

## 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	<ul style="list-style-type: none"> <li>• Construction of Linear graphs and interpretation</li> <li>• Solving harder equation with coefficients and fractions, unknown on both sides, brackets etc.</li> <li>• Scale diagrams</li> <li>• Plan and elevation</li> <li>• Bearing and loci</li> </ul>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Interpret and use conversion graphs and other graphs of proportional relationships</li> <li>• Identify the equations of horizontal and vertical lines</li> <li>• Plot coordinates from a rule to generate a straight line</li> <li>• Identify key features of a linear graph</li> <li>• Identify parallel lines from algebraic equations</li> </ul> <ul style="list-style-type: none"> <li>• use simple plans and elevations.</li> <li>• Visualise and use 2-D representations of 3-D objects</li> <li>• Make scale drawings (Isometric paper)</li> <li>• Use and interpret maps and scale drawings</li> <li>• Find simple loci</li> <li>• Use bearings to specify direction</li> <li>• Introduce conventions for drawing and measuring bearings</li> <li>• Plot and measure the position of an object on a given bearing and distance from a specified point</li> </ul> <p>Solve problems involving bearings</p>	<ul style="list-style-type: none"> <li>• Use real contexts to help assign practical meaning to the gradient and the intercept.</li> <li>• Plot coordinates from a rule to generate a straight line</li> <li>• Build on the previous one and is students' first formal introduction to straight line graphs.</li> <li>• Identify parallel lines from algebraic equations</li> <li>• See the links/similarities/differences between the different mathematical representations of a relationship e.g. the equation, the coordinates and the graphical representation.</li> </ul> <ul style="list-style-type: none"> <li>• Use 2-D representations for 3-D shapes</li> <li>• Use scale diagrams and map scales</li> <li>• Represent situations by using a locus</li> <li>• Use bearings to specify direction</li> <li>• Use an isometric grid to draw cuboids</li> <li>• Identify the equations of horizontal and vertical lines</li> <li>• Identify key features of a linear graph</li> <li>• Make links between the graphical and the algebraic representation</li> </ul>	<ul style="list-style-type: none"> <li>• At the end of each unit there will be a unit test.</li> <li>• There will be online assessments for each topic covered.</li> <li>• All Students will be sitting an End of term assessment.</li> <li>• Students will be assessed additionally as best seen fit by their subject teacher.</li> </ul>

			<ul style="list-style-type: none"> <li>• Recognise the different ways to represent 3-D shapes</li> <li>• Identify when to use loci in problems</li> <li>• Record methods, solutions and conclusions when solving a geometric problem.</li> </ul>	
Autumn 1	<ul style="list-style-type: none"> <li>➤ Number</li> <li>• Order of Operation</li> <li>• Rounding, Approximation and estimation</li> <li>• Factors and Multiples (HCF and LCM, Venn Diagram)</li> <li>• Roots and Surds</li> <li>• Indices</li> <li>• Standard form and its applications <ul style="list-style-type: none"> <li>➤ Algebra <ul style="list-style-type: none"> <li>• Straight line graphs</li> </ul> </li> </ul> </li> </ul>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Calculate accurately negative and positive numbers following BIDMAS</li> <li>• Round numbers and Estimation calculations</li> <li>• Work accurately with square, cubes and roots</li> <li>• Identify primes, factors and multiples</li> <li>• Complete prime factorisation</li> <li>• Find HCF and LCM</li> <li>• Understand surd notation</li> <li>• Understand and work with questions involving surds</li> <li>• Work with indices- Index laws</li> <li>• Calculate with Standard form</li> <li>• Plotting and drawing straight line graphs</li> <li>• Finding the gradient and y intercept of a line and equations of straight line given the gradient and y intercept.</li> </ul>	<ul style="list-style-type: none"> <li>• Select and use appropriate calculation strategies to solve increasingly complex problems</li> <li>• Extend their understanding of the number system.</li> <li>• Use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals</li> <li>• Recognise and use relationships between operations including inverse operations</li> <li>• Appreciate the infinite nature of the sets of integers, real and rational numbers.</li> <li>• Use problem solving strategies to find solutions</li> <li>• Substitute numerical values into formulae and expressions, including scientific formulae</li> </ul>	<ul style="list-style-type: none"> <li>• All Students will be sitting an End of term assessment.</li> <li>• Students will be assessed additionally as best seen fit by their subject teacher.</li> <li>• Mathswatch</li> </ul>
Autumn 2	<ul style="list-style-type: none"> <li>➤ Algebra</li> <li>• Expression, equations and Formulae</li> <li>• Algebraic simplification</li> <li>• Algebraic Expansion and Factorisation</li> <li>• Equation of straight-line graphs</li> <li>• Solving equations</li> </ul>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement)</li> <li>• Expand products of one or two or <b>three</b> binomials</li> <li>• Factorise expressions into a single bracket</li> <li>• Factorise Quadratic expressions when <math>a=1</math></li> <li>• Work with Coordinates in all four Quadrants</li> <li>• Identify the equations of horizontal and vertical lines</li> <li>• Plot coordinates from a rule to generate a straight line</li> </ul>	<ul style="list-style-type: none"> <li>• Use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships</li> <li>• Substitute values in expressions, rearrange and simplify expressions, and solve equations</li> <li>• Understand and use the concepts and vocabulary of expressions, equations, formulae inequalities, terms and factors</li> <li>• Use language and properties precisely to analyse numbers and algebraic expressions</li> <li>• Make and test conjectures about patterns and relationships; look for proofs or counter-examples</li> </ul>	<ul style="list-style-type: none"> <li>• All Students will be sitting an End of term assessment.</li> <li>• Students will be assessed additionally as best seen fit by their subject teacher.</li> <li>• Mathswatch</li> </ul>

	<ul style="list-style-type: none"> <li>• Sequences</li> <li>• Rearranging formula</li> <li>• Laws of Indices (More Complex)</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Finding equations of parallel and perpendicular lines.</b></li> <li>• Solving equations (all types)</li> <li>• Solving Simultaneous equations</li> <li>• Recognise arithmetic and geometric sequences and appreciate other sequences that may arise</li> <li>• To be able to rearrange to make a variable the subject of the equation.</li> <li>• Understand, derive and use the rules of indices with integer values</li> <li>• Apply the laws of Indices with Algebra- <b>including fractional</b> and negative indices.</li> </ul>	<ul style="list-style-type: none"> <li>• Make connections between number relationships, and their algebraic and graphical representations</li> <li>• Identify key features of a linear graph</li> <li>• Model situations or procedures by translating them into algebraic expressions</li> <li>• Solve problems involving linear sequences in a variety of contexts</li> <li>• Students begin to appreciate that writing with algebra applies the rules of arithmetic to unknown numbers which are represented as letters.</li> <li>• It is important to define the difference between an expression, equation and formula.</li> <li>• Understand quadratics in the general form</li> <li>• <math>x^2 + bx + c</math> helps to factorise and expand expressions.</li> <li>• Develop, mental methods to factorise quadratics is key to gaining confidence with quadratics equations later on.</li> </ul>	
Spring 1	<ul style="list-style-type: none"> <li>➤ Handling Data</li> <li>• Graphs, Charts for both Grouped and ungrouped data</li> <li>• Statistical Measures</li> <li>• Averages from tables and Graphs</li> </ul>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers)</li> <li>• Construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data.</li> <li>• Describe simple mathematical relationships between two variables (Bivariate data) in observational and experimental contexts and Illustrate this using scatter graphs.</li> </ul>	<ul style="list-style-type: none"> <li>• Move freely between different numerical, algebraic, graphical and diagrammatic representations</li> <li>• Develop algebraic and graphical fluency, including understanding linear functions</li> <li>• Identify variables and express relations between variables algebraically and graphically</li> <li>• Begin to reason deductively in number and algebra</li> <li>• Develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems</li> <li>• Develop their use of formal mathematical knowledge to interpret and solve problems</li> <li>• Begin to model situations mathematically and express the results using a range of formal mathematical representations</li> </ul>	<ul style="list-style-type: none"> <li>• At the end of each unit there will be a unit test.</li> <li>• There will be online assessments for each topic covered.</li> <li>• All Students will be sitting an End of term assessment.</li> <li>• Students will be assessed additionally as best seen fit by their subject teacher.</li> <li>• Mathswatch</li> </ul>

	<ul style="list-style-type: none"> <li>➤ Algebra</li> <li>• Solving harder equations</li> <li>• Inequalities</li> <li>• Quadratic expressions and equations</li> <li>• Simultaneous equations</li> </ul>	<ul style="list-style-type: none"> <li>• Identify possible primary or secondary sources; determine the sample size and most appropriate degree of accuracy.</li> <li>• Form and solve linear equations and inequalities in one unknown, including those where the unknown appears on both sides</li> <li>• Rearrange and solve linear equations and inequalities given in any form, including those involving fractions and brackets</li> <li>• Introducing Quadratics and solving simple quadratic equations</li> <li>• Solving simple simultaneous equations</li> </ul>	<ul style="list-style-type: none"> <li>• Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems.</li> <li>• Translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution.</li> </ul>	
Spring 2	<ul style="list-style-type: none"> <li>➤ Number</li> <li>• Fraction, Decimal and Percentages</li> <li>• Percentages</li> <li>• Ratio and Proportion</li> <li>➤ SSM</li> <li>• Angles and trigonometry</li> </ul>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Convert between fractions, decimals and percentages (review Year 7)</li> <li>• Use percentages greater than 100%</li> <li>• Express one quantity as a percentage of another</li> <li>• Increase and decrease a quantity by a given percentage</li> <li>• Find the original quantity using its final amount and percentage change</li> <li>• Solve problems involving percentage change and reverse percentage</li> <li>• Write, simplify and compare ratios</li> <li>• Convert between currencies and measures</li> <li>• Recognise and use direct proportion</li> <li>• Solve problems involving ratio and proportion.</li> </ul> <p>Higher only:</p>	<ul style="list-style-type: none"> <li>• extend their understanding of the number system.</li> <li>• extend and formalise their knowledge of ratio and proportion in working with measures and geometry, and in formulating proportional relations algebraically</li> <li>• identify variables and express relations between variables algebraically and graphically</li> <li>• begin to reason deductively in number and algebra</li> <li>• select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems.</li> <li>• consolidate their numerical and mathematical capability from key stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers and roots</li> <li>• select and use appropriate calculation strategies to solve increasingly complex problems</li> </ul>	<ul style="list-style-type: none"> <li>• All Students will be sitting an End of term assessment.</li> <li>• Students will be assessed additionally as best seen fit by their subject teacher.</li> <li>• Mathswatch</li> </ul>

	<ul style="list-style-type: none"> <li>• Pythagoras' Theorem</li> <li>• Angle properties in a polygon-Interior and Exterior angles in a polygon</li> <li>• Basic Trigonometry</li> </ul>	<ul style="list-style-type: none"> <li>• Derive Pythagoras' theorem</li> <li>• Use Pythagoras' theorem to find missing sides in right-angled triangles</li> <li>• Solve associated problems in other shapes where right-angled triangles exist</li> <li>• Deduce whether a triangle is right-angled by considering its sides</li> <li>• Derive the proof of the sum of the angles in a triangle</li> <li>• Find the formula for sum of the angles of any polygon</li> <li>• Understand and use the sum of the exterior angles of a polygon</li> <li>• Solve problems involving the angles/number of sides in a regular polygon</li> <li>• Develop an understanding of the trigonometric ratios</li> <li>• Solve problems using trigonometric ratios in right-angled triangles</li> </ul>	<ul style="list-style-type: none"> <li>• move freely between different numerical, algebraic, graphical and diagrammatic representations</li> <li>• know the formulae for: Pythagoras' theorem, <math>a^2 + b^2 = c^2</math></li> <li>• Investigate the trigonometric ratios using similar triangles</li> <li>• Define and use the cosine, sine and tangent ratios</li> </ul>	
<p>Summer 1</p>	<ul style="list-style-type: none"> <li>• 2-D shapes recap</li> <li>• Angles and parallel lines</li> <li>• Angles in Polygon (review)</li> <li>• Geometric Reasoning</li> <li>➤ Algebra</li> <li>• Rate of Change and graphs</li> <li>• Quadratic Graphs</li> <li>• Equations of straight lines revisiting</li> </ul>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Understand the difference between regular and irregular polygons</li> <li>• Corresponding, Alternate and supplementary angles.</li> <li>• Finding interior and exterior angles of any regular polygon.</li> <li>• Use linear and quadratic graphs to estimate values of <math>y</math> for given values of <math>x</math></li> <li>• Introduction to KS4 content: Solve simultaneous equations algebraically and graphically.</li> <li>• Use linear graphs to find approximate solutions of simultaneous linear equations</li> <li>• Plot graphs of equations that correspond to straight-line graphs in the coordinate plane;</li> </ul>	<ul style="list-style-type: none"> <li>• revisit their angle facts from earlier work in both Years 7 and 8 to understand the proof of the sum of the angles in a triangle.</li> <li>• Investigate how other polygons, starting with quadrilaterals, can be divided into triangles and so deduce the general formula.</li> <li>• Following on from investigating exterior angles, they will then solve a series of problems such as finding the number of sides given information about the angles of polygons.</li> <li>• Identify variables and express relations between variables algebraically and graphically</li> <li>• begin to reason deductively in number and algebra</li> <li>• select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems.</li> <li>• Identify and interpret gradients and intercepts of linear functions graphically and algebraically</li> </ul>	<ul style="list-style-type: none"> <li>• At the end of each unit there will be a unit test.</li> <li>• There will be online assessments for each topic covered.</li> <li>• All Students will be sitting an End of term assessment.</li> <li>• Students will be assessed additionally as best seen fit by their subject teacher.</li> <li>• Mathswatch</li> </ul>

- 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

- Find approximate solutions to contextual problems from given graphs of a variety of functions including:
  - (e.g. real-life linear graphs)