determine the equation of a line that is perpendicular to another line

				and passes through a given point. Identify the region defined by two or more inequalities.

Unit 10: Representing and interpreting data

	Year 7	Year 8	Year 9		Year 10
Catch-up Programme	Work out the mode, median, mean and range for a set of raw data. Problem solve with the mean to work out missing values. Explain that mode, median and range are measures of average. Explain that range is a measure of consistency/spread. Construct compound bar charts. Construct pie charts. Interpret pie charts.	Problem solve with the mean. Calculate averages and the range from a frequency table. Construct frequency polygons. Interpret frequency polygons. Construct stem-and leaf diagrams. Interpret stem-and-leaf diagrams.	Calculate averages and the spread of data from a grouped frequency table. Compare two or more sets of data using averages and the spread calculated from grouped frequency tables. Accurately plot scatter graphs. Identify any correlation that may be present on a scatter graph. Construct a line of best fit on a scatter graph. Identify outliers on a scatter graph. Construct and interpret time-series graphs.	**Foundation**	Problem solve with the mean. Plot scatter graphs, lines of best fit and estimate values. Construct a pie chart. Construct stem-and-leaf diagrams and identify the range and median. Plot frequency polygons. Calculate the mean and mode from ungrouped and grouped data.
Core Programme	Work out the mode, median, mean and range for a set of raw data. Problem solve with the mean to work out missing values. Explain that mode, median and range are measures of average. Explain that range is a measure of consistency/spread. Work out averages and the range from a frequency table. Construct pie charts.	Construct stem-and leaf diagrams. Interpret stem-and-leaf diagrams. Accurately plot scatter graphs. Identify any correlation that may be present on a scatter graph. Construct a line of best fit on a scatter graph. Identify outliers on a scatter graph. Determine the modal class, an estimate of the range, and the interval in which the median can be found.	Construct and interpret frequency polygons from grouped data. Construct and interpret time-series graphs and comment on trend or patterns. Construct cumulative frequency graphs. Extract the median from a cumulative frequency graph. Construct a histogram for a continuous set of data or equal and unequal class widths. Interpret histograms to determine frequencies and complete missing values or bars in a	**Intermediate**	Construct a boxplot from raw data or given information. Compare distributions of two or more sets of data by comparing the median and the IQR. Identify the LQ, UQ and IQR from a cumulative frequency diagram. Plot histograms for grouped data of unequal class widths. Interpret histograms to complete missing bars on a histogram or missing rows on a table. Calculate proportions from a histogram
				Higher	*Intermediate objectives and…* Estimate the median from a histogram

	Interpret pie charts.	Calculate an estimate of the mean for grouped data. Compare two or more sets of grouped data and form conclusions based on the average and the spread of the data (knowing which calculations to use for each).	histogram/table.		

Unit 11: Transformations and other graphs

	Year 7	**Year 8**	**Year 9**		**Year 10**
Catch-up Programme	Reflect across an axis. Reflect in horizontal or vertical lines defined as a function. Rotate a shape about a point on coordinate axes. Translate a shape using vectors. Describe a reflection, rotation, or a translation. Combine reflections, rotations, or translations.	Reflect lines in lines $y = x$ and $y = -x$. Enlarge a shape by a given scale factor (no centre of enlargement). Calculate a scale factor that has taken an object to its image. Enlarge a shape using a positive integer scale factor and a centre of enlargement. Describe transformations using the correct vocabulary.	Enlarge a shape using a unit fraction positive scale factor and construct its image. Describe a transformation (to be removed in the 2021 cycle – dropped to year 8) Apply successive transformations to an object and construct its' image. Plot a quadratic function (positive coefficient of x^2)	**Foundation**	Reflect a shape in line given as an equation. Enlarge a shape by a positive scale factor. Describe a transformation. Combine transformations. Combine vectors. Plot a quadratic.
Core Programme	Reflect a line using a given function (horizontal, vertical, $y = x$, or $y = -x$). Rotate a shape about a given point on coordinate axes. Translate a shape using vectors.	Enlarge a shape by a given scale factor (no centre of enlargement). Calculate a scale factor that has taken an object to its image. Enlarge a shape using a positive integer or unit	Enlarge a shape using a negative scale factor. Combine transformations. Plotting quadratic functions. Estimating the solutions to a simultaneous	**Intermediate**	Transform a shape. Calculate with column vectors. Fully describe a transformation. Substitute into a function (function notation). Solve an equation given (function notation). Substitute expressions into other expressions. Transform a graph (translate)

Describe a reflection, rotation, or a translation. Combine reflections, rotations, and translations.	fraction scale factor and a centre of enlargement. Describe a transformation. Apply successive transformations to an object and construct its' image.	equation (quadratic and linear). Plotting cubic functions. Plotting reciprocal functions.

Higher

Calculate with column vectors.

Substitute into and evaluate functions.

Solve equations written in function notation format.

Substitute expressions into functions.

Work out inverse functions.

Transform any graph (translate and stretch).

Unit 12: Surface area and Volume

	Year 7	Year 8	Year 9		Year 10
Catch-up Programme	Recognise and draw the net of a 3D object. Work out the volume of a cube or a cuboid or to work out a missing length given the volume. Calculate the surface area of a cube. Calculate the surface area of a cuboid. Calculate the surface area of a triangular prism.	Draw a 3D object as a plan, right or front 2D elevation. Draw a 3D object from given elevations and plans. Calculate the volume of a prism. Calculate the surface area of a triangular prism. Convert between units of area and volume.	Work out the volume of a cylinder (including with exact units). Calculate the surface area of a prism. Calculate the surface area of a prism that requires Pythagoras' theorem to find a required length. Calculate speed, distance, or time using the appropriate formula.	**Foundation**	Draw a plan or elevation of a 3D object and sketch a 3D object from a plan and its elevations. Calculate the volume of a prism (including cylinders). Calculate the surface area of a prism. Calculate average speed, distance, or time using the appropriate formula. Calculate density, mass, or volume using the appropriate formula.
Core Programme	Draw shapes using isometric perspective. Calculate the surface area of a cube. Calculate the surface area of a cuboid. Convert between units of area and volume. Calculate the surface area of a triangular prism.	Draw elevations or the plan of a 3D shape (to scale if required). Sketch a 3D shape from given perspectives or plans. Calculate the area of the cross-section of a prism. Calculate the volume of a prism. Calculate the exact value of a circle using π. Calculate the volume of a cylinder.	Work out the volume of a cylinder (including with exact units). Use Pythagoras' theorem in cuboids. Calculate average speed, distance, or time using the appropriate formula. Calculate density, mass, or volume using the appropriate formula.	**Intermediate**	Calculate average speed or problem solve with multi-part journeys. Calculate the density of a mixture or problem solve with mixtures. Calculate the volume of a cones, pyramids, and spheres. Calculate the surface area of cones. Calculate the surface area of spheres, hemispheres, and quarter-spheres. Calculate similar areas or volumes.
				Higher	*Intermediate objectives and…* Application of Pythagoras' theorem and trigonometry in cuboids, pyramids, and cones. Calculate the volume of a frustum (can be calculated from using volume of two cones or similar volumes).

| | | Calculate missing lengths on a prism given the volume.

Calculate the surface area of an 'L' shaped prism.

Apply Pythagoras' theorem to calculate surface areas of triangular prisms. | | |
|---|---|---|---|---|

2 3 4 6

Unit 13: Probability

	Year 7	Year 8	Year 9
Catch-up Programme	Recognise the probability values (or range of values) associated with key words such as certain, even chance, and unlikely. Calculate the probability of an event occurring (as a fraction or decimal) and accurately mark the event on a probability scale. Know that the sum of mutually exclusive events is 1 and to calculate missing probabilities (decimals and fractions). Calculate the probability of an event not occurring.	List all the outcomes of an experiment or an event using a systematic list or a table. Calculate the theoretical probability of an outcome from two events (2 dice, etc…) Complete two-way tables from given information and to calculate probabilities from it. Calculate the relative frequency on an experimental event. Justify which relative frequency best reflects the probability of an event occurring (the greatest number of trials). Sort information into a frequency tree and determine probabilities from them.	Compare theoretical and experimental probabilities to identify bias. Interpret "OR" and "AND" in the contexts of probability, and to calculate the probabilities of events occurring. Calculate the number of times an event is expected to occur. Sort elements and frequencies into a Venn diagram, and to calculate probabilities from them.
Core Programme	Calculate the probability of an event occurring (as a fraction or decimal) and accurately mark the event on a probability scale. Know that the sum of mutually exclusive events is 1 and to calculate missing probabilities (decimals and fractions). Calculate the probability of an event not occurring. List all the outcomes of an experiment or an event using a systematic list or a table. Calculate the theoretical probability of an	Create a sample space for outcomes of two events and determine the probabilities of more complicated events. Complete two-way tables from given information and to calculate probabilities from it. Calculate the relative frequency on an experimental event. Justify which relative frequency best reflects the probability of an event occurring (the greatest number of trials).	Interpret "OR" and "AND" in the contexts of probability, and to calculate the probabilities of events occurring. Calculate the number of times an event is expected to occur. Sort elements and frequencies into a Venn diagram, and to calculate probabilities from them. Construct a tree diagram for independent events and calculate probabilities from them.

	Year 10
Foundation	List all the outcomes of an experiment or an event using a systematic list or a table and calculate probabilities from them. Complete two-way tables from given information and to calculate probabilities from it. Calculate the relative frequency on an experimental event. Calculate the number of times an event is expected to occur. Sort elements and frequencies into a Venn diagram, and to calculate probabilities from them. Sort information into a frequency tree and determine probabilities from them. Construct a tree diagram for independent events and calculate probabilities from them.
Intermediate	Calculate the probability of independent events (multiple outcomes) using a probability tree or direct calculation. Calculate the probability of conditional events (multiple outcomes) using a probability tree or direct calculation. Use the product rule for counting. Sort frequencies and elements into a triple set Venn diagram and calculate probabilities from them. Interpret set notation to calculate probabilities from a Venn diagram. Construct probability tree diagrams for simple algebraic probabilities (independent events).
Higher	*Intermediate objectives and…* Form probability tree diagrams for algebraic probability (independent or conditional). Form and solve equations that result from two successive events with algebraic probabilities.

	outcome from two events (2 dice, etc…) [simple scenarios]	Compare theoretical and experimental probabilities to identify bias.			