MATHEMATICS

Year 7

What are the aims and intentions of this curriculum?

The aim of our Key Stage 3 Curriculum is to consolidate the numerical and mathematical capability and skills learnt from key stage 2 and to extend students' understanding of the number system and place value to include decimals, fractions, powers and roots. The curriculum also seeks to equip students with the knowledge to be able to make generalisations about the number system that will help them to make the necessary connections between mathematical topics and voids re-teaching when developing concepts in isolation. It also seeks to develop fluent understanding of the axioms and structures of number that are fundamental to mathematics which underpins the understanding of algebraic notations developed in this year and in the subsequent years. The KS3 Curriculum also aims to equip Students to apply algebraic reasoning in new contexts such as Geometry, and to also make linkage to different interpretations of fractions and be introduced to ratio.

Term	Topics	Knowledge and key terms	Skills developed	Assessment
Autumn 1	**Number** • Factors and Multiples	**Students will be able to:** • Understand Types of numbers, factors and Divisibility • Prime factorisation and with powers. • Finding HCF and LCM of two numbers. • Unique Factorisation	• use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem. **Factors: families – using the factor tree** **Multiples: extended families (number of family members living together** **Prime: Single parent – Mom and 1 child or Dad and 1 child**	• All Students will be sitting an End of term assessment. • Students will be assessed additionally as best seen fit by their subject teacher. Mathswatch Group work Class discussions Targeted Questioning
	• Fractions	• Consider the concepts of equivalent fractions, working with improper and mixed fractions. • Students are required to find equivalent fractions including simplifying by finding common factors in the numerator and denominator. • Build on knowledge of fractions from KS2. • Explore multiple interpretations of fractions and establish useful language and representations to use alongside these. • Add and Subtract proper fractions	• Explore multiple representations of fractions • Recognise and name equivalent fractions • Convert between mixed numbers and improper fractions • Compare and order numbers (including like and unlike fractions) **Fractions: Equality and equity in homes**	

	• Fraction, Decimal and Equivalence	• Explore multiple representations of fractions • Recognize and name equivalent fractions • Convert fractions to decimals • Convert between mixed numbers and improper fractions • Compare and order numbers (including like and unlike fractions) • Convert simple fractions and decimals to percentages • Express one quantity as a fraction of another considering the equivalence of fractions	• Consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals and fractions.	
	• Negative numbers • BIDMAS	• Interpret negative numbers in a variety of contexts • Compare and order positive and negative numbers • Use positive and negative numbers to express change and difference • Calculate using all four operations with positive and negative values • Use number lines to model calculations with negative numbers • Form and manipulate expressions involving negative numbers • Understand and know order of operations	Develop a sense of flexible number composition by solving problems involving time of day and quantities of time. • Have an awareness of different numerical systems and their representation. • Understand that operations of equal priority can be evaluated in any order • Understand that written calculations follow rules of 'syntax' determining the order of operations • Understand the higher priority of multiplication with division over addition with subtraction in written calculations. • Interpret the order of operations from written calculations, function machines and worded descriptions	
	ALGEBRA • Algebraic Expression	• Use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships • Substitute values in expressions, rearrange and simplify expressions	**Negative and positive numbers: School's behaviour policy** **Calculations following rules: Priorities in our daily lives**	

Autumn 2	• Algebraic Expression • Sequences **Shape Space and Measure** **Angle Facts** • **Parallel Lines**	**Students will be able to:** • Collect like terms and simplify expressions and expand brackets.*1 • Generate terms of a linear sequence using term to term and position to term rules • Use linear expressions to describe the nth term of an arithmetic sequence • Use geometric patterns*2 to derive sequences • Derive sequences from different contexts • Estimate, measure, draw and calculate angles. • Describe, classify and identify types of angles using clear vocabulary • Measure and draw angles accurately. • Revise facts involving angles around a point, angles at a point on a straight line and vertically opposite angles from experiences in primary school. • Use properties of a triangle to work out unknown angles. • Solve problems involving quadrilaterals. • Use the properties of isosceles and equilateral triangles to solve problems. • Work out unknown angles when two or more lines meet or cross at a point. • Work out unknown angles involving parallel lines. • Explore and clarify definitions of parallel lines and perpendicular lines, and use rules around corresponding, alternate and co-interior angles. • Formulate equations to show relationships between angles using the angle facts that are introduced in this unit.	• Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems • Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems. • recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions • deduce expressions to calculate the nth term of linear sequences *1: grouping Team players – world cup matches *2: Predicting goals • Draw and measure acute and obtuse angles reliable to the nearest degree • Estimate the size of a given angle • Know and use angle facts: angles at a point, angles at a point on a straight line, vertically opposite angles, Angles in a Triangle and Quadrilateral. • Generalizations and reasoning – e.g. going beyond two angles • Define parallel lines • Use angle facts around corresponding, alternate and co-interior angles to find missing angles	• All Students will be sitting an End of term assessment. • Students will be assessed additionally as best seen fit by their subject teacher. Mathswatch Group work Class discussions Targeted Questioning

	Interior and Exterior Angles • Area and Perimeter of 2-D shapes	• Describe the line and rotational symmetry*1 of triangles. • Describe the line and rotational symmetry of quadrilaterals. • Work out the interior and Exterior angles*2 of a polygon • Work out the interior and Exterior angles of a polygon. • Find Area*3 and Perimeter of 2d shapes. • 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. • Area of compound shapes	*1: Round about (some) *2: Interior and exterior decorators, the hexagons on a honey comb *3: details on a land title, the hexagons on a honey comb • Appreciate the concept of area as a measurable quantity • Find the area of rectilinear shapes • Find the area of other 2-D shapes including triangles, and special quadrilaterals • Generalise formulae for finding the area of 2-D shapes using the language of height, base, width, length etc. • use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate • use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.) • know and apply formulae to calculate: area of triangles, parallelograms, trapezia) Land title - Elevator, buses, Air craft, Train, Cars etc - luggage	
Spring 1	• Percentages	**Students will be able to:** • work with percentages as another representation of ratios and fractions. • use their knowledge of arithmetic with decimals and fractions. • use of percentages to compare quantities and find a given percentage of a quantity.	• Understand percentages as a ratio of two quantities where one quantity is standardised to 100 • Understand percentages as a fractional operator with a denominator of 100 • Understand and interpret percentages over 100 • Interpret a percentage as a fraction and decimal • Express a quantity as a percentage of another • Compare two quantities using percentages	• All Students will be sitting an End of term assessment. • Students will be assessed

		• increase and decrease quantities by a given percentage and find the original quantity given a percentage of the quantity.	• Find a percentage of an amount with and without a calculator • Select and use appropriate calculation strategies to solve increasingly complex problems	additionally as best seen fit by their subject teacher. Mathswatch Group work Class discussions Targeted Questioning
	Handling Data • Charts and Averages	• Construct and interpret charts and graphs • Calculate averages: Mean, mode, median and range **Median: choosing the best salary** **Mode: number of sales on a particular product in a shop** **Range: Sports**	• Find the mean, median mode and range from raw datasets • Use the mean, median and mode to compare data sets • Use an average plus the range to compare datasets • Find the mode, median and mean from tables and graphical representations (not grouped) • Explore what can and cannot be inferred in statistical settings and begin to express their arguments formally. • Begin to model situations mathematically and express the results using a range of formal mathematical representations.	
	ALGEBRA • Forming and solving equation	• Derive equations from different contexts • Solve linear equations with an unknown on one side	• Understand and use the concepts and vocabulary of expressions, equations*1, inequalities*2, terms, and factors • Use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement) ***1 Equality in the class room, home, road and workplaces** ***2 Speed limits, number of persons in the elevators, grade boundaries, who can take a given medication, age limit – travel for free, eat a hotel free, TV license free for > 80 years old etc**	

Spring 2	• Written Calculations Multiplication, Addition, subtraction and dividing of decimals. • Rounding and Estimation • Circles ➢ Area, circumference Compound shapes • Ratio and Map Scale	• Build on KS2 knowledge of adding, subtracting multiplying and dividing with decimals. • Apply approximation in terms of rounding numbers and estimating numbers. **Crowd in a stadium/Kings Coronation** **Covid cases** **Money** • Finding Area and Circumference of circles. • Calculate area and perimeter of composite shapes involving sectors of circles **Using marketing strategies to increase sales on products with circular openings (make the opening wider; customer uses more of the product hence will purchase it more often)** • Understand the concept of ratio and use ratio language and notation • Connect ratio with understanding of fractions • Compare two or more quantities in a ratio • Recognise and construct equivalent ratios • Express ratios involving rational numbers in their simplest form • Sharing in a given ratio • Construct tables of values and use graphs as a representation for a given ratio • Compare ratios by finding a common total value • Solve questions involving ratio.	• Understand the equal priority of addition with subtraction and multiplication with division in written calculations • Rounding to a given number of decimal places and significant figures • Estimation of numbers and employ them in calculations. • Understand the relationship between ratio and fractions • Round numbers to a required number of decimal places • Round numbers to a required number of significant figures • Consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals • Estimate quantities in a variety of contexts including area and perimeter • Identify and reason if an estimate is an over- or under-estimate • Explore relationship between circumference and diameter/radius. • Explore relationship between area and radius, area and circumference of a semi-circle and other sectors. • Introduce to pi as the constant linking the relationship between the two measures. • Work with ratios and quantities. • use ratio notation, including reduction to simplest form • divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations) • relate ratios to fractions and to linear functions • solve problems involving direct and inverse proportion, including graphical and algebraic representations • Solve simple word problems involving ratio and direct proportion.	• All Students will be sitting an End of term assessment. • Students will be assessed additionally as best seen fit by their subject teacher. Mathswatch Group work Class discussions Targeted Questioning

	• Transformation of 2-D shapes Translation, Reflection and Rotation	• STEM: Metric and imperial units • Using the unitary method • Proportion • Proportional reasoning **Students are expected to:** • Introduce reflection and rotation through previous experience of line and rotational symmetry. • Reflection of an object in a mirror line • Identify horizontal and vertical mirror lines and their equations • Rotation of an object using the centre of rotation • Translate shapes by a given number of units (positive or negative) in the x and y directions • Combine transformations and which combinations can be expressed as a single transformation • Consider how different transformations acting on an object produce different images. Reflection, rotation, and translation.	• 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. • Explore the ratios of sides lengths within and between shapes produced by an object being enlarged by a given scale factor • Recognise which transformations produce congruent shapes • identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional **and negative** scale factors) **Transformation 2-D shapes: The use of a mobile phone** **Rotation: The game around the world/movie** **Translation: ChaCha slide dance**	
	• Algebra recap: ➢ Simplifying algebraic expression ➢ Rearranging formula ➢ Solving simple equations	• Simplify algebraic expressions • Rearrange formulae to make a different subject • Solve equations and substitute values in order to find unknowns	• Use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships • Substitute values in expressions, rearrange and simplify expressions, and solve equations **Rearrange formulae: stepping aside and listening to another person point of view** **Solve equations: Suspect – police solving a case** **Substitutes: Online grocery shopping, Net ball/Foot ball matches etc**	• All Students will be sitting an End of term assessment. • Students will be assessed additionally as best seen fit by their subject teacher. • Maths watch

Summer 1	• Construction: ➢ Angles and triangles	**Students are expected to:** • Draw and construct triangles and quadrilaterals. • Analyse the geometrical properties of triangles and quadrilaterals. • Draw and measure angles within this context allowing them to practise the skills learned in the previous unit.	• Construct triangles and quadrilaterals for given conditions using ruler, protractor and compasses • Explore and define the minimum conditions for constructing triangles • Familiarise with the different cases of minimum conditions for the construction of triangles • Recognise when two triangles are congruent using the criteria of minimum conditions	• All Students will be sitting an End of term assessment. • Students will be assessed additionally as best seen fit by their subject teacher. Mathswatch Group work Class discussions Targeted Questioning
	• Coordinate Geometry ➢ Straight line equations	• Develop their understanding of the Cartesian coordinate grid and solve problems in all four quadrants. • Apply their understanding from previous units including negative numbers and geometric properties of triangles and quadrilaterals. • label horizontal and vertical lines by recognising the constant x or y coordinates along them. • Familiarise with the equation of a straight line and the constants	• Read and write coordinates of points in all four quadrants. Including non-integer coordinates **Lost at sea, Diverted aircraft, Air Traffic Controllers** • Find the mid-point of a line segment or two points • Use the midpoint and a point on the line to find the coordinates of another point on the line. **Meeting a friend half way** • Recognise and plot horizontal and vertical lines on a coordinate axis **Self-reflection at the end of a lesson** **Taking chances in life** **Weather forcast**	
	• Probability	• Understand and use the probability scale from 0 to 1 • Understand and use the language associated with probability • Understand what is meant by 'random' • Appreciate the difference between experimental and theoretical probability • Understand that different trials of an experiment may well produce difference outcomes • Systematically list outcomes using a variety of representations for both single and combined events	• Record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0-1 probability scale. • Understand that the probabilities of all possible outcomes sum to 1 • Generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities.	

	• Volumes and Surface Area of 3d shapes	• Use Venn diagrams and understand the meaning of union and intersections. • To calculate the volume of a prism, identify the cross-section and calculate its area. • Find the volume and surface area of solids • Convert between different units of area and volume • know and apply formulae to calculate the volume and surface area of cuboids and other right prisms • Identify nets of different 3D shapes. • Know the properties of 3D shapes. • Calculate the surface area and Volume of a cube and Cuboid. • Convert between different units of volume: cm^3, ml and litres. • Convert between metric measures for area and volume.	**Venn diagrams: Relationships and families** • know and apply formulae to calculate the volume and surface area of cuboids and other right prisms • know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders) • identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres **Volume: Optimising space**	