MATHEMATICS

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

Summer 2	• Construction:
	  ➢ Angles and triangles
	
	• Coordinate Geometry
	  ➢ Straight line equations
	
	• Probability
	•
		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.
		• 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
		
		• 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
			• 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
			
			• Read and write coordinates of points in all four quadrants. Including non-integer coordinates
			• 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
			• Recognise and plot horizontal and vertical lines on a coordinate axis
				• All Students will be sitting an End of term assessment.
				
				• Students will be assessed additionally as best seen fit by their subject teacher.
				
				Mathswatch

		• Systematically list outcomes using a variety of representations for both single and combined events Use Venn diagrams and understand the meaning of union and intersections.	• 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.	

Autumn 1	• Factors and multiples
	  ➢ Prime factor decomposition
	
	• Arithmetic sequence
	
	• Angles and transversals (build on Year 7 knowledge)
	
	• Algebra Solving Equations
	
	• Probability
	  ➢ Review year 7
	  ➢ Experimental
		Students will be able to:
		• Multiply and divide integers (negatives)
		• Use multiples, factors, common factors, HCF, LCM and primes
		• Find the prime decomposition of a number
		• 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
		
		• Recognise alternate and corresponding angles
		• Calculate missing angles using the angle concepts.
		• Find interior and exterior angles in polygons
		
		• Solving two step equations with brackets and variables on both sides.
		
		• Interpret the results of an experiment
		• Use diagrams and tables to record in a systematic way all possible mutually exclusive outcomes for single events and for two successive events
		• Compare estimated experimental probabilities with theoretical probabilities
			• Breaking numbers down into prime factors to investigate their structure and connections with other numbers
			• Using geometric knowledge to solve problems
			• Identifying the mathematical aspects of the situation or problem.
			
			• Using algebra and sequences to investigate problems
			
			• Recognising and explaining how to calculate angles in diagrams
			• Identifying and classifying shapes by their geometrical properties
			• Explaining the method when calculating angles in diagrams
			• Explaining the different properties of quadrilaterals.
			
			• 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.
				• 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

| Autumn 2 | • Fraction, decimal and Percentages

• Fractions

• Percentages

• Indices

• Circles
  ➢ Area, circumference Compound shapes

• Probability | **Students will be able to:**
• Convert between fractions, decimals and percentages
• Add and subtract fractions by writing them with a common denominator - include mixed numbers
• Calculate fractions of a quantity; multiply and divide an integer by a fraction
• Multiply and divide fractions including with mixed numbers
• Calculate percentages of a quantity
• Calculate a percentage change
• Calculate percentage increases and decreases using the multiplier method

• Know and apply the laws of indices for multiplying and dividing with powers

• Finding Area and Circumference of circles.

• Calculate area and perimeter of composite shapes involving sectors of circles
• 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.
• Frequency tree diagrams | • Solve problems involving percentage change, including:
  o percentage increase,
  o decrease
  o original value problems
  o and simple interest in financial mathematics

• Simplifying expressions involving sums, products and powers, including the laws of indices

• 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.
• Use language and properties precisely to probability and statistics. | • 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 |
| Spring 1 | • Standard Form

• Congruency of 2-D shapes

• Symmetry of 2-D shapes

• Transformation (build on year 7 knowledge)
  Rotation, reflection, | **Students will be able to:**
• Use standard form to express very large and small numbers
• Convert between standard form and ordinary numbers
• Order large and small numbers
• Know the criteria for congruence of triangles
• Apply properties of plane figures, and the criteria for congruence, using appropriate language
• Translate a shape by a given vector
• Reflect a shape in a line, including on coordinate axes
• Rotate a shape about a centre, including on coordinate axes
• Identify the type of transformation carried out by comparing an object and image
• Enlarge 2-D shapes given a centre of enlargement and a positive integer scale factor | • Use the language and notation associated with reflections, rotations, translations and enlargements.
• Calculate with and interpret standard form A x 10^n, where $1 \le A < 10$ and n is an integer.

• Identifying the symmetries of 2-D and 3-D shapes and the different transformations of 2-D shapes

• Explaining the different properties of reflections, rotations, translations and enlargements | • All Students will be sitting an End of term assessment.

• Students will be assessed additionally as best seen fit by their subject teacher.
• Mathswatch |

	translation and **Enlargement**
	
	• Ratio and Proportion
	
	• Linear graph
	  ➢ y = mx +c
	  ➢ gradients and their interpretations
		• Enlarge 2D shapes using a negative scale factor
		• Use scale factors
		
		• Use ratio notation, including reduction to simplest form
		• Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction
		• Relate the language of ratios and the associated calculations to the arithmetic of fractions and to linear functions
		• Identify the equations of horizontal and vertical lines
		• Plot coordinates from a rule to generate a straight line
		• Identify key features of a linear graph
		• Make links between the graphical and the algebraic representation
		• Identify parallel lines from algebraic equations
			• Show how ratio can be used in a geometrical context.
			
			• Plot graphs of equations that correspond to straight-line graphs in the coordinate plane;
			• Use the form y = mx + c to identify parallel lines
			• Find the equation of the line through two given points, or through one point with a given gradient
			• Identify and interpret gradients and intercepts of linear functions graphically and algebraically
			• Gradient is a measure of rate of vertical change divided by horizontal change.
			• Parallel lines have the same gradient
			• The y intercept always has the x value equal zero.	

Spring 2	• Scatter Diagram • Solve linear equation with unknown variable on both sides • Construct the graph for linear equations • Real life graphs and rate of change	**Students will be able to:** • Plot scatter graphs • Describe the type of correlation observed • Interpret correlation in the context of the data set • Construct and solve linear equations with integer coefficients (unknown on either or both sides, with or without brackets) by an appropriate method • Plot the graphs of linear functions where y is given explicitly in terms of x • Construct linear functions arising from real life problems and plot their graphs; discuss and interpret graphs arising from real situations such as distance time graphs	• Collect bivariate data and use the graphical representation to make simple inferences about the relationship. • Make lines with science and other areas of the curriculum during this unit. • Solve linear equations with an unknown on one side (revise from Year 7) • Solve linear equations with an unknown on both sides • Solve equations involving fractional terms and brackets • Use real contexts will help assign practical meaning to the gradient and the intercept. • Interpret the solution to an equation based on the context from which it is derived.	• All Students will be sitting an End of term assessment. • Students will be assessed additionally as best seen fit by their subject teacher.
Summer 1	• Fractions (Review) • Data collection • 2-way tables	**Students will be able to:** • Decide what data to collect to answer a question and the degree of accuracy needed • Identify possible sources and consider sample size. • Plan how to collect the data	• Draw and interpret two-way tables • Collect bivariate data and use the graphical representation to make simple inferences about the relationship.	• All Students will be sitting an End of term assessment.

• Range and Averages for grouped data • Stem and leaf diagram • Pie Charts • Bar Graphs • Frequency diagrams	• Construct frequency tables with equal class intervals to gather continuous data and 2-way tables for recording discrete data • Collect data using a suitable method • Calculate statistics for sets of data and recognise when it is appropriate to use the range, mean, median and mode and for grouped data the modal class. • Construct graphical representations and identify which are most useful in the context of the problem. Include stem and leaf diagrams; pie charts for categorical data, bar charts and frequency diagrams for discrete and continuous data; simple scatter graphs • Interpret tables, graphs and diagrams and relate findings to questions being explored • Gather data from specified secondary sources, including printed tables and lists and the internet	• Appreciate the difference between discrete and continuous data • Understand why the exact mean cannot be found from grouped data • Find an estimate of the mean from grouped data and continuous data • Describe, interpret and compare distributions, involving appropriate measures of central tendency and spread	• Students will be assessed additionally as best seen fit by their subject teacher.