

**Year 10 (Higher)**

In Y10, students enter the first year of formal study for their GCSE. In many schools, students have been tiered into foundation or higher according to how well they fared with the more advanced topics in Y9. For students on both tiers, core knowledge and skills are revisited, to ensure that students have the **fluency** and **conceptual understanding** necessary to access the entire KS4 curriculum. Having revisited knowledge and skills from KS3, students are equipped to fully explore the core concepts of **mathematical thinking, mathematical reasoning, and problem-solving**. This is done in every half term, as students build up to answering exam-style questions, and teachers model **mathematical language and notation** which is suitably formal for KS4.

	<u>Learning Period 1: Autumn</u>	<u>Learning Period 2: Autumn</u>	<u>Learning Period 3: Spring</u>	<u>Learning Period 4: Spring</u>	<u>Learning Period 5: Summer</u>	<u>Learning Period 6: Summer</u>
Topic title	Number	Percentages and Probability	Algebra	Geometry	Similarity	Probability and Statistics
Key questions	<p>What is a power and root? How can I calculate with irrational numbers without a calculator? What are indices and how can I evaluate them? How can I calculate with very large and very small numbers without a calculator? What is a sequence and how do I identify different types of sequences?</p>	<p>How can I use percentage and decimal conversions to allow me to calculate percentages? How are percentages used in everyday life? How can I calculate a probability for an event or using experimental data? How can I find all the possible outcomes of a situation using systematic listing? What is set notation and how can I use a Venn diagram to organise data?</p>	<p>What methods can I use to solve a quadratic equation? How can I link those solutions to a quadratic graph? How can I solve an equation with more than one variable?</p>	<p>How can shapes be transformed? What is the error interval caused by rounding numbers and how can we overcome this? What is Pi and how can I use it to calculate area and circumference of a circle? What is the equation of a circle and how can I use this to find key points on a graph? How can I use formulas to calculate volume and surface area of 3D shapes?</p>	<p>How can I use ratio to solve problems? What is a compound measure and how can I use a formula to calculate it? How can I use formal notation to find a formula to link two variables that are in direct or inverse proportion of each other? What is Pythagoras' theorem and how can I use it to find missing lengths on a right-angled triangle? What is similarity and how does it link to shapes together? How can I use right angled and non-right angled trigonometry to solve problems?</p>	<p>What is an average and how does it represent a data set? What is the benefit of tabulating data? How can I achieve a fair sample from a population? How can I represent data in a visual format? How can I make predictions from a data set? How can I make comparisons between two data sets?</p>
Key knowledge/concepts and skills	<p><b><u>Unit 1 - Powers and Roots</u></b> Understand what is meant by squaring, cubing and their inverses.</p> <p><b><u>Unit 2 - Surds and Irrational Numbers</u></b> Understand what a surd is. Be able to simplify surd using understanding of squared numbers. Expand brackets containing surds. Rationalise the denominator of a fraction with a surd.</p> <p><b><u>Unit 3 - Indices</u></b> Use the index laws to evaluate numerical indices (including fractional and negative) Use the index laws to simplify algebraic indices (including fractional and negative)</p> <p><b><u>Unit 4 - Standard form</u></b> Convert between standard form and ordinary numbers Calculate with numbers in standard form using all 4 operations</p> <p><b><u>Unit 5 - Sequences</u></b> Understand how the different types of sequences are generated including arithmetic, geometric, Fibonacci and triangular numbers Generate a sequence given the nth term (including quadratic) Assess if a number appears in a sequence Find the nth term of a given sequence including quadratic nth term.</p>	<p><b><u>Unit 6 - Fractions, Decimals and Percentages</u></b> Convert between fractions, decimals and percentages</p> <p><b><u>Unit 7 - Percentages</u></b> Calculate percentage changes Work out the percentage of an amount Calculate compound interest/depreciation Solve problems with growth and decay</p> <p><b><u>Unit 8 - Probability, Sets and Venn diagrams</u></b> Calculate basic probabilities and relative frequency Use sample space diagrams and the product rule for counting to systematically list outcomes Use and create tree diagrams with/without replacement I can use a Venn diagram to sort data and solve problems Use set notation for Venn diagrams</p>	<p><b><u>Unit 9 - Quadratics</u></b> Expand two or more brackets Factorise quadratics including those with a coefficient greater than 1 Use factorising to solve quadratics. Use the quadratic formula to solve quadratics Write a quadratic in the completing the square format</p> <p><b><u>Unit 10 - Quadratic graphs</u></b> Be able to recognise and draw quadratic graphs Understand the link between solving quadratics and the roots of a graph Be able to solve quadratic simultaneous equations graphically.</p> <p><b><u>Unit 11 - Algebraic Fractions</u></b> Simplify algebraic fractions using factorising Use the four operations with algebraic fractions. Solve equations with algebraic fractions</p> <p><b><u>Unit 12 - Simultaneous Equations</u></b> Solve linear simultaneous equations Form linear simultaneous equations from a variety of contexts including ratio. Solve quadratic simultaneous equations algebraically</p>	<p><b><u>Unit 13 - Transformations</u></b> Be able to perform the 4 transformations (rotation, reflection, translation and enlargement (including fractional and negative) Be able to describe which transformation has taken place</p> <p><b><u>Upper and Lower Bounds</u></b> Be able to write down the error interval for a given degree of accuracy Work out the upper and lower bound of a given value Find the upper and lower bound of a given calculation</p> <p><b><u>Unit 14 - 2D shapes including circle geometry</u></b> Calculate the area and circumference of circles and part circles Calculate the area and perimeter of sectors Recognise and use the equation of a circle</p> <p><b><u>Unit 15 - 3D shapes</u></b> Recognise vocabulary linked to 3D shapes including plans and elevations</p> <p><b><u>Unit 16 - Volume and Surface Area</u></b> Calculate the volume and surface area of 3D shapes including prisms, cones, spheres and pyramids, using a given formula where appropriate.</p>	<p><b><u>Ratio review</u></b> Share in a given ratio Solve problems when given part of a ratio Write ratios as fractions and equations Combine ratios</p> <p><b><u>Unit 17 - Compound Measure and Direct and Inverse Proportion</u></b> Use compound measures such as density and speed to solve problems Use formal notation to solve problems involving direct and inverse proportion including with powers and roots</p> <p><b><u>Unit 18 - Pythagoras' Theorem</u></b> Use Pythagoras' theorem to be able to solve problems including those in 3D</p> <p><b><u>Unit 19 - Similarity and Trigonometry</u></b> Be able to use the principles of similarity to prove two shapes are similar and to solve problems with similar shapes Trigonometry in a 3D context</p> <p><b><u>Unit 20 - Further trigonometry</u></b> Use cosine rule, sine rule and <math>\frac{1}{2}ab\sin C</math> in non right-angled triangles to solve problems</p>	<p><b><u>Unit 21 - Averages and Spread</u></b> Calculate the averages and measures of spread of a set of data Calculate averages from ungrouped and grouped data tables</p> <p><b><u>Unit 22- Data collection and Sampling</u></b> Tabulate and classify data Identify different types of sampling Calculate group sizes for stratified sampling</p> <p><b><u>Unit 23 - Presenting Data including Scatter Graphs</u></b> Construct and interpret pie charts Interpret time series graphs Plot scatter graphs and identify correlation/relationship Use a line of best fit to extrapolate/interpolate Construct and interpret frequency polygons</p> <p><b><u>Unit 24 - Further Statistical Diagrams</u></b> Construct histograms Plot and interpret cumulative frequency Construct and compare box plots</p>
Assessment & Educational Visit Opportunities		Assessment 1	Intermediate maths challenge	Assessment 2		EOY 10 Assessment