Maths

Key Stage Three Curriculum

	Autumn A	Autumn B		Spring A	Spring B	Summer A		Summer B
Year 7	Place Value Use 4 operations with numbers consisting of up to 3 digits as a minimum, including decimals. Find percentages of an amount and increase/decrease a value by a percentage.	Algebra Recognise, substitute values into, write and simplify equations, expressions, identities and formulae. Expand single, double and triple brackets. Factorise linear expressions.	PROGRESS TEST ONE	2D Shapes Converting between metric units. Recognising 2D shapes and their properties including circles. Finding the area and perimeter of 2D shapes including circles and compound shapes.	Statistics Find the mean, median, mode and range of a data set including grouped data. Complete two-way and frequency tables. Draw and interpret a variety of data displays including pictograms, time series and scatter graphs, bar charts and stem and leaf diagrams.	Fractions Simplify and calculate with fractions. Find fractions of an amount. Convert between fractions, decimals and percentages. Convert between mixed numbers and improper fractions.	PROGRESS TEST TWO	Ratio Simplify and scale up a ratio. Convert a ratio into a unit ratio. Convert between fractions and ratios. Share a ratio into two or three parts. Solve proportion problems including recipes, map scales and currencies.
Assessment	Baseline assessment (first week of term) Mid Unit Assessment – Place Value End of unit assessment – Place Value	Baseline re-assessment (first week after half term holiday) Mid Unit Assessment - Algebra End of unit assessment - Algebra		Mid Unit Assessment – 2D Shapes End of unit assessment – 2D Shapes	Mid Unit Assessment – Statistics End of unit assessment – Statistics	Mid Unit Assessment – Fractions End of unit assessment – Fractions		Mid Unit Assessment – Ratio End of unit assessment – Ratio

	Autumn A	Autumn B		Spring B	Spring B	Summer A		Summer B
Year 8	<u>Types of Number</u> Use powers and roots, including using index laws, fractional powers and negative powers. Using prime factor decomposition to find HCF and LCM. Rounding and estimating. Calculating with numbers in standard form.	<u>Probability</u> Use a number line to represent the probability of an event. Calculate the probability of an event including from Venn, stem and leaf and sample space diagrams and frequency trees. Understanding key terms.	**PROGRESS TEST THREE**	<u>Sequences and Graphs</u> Substitute values into expressions or formulae. Find or use the nth term of arithmetic and geometric sequences. Plot linear functions. Find the gradient, y-intercept or full equation of a straight lines.	<u>3D Shapes</u> Categorise 3D shapes using their properties. Calculate the volume and surface area of 3D shapes. Draw plans, elevations and nets. Convert metric units of volume.	<u>Angles and Constructions</u> Calculate missing angles, including on a straight line, about a point, inside polygons and in parallel lines. Construct the loci equidistant from one/two points or lines.	**PROGRESS TEST FOUR**	<u>Transformations</u> Recognise lines of symmetry and rotational symmetry. Describe and draw all four transformations. Draw and calculate with vectors.
Assessment	Baseline assessment (first week of term) Mid Unit Assessment – Types of Number End of unit assessment – Types of Number	Mid Unit Assessment - Probability End of unit assessment - Probability		Mid Unit Assessment – Sequences and Graphs End of unit assessment - Sequences and Graphs	Mid Unit Assessment – 3D Shapes End of unit assessment - 3D Shapes	Mid Unit Assessment – Angles and Constructions End of unit assessment - Angles and Constructions		Mid Unit Assessment - Transformations End of unit assessment - Transformations

	Autumn A	Autumn B		Spring B	Spring B	Summer A		Summer B
Year 9	<u>Further Algebra</u> Solve one and two step equations Rearrange linear equations Expand double and triple brackets Factorise all forms of quadratics Solve quadratics by factorising, completing the square and using the quadratic formula Draw inequalities on a number line Solve linear inequalities with up to two variables and quadratic inequalities	<u>Fractions/Decimals</u> Find fractions of amounts Use four operations with fractions, mixed numbers and algebra Convert between mixed numbers and improper fractions Convert between fractions, decimals and percentages Convert recurring decimals to fractions Increase/decrease an amount by a given percentage Reverse percentages Apply simple and compound interest	**PROGRESS TEST FIVE**	<u>Triangles</u> Identify whether shapes are similar or congruent Find missing lengths in similar shapes Use Pythagoras' theorem to find the length of any side of a triangle Use trig. ratios to find missing sides/angles of a triangle Know the exact values of sin θ, cos θ and tan θ for 0°, 30°, 45°, 60° and 90° Find missing sides, angles or areas of non-right-angled triangles	<u>Further Statistics</u> Find averages from a frequency table or grouped data Draw and interpret stem-and-leaf diagrams including back to back Draw and interpret frequency polygons, pie charts and scatter graphs, box plots Describe correlation Use interpolation and extrapolation with a line of best fit Calculate median, lower quartile, upper quartile and IQR from a list of values	<u>Multiplicative Reasoning</u> Convert between metric units for length, area and volume Calculate speed, distance, time, density, mass, volume, force, pressure and area Convert between m/s and km/h Calculate a persons wage using time and a half, double time etc. Find percentage change Reverse percentages Calculate simple and compound interest	**PROGRESS TEST SIX**	<u>Graphs</u> Plot a linear function from a table of values Find the midpoint, calculate gradients and find the equation of a line from a graph or two coordinates Identify the graph of a linear equation using $y = mx + c$ Plot quadratic, cubic and reciprocal graphs Calculate gradient and area under a real-life graph Interpret real-life graphs such as distance-time and velocity-time Interpret basic real-life graphs such as phone bill rates
Assessment	Mid Unit Assessment – Algebra 2 End of unit assessment – Algebra 2	Mid Unit Assessment – Fractions/Decimals End of unit assessment - Fractions/Decimals		Mid Unit Assessment - Triangles End of unit assessment - Triangles	Mid Unit Assessment – Data End of unit assessment - Data	Mid Unit Assessment – Multiplicative Reasoning End of unit assessment - Multiplicative Reasoning		Mid Unit Assessment - Graphs End of unit assessment - Graphs

Year 7 Maths: Place Value

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Know how decimal notation and place value are built Know the structure of either column method or grid method for multiplication	Understand place value in context such as pounds and pence	Multiply and divide numbers in the form TU x TU, HTU × U, HTU ÷ U Round numbers to an appropriate degree of accuracy Estimate answers to calculations involving more than two operations Estimate roots Order decimals, as a list or using > < Add and subtract integers and decimals Multiply or divide any number by 0.1 and 0.01 Multiply and divide decimals
Know the order of operations (with and without brackets) Brackets, Indices, Division, Multiplication, Addition, Subtraction	Understand how temperatures can go below 0 degrees or how a bank account can become overdrawn	Use 4 operations with negative numbers
	Understand how shops apply a percentage discount or how bills increase by a percentage Can extend to simple interest and understand interest on savings or charges on debt	Find a percentage of an amount Increase/decrease an amount by a given percentage

Year 7 Maths: Algebra

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Recognise equations, expressions, identities and formulae	Understand how symbols and letters can represent numbers, in a similar way to how coding is performed	Substitute values into expressions or equations incl. the kinematic formulae Write algebraic expressions e.g. five less than a number is n - 5
Recognise that operations learnt in Place Value apply to algebraic terms in the same way	Being able to manipulate algebra so that it is easier to simplify and/or solve	Simplify algebraic expressions using all four operations Multiply a set of brackets by numbers, letters and both Expand two sets of brackets then simplify Expand double and triple brackets Factorise linear expressions
	Understand how unknown values can be found if written algebraically	Find the input and output from a function machine Use function machines to find an inverse function Solve one step and two step equations including with a fraction Solve equations including brackets Solve equations with unknowns on both sides including where one is negative Solve problems by forming and solving equations

Year 7 Maths: 2D Shapes

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Know common metric units conversions including between length and area/volume; e.g. 1m = 100cm, 1kg = 1000g, etc.	Understand units that are used in everyday life	Convert all metric units including between length and area/volume
Recognise the properties of 2D shapes. Labelling parts of a circle	Understand the practical application of finding an area, for example how much carpet is needed to cover a floor. Understand the practical application of finding a perimeter, for example how much skirting board is needed for a room.	Calculate the area of triangles, parallelograms and trapeziums. Calculate area and circumference of circles including in terms of pi Find area and perimeter of sectors Calculate the area of compound shapes. Calculate missing lengths given the area or perimeter. Calculate the area or perimeter using algebra, fractions or decimals Solve worded problems including perimeter and area.

Year 7 Maths: Statistics

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Identify the difference between discrete and continuous data Understanding how outliers can affect averages	Understand how data can be collected, for example on a survey. Have a cultural understanding of an average.	Find the mean, median, mode and range for discrete data sets Find a set of values when given the mean, median, mode and range
Understand what defines the modal class	Use real-life tables such as a bus time table.	Reading timetables Complete two way tables Complete frequency tables (tally charts)
Know how to interpret time series graphs, bar charts (clustered and composite) and scatter graphs Know that methods for calculating the mean when exact data is given is different to when grouped data is given	Interpret charts to see whether there is a correlation between two variables, for example the number of calories consumed and a person's body mass index.	Drawing time series graphs and bar charts (clustered and composite) Calculate the mean from a frequency table Estimate the mean of grouped data
	Understanding what information cannot be taken from a pie chart and seeing media stories that use pie charts inappropriately	Reading pie charts Constructing pie charts

Year 7 Maths: Fractions

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Know that simplifying and scaling up fractions are both methods of finding equivalent fractions.	Understand how shops can decrease prices by a fraction.	Cancel a fraction down to its simplest form Change an improper fraction to a mixed number Find simple fractions of whole number quantities including multiplying a fraction by a whole number Express one number as a fraction of another (halves, quarters, thirds)
Interpret division as a multiplicative inverse (for example, know that 1 divided by 1/4 is the same as 1 × 4) – this is the reasoning for the method of dividing fractions)	Understand how calculations can be made using fractions.	Add and subtract fractions Add and subtract mixed number fractions Find the reciprocal of a number Multiply and divide fractions by an integer Multiply and divide fractions by fractions including mixed numbers
Know names of place value columns (tenths, hundredths, thousandths) which relate to that digit's fraction (for example, 0.1 is 1 tenth and therefore 1/10 as a fraction)	Understand how people can interchange between fractions, decimals and percentages in everyday conversation. Understand how statistics given in the media can be given in the form of a fractions, decimals or percentages.	Compare and order fractions by converting them to decimals or equivalent fractions Converting between fractions, decimals and percentages Compare and order a mixture of fractions, decimals and percentages Be able to enter time as a mixed number and a decimal into a calculator Convert a recurring decimal to a fraction

Year 7 Maths: Ratio and Proportion

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Know that ratios can be written from a worded statement/problem Know that ratios containing different units must first be converted to the same unit before simplifying to its simplest form	Understand that a quantity can be split into parts Apply ratio to real-life examples	Scaling up and fully simplifying a ratio Simplifying a ratio containing decimals Converting a ratio into a unit ratio Converting between fractions and ratios Sharing a quantity in a ratio with 2 parts Using ratios with three or more parts Sharing a ratio A:B, where B gets £x more than A Solving worded ratio problems
Understand that multiplicative reasoning involves scaling up or simplifying proportion (for example, a recipe serving 10 people being used for 5 or 20 people)	Understand comparable costs of similar products Apply proportion to scale recipes Use maps and scale drawings Calculate the cost of multiple products Understand the use of currency exchange	Solve problems involving direct proportion Use the unitary method to solve simple word problems Solve best buy / unit price problems Use map scales to find the actual distance Convert between currencies Solve inverse proportion problems

Year 8 Maths: Types of Number

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Know square, cube and triangle numbers (up to 12 squared, 5 cubed and the first 5 triangular numbers)		Calculate squares, square roots, cubes and cube roots Calculating combinations of powers, roots and brackets - BIDMAS Use index laws ($2a^4 \times 3a^5$) including with negatives and multiple operations Find the reciprocal of a number Find fractional and negative powers of an integer and fraction
	Recognising that a factor is a part of something	Find the HCF/LCM of two/three numbers Write numbers as a product of their prime factors Use prime factor decomposition to find the HCF and LCM
	Able to round for ease of calculation in everyday circumstances Recognising that rounding will affect the level of accuracy	Round numbers to a set number of decimal places or significant figures Write the error interval of a number that has been rounded Estimate answers including to solve problems
Know the order of positive and negative numbers, including decimals	Identifying areas where standard form is commonly used (e.g. distance, measurements, space, etc)	Multiply large numbers and decimals with up to two decimal places Write large and small numbers in standard form Convert standard form to ordinary numbers Use calculations involving standard form including problem solving

Year 8 Maths: Probability

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Understand the definition of probability Know words that are commonly used to describe the likeliness of an event happening	Able to use words to describe the likelihood of an event happening (may be less mathematical initially) Use probability to make informed decisions as to the risk required versus the reward	Show probabilities on a number line using fractions, decimals and percentages Calculate the probabilities of single events including equally likely events
Know the expected layout of a sample space diagram	Understanding the possible choices from events Recognise where order of choices does and does not matter (e.g. menu choices must take order into account but choosing a combination of ice cream flavours does not)	List the possible outcomes for mutually exclusive events such as menu choices Find the number of possible combinations Work out probabilities from sample space diagrams
Understand mutually exclusive and exhaustive outcomes Understand that mutually exclusive events sum to 1		Find the probability of events not happening Compare theoretical and experimental probabilities (relative frequency) Investigate with dice or coins the difference between theoretical and experimental probability
Use set notation (write numbers in sets)	Interpreting conclusions from a variety of data sources Identifying why a diagram may or may not be useful for a given set of data	Complete two way tables and find probabilities using them Use Venn diagrams to represent events and calculate probabilities Construct and interpret frequency trees

Year 8 Maths: Sequences and Graphs

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
	Recollection of commonly used formulae. Some may be recognised from Science (speed, pressure, density, suvat, etc)	Substitute values into expressions and formulae Find missing terms in a sequence and the rule that it follows
Know how Fibonacci style sequences are structured		Compare geometric and arithmetic sequences Generating linear sequences given the nth term Finding the nth term of linear sequences (increasing and decreasing)
Know that a linear equation gives a straight line graph Know the general form of a linear equation is y=mx+c Know the definitions of gradient and y-intercept	Understanding that linear graphs demonstrate a relationship between two variables and are often used in statistics used in the media	Plot graphs of x=n and y=n where n is an integer Plot a linear function from a table of values including y=mx+c Investigation: Plot and compare graphs of 2n, 2n+2, 2n-3 and n, 2n, 3n Find the midpoint of a line or of two coordinates Calculate gradients of lines from a graph and from two coordinates Identify the graph of a linear equation using y=mx + c

Year 8 Maths: 3D Shapes

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Understand properties of 3D shapes (vertices, faces, edges)	Identify 3D shapes in real life	Categorise 3D shapes into prisms, pyramids and spheres
Know formulae to calculate the volume of cuboids and prisms including cylinders Know 1 litre = 1000ml 1 litre = 100cl Know the conversion: 1 litre = 1000cm^3	Recognising that both litres and cm^3 are units for capacity	Calculate volumes of cuboids and prisms including cylinders Calculate the volume of a compound 3D shape Solve problems involving volume such as filling a shape with liquid Convert units of volume include litres to cm^3
Know how to find the area of 2D shapes (squares, rectangles, triangles) in order to find the surface area Know the definition of the words plan and elevation Know how to use a co-ordinate grid Know how to substitute dimensions into a given formula	Recognising surface area involves the faces of a shape Recognising that nets can be folded into a 3D shape Understanding birds eye view as a term	Calculate surface area of cuboids and prisms Investigate nets – to find the number of faces, edges and vertices Draw plans and elevations of 3D shapes Find 3D coordinates of cuboids Find the volume and surface area of pyramids and spheres, using a given formula

Year 8 Maths: Angles and Constructions

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Know that angles on a straight line sum to 180^o Know that angles about a point sum to 360^o Know that angles in a triangle sum to 180^o Know that angles in a quadrilateral sum to 360^o Know the formula to calculate the sum of angles in any polygon Know the definitions for co-interior, vertically opposite, alternate and corresponding angles		Calculate missing angles on a straight line Calculate missing angles about a point Calculate missing angles in triangles (including equilateral and isosceles) Calculate missing angles in quadrilaterals (including rhombus, parallelograms, etc) Calculate missing angles in polygons (including regular shapes) Find missing angles using algebraic expressions and equations Find missing angles in parallel lines Find exterior and interior angles of polygons
Know the definitions of the words bisector, perpendicular and equidistant	Learning about industries that use scale drawings (engineering, product design, architecture, landscape design, etc)	Accurately construct triangles Construct loci - equidistant from a point Construct loci - equidistant from two points (bisect a line) Construct loci - equidistant from a line Construct loci - equidistant from two lines (bisect an angle) Make and use accurate scale drawings

Year 8 Maths: Transformations

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Know the definition of the words reflect and symmetry Know the difference between reflectional symmetry and rotational symmetry	Understand how shapes are manipulated from a design aspect	Identify a shape's order of rotational symmetry Reflect a shape in the x and y axis, the equation of a line in the form y = n or x = n and in y = x and y = -x Fully describe a reflection
Know the definition of the words translation and vector		Describe and draw translations with words Describe and draw translations using vector notation
Know the definition of the words enlargement and scale factor		Draw an enlargement with and without a centre of enlargement Fully describe an enlargement using scale factors, direction and centre of enlargement
Know the definition of the word rotation Recognise which directions are clockwise and anti-clockwise		Draw and fully describe rotations (using a fraction of a turn and degrees) Draw and fully describe a combination of transformations
Know the definition of invariant	Linking vectors with physics	Identify invariant points once a transformation has been performed Draw, add, subtract vectors and scale up vectors

Year 9 Maths: Further Algebra

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Know that double bracket expressions show two brackets being multiplied Know the definition of a quadratic expression/equation	Understanding that these algebraic processes are tools to help solve problems and/or analyse data that fits a trend Recognise that the trend of a quadratic graph is common in Science and Engineering, hence their importance in our learning	Change the subject of a linear equation Expand double and triple brackets and simplify Factorise quadratics in the form $ax^2 + bx + c$ where $a = 1$ Factorise quadratics in the form $ax^2 + bx + c$ where $a > 0$
Know that in order to factorise quadratics, you need them in the form $ax^2 + bx + c$		Solve quadratics by factorising Solve quadratics by completing the square Solve quadratics by using the quadratic formula Rearrange quadratic equations and then solve
Know notation for drawing inequalities (filled circle ≤ or ≥; open circle < or >)		Represent an inequality on a number line Solve linear inequalities with one and two variables Solve quadratic inequalities

Year 9 Maths: Fractions/Decimals

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Understand that irrational numbers cannot be written as fractions Understand the difference between terminating and recurring decimals		Find fractions of amounts including improper fractions Four operations with fractions and mixed numbers
Recognise that mixed numbers, improper fractions, decimals and percentages are all ways of showing a portion Know the definition of a mixed number and improper fraction	Important for comparing financial situations in different numeric form, e.g. 1/3 off, extra 10% free, buy one get one free, etc.	Convert between mixed numbers and improper fractions Convert between fractions, decimals and percentages Convert fractions to decimals using division Convert recurring decimals to fractions
	Important for financial situations including loans, savings, interest rates, credit cards, investment, mortgages, etc.	Revision of percentage increase and decrease Simple and compound interest
Recognise that fraction rules still apply to fractions containing an unknown value		Simplify algebraic fractions Use four operations with algebraic fractions

Year 9 Maths: Triangles

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Identify whether shapes are similar or congruent Understand that angles in similar shapes are the same	Recognise that scale factors and similar shapes are useful when scaling up or down models, plans, construction drawings, etc.	Find missing lengths in similar shapes using scale factors
Know the formula for Pythagoras' theorem from memory	Linking with real life scenarios such as standard measurement for televisions	Use Pythagoras' theorem to find the length of the hypotenuse of a triangle and a shorter side of a triangle Use Pythagoras' theorem to find the length of a vector Solve problems using Pythagoras' theorem including diagonals of rectangles, length of ladders, perimeters of compound shapes, etc
Know the trigonometric ratios for sine, cosine and tangent from memory Know the exact values of sin θ, cos θ and tan θ for 0^o, 30^o, 45^o, 60^o and 90^o Know the sine and cosine rules from memory		Use trigonometric ratios to find missing sides and angles of a right-angled triangle Use the sine and cosine rules to find a missing length or angle Find the area of a non-right-angled triangle using $A = \frac{1}{2}ab\sin C$ Find missing lengths or angles of a non-right-angled triangle when given the area by using $A = \frac{1}{2}ab\sin C$

Year 9 Maths: Further Statistics

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Know how to calculate mean, median, mode and range from raw data Know that the range is not an average but a measure of spread	Recognising that when the word average is used in the media, this is often the mean but sometimes other forms a an average are more appropriate	Find averages from a frequency table Find averages from grouped data Compare and describe populations using an average and measure of spread
		Draw and interpret stem-and-leaf diagrams (including back-to-back), scatter graphs, box plots and frequency polygons Describe correlation Use interpolation and extrapolation with a line of best fit Calculate median, lower quartile, upper quartile and IQR (inter-quartile range) from a list of values
	Understanding what information cannot be taken from a pie chart and seeing media stories that use pie charts inappropriately	Reading pie charts Constructing pie charts

Year 9 Maths: Multiplicative Reasoning

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Know conversions for all basic metric units (mm, cm, m, km, g, kg, tonne, ml, l)		Convert between cm^2 and m^2, cm^3 and m^3
Know the formulae to calculate speed, density and pressure from memory	Clear links here to Science. These formulae will also be covered there. (GCSE Physics also requires all of these to be committed to memory. GCSE Combined Science requires only speed and density to be memorised)	Calculate speed, distance and time Calculate the average speed of a journey split into parts Convert between m/s and km/h Substitute into kinematic formulas Calculate density, mass and volume Calculate the density of a liquid made by mixing multiple liquids Calculate force, pressure and area Calculate a person wage using time and a half, double time etc.
	Important for financial situations including loans, savings, interest rates, credit cards, investment, mortgages, etc.	Revision of percentage increase or decrease Find the percentage change (percentage profit/increase/decrease) Simple and compound interest

Year 9 Maths: Graphs

Core Knowledge And Cultural Knowledge (KNOW)		SHOW
Know the definitions of gradient and y-intercept	Understanding that linear graphs demonstrate a relationship between two variables and are often used in statistics used in the media	Plot a linear function from a table of values including $y = mx + c$ and $ax + by = c$ Find the midpoint of a line from a graph Find the midpoint of two coordinates Calculate gradients of lines from a graph Calculate gradients of lines from two coordinates
Know that a linear equation gives a straight line graph Know the general form of a linear equation is y=mx+c		Find the equation of a line from a graph Find the equation of a line from two coordinates Find the equation of a line given the gradient and one coordinate Identify the graph of a linear equation using $y = mx + c$ Calculate gradient and area under a real-life graph
Identify quadratic, cubic and reciprocal graphs if shown	Recognise that the trend of a quadratic graph is common in Science and Engineering, hence their importance in our learning	Plot quadratic, cubic and reciprocal graphs Interpret real-life graphs such as phone bill rates, distance-time and velocity-time