Hodgson Academy

Mathematics

HIGHER

KS4 Curriculum Overview

At Hodgson anything is possible when we ***'Imagine, Believe, Achieve'***

Year 10

Autumn Term		Spring Term		Summer Term	
HT1	HT2	HT3	HT4	HT5	HT6
Algebraic Manipulation: Students will consolidate their understanding of key algebraic approaches including substitution; using laws of indices; and expanding and factorising into a single bracket. This recap module will form the foundation for new concepts studied in later modules. **Equations, Inequalities and Formulae:** In this module, students will learn how to solve more complex equations and inequalities, such as equations involving fractions or variables on both sides of the equation. Later in this module, students will use these skills to rearrange complex mathematical formulae. **Quadratic Expressions, and Equations:** Students will learn how to factorise quadratic expressions in order to	**Percentages:** This unit builds on students' understanding gained in KS3. Students will be reminded of non-calculator methods for finding percentage change as well as finding the original amount given a percentage change. However, this module will largely focus on using calculator methods to solve percentage problems, building towards repeated percentage change and solving problems involving simple and compound interest. **Ratio and Scale:** Students will learn how to solve a variety of problems involving ratio. This will include ratios with fractions, combining ratios and working with algebraic ratios. **Working with Fractions:**	**Non-Calculator Methods:** Students will revisit how to complete calculations using order of operations (BIDMAS). They will then learn how to write recurring decimals as a fraction. **Straight Line Graphs:** Students will build on simple graphical analysis by being introduced to more algebraic methods to interpret graphs they have seen in previous years. Students will be able to represent linear equations and inequalities on a graph as well as finding the equation of a line from a graph of given information. **Probability:** In this module students will revisit key terminology associated with probability. They will be able to identify independent and dependent events and use	**Perimeter, Area and Volume:** In this module students will be revisit key the geometrical constructs of perimeter and area. Building on this they will be able to find the surface are and volume of a range of common 3D shapes, included truncated or compound 3D shapes. **Interpret and Represent Data:** During this module, students will revisit finding averages and range from a list as well as tables of data. They use these values to compare the distribution between two or more data sets. Later in the module students will learn how to use capture-recapture methods, interpolation and extrapolation to make prediction beyond the data that they can see in front of them.	**Angles:** In this module students will review key angle rules studied at key stage 3, including angles in parallel lines and angles in polygons. They will look at wider problem solving using these rules. **Graphs and Diagrams:** Students will build upon the skills learnt in the HT4 module "Interpreting and representing data". They will learn how to represent data on a variety of graphs and diagrams including histograms, cumulative frequency graphs and box plots. **Vectors:** Students will have met vectors to describe translations during Key Stage 3. They will revisit this to describe movement between	**Factors, Powers and Surds:** In this module, students will firstly spend time reviewing factors, multiples and prime numbers, including writing numbers as a product of prime factors. They will then look at the laws of indices, including fraction and negative indices. Later in the module, higher students will learn how to work with surds – simplify surds, calculating with surds and rationalising the denominator. **Pythagoras' Theorem and Trigonometry:** In this module, students will review their understanding of using Pythagoras' Theorem to find missing lengths in right-angled triangles. Students will then explore the sine, cosine and tangent ratio

eventually be able to solve quadratic equations later in the module.	In this module, students will revisit how to add, subtract, multiply and divide fractions. Later in the module, students will apply this knowledge to work with algebraic fractions.	tree diagrams to calculate the probability of more than one event happening. **Rounding and Estimation:** Students will recap how to round numbers to decimal places and significant figures before applying this to estimating calculations and finding the error interval for a rounder number or calculation.	**Non-Linear Graphs:** Students will learn how to plot quadratic, cubic, reciprocal and exponential graphs before being able to find the key features of these graphs, such as the y-intercept, roots and any turning points. Students will use tangents and the trapezium rule to estimate the gradient of a curve and the area under a curve, respectively. Later in this module, students will investigate the equation of a circle centred about the origin.	points as a column vector. Students will then build on this knowledge to find resultant vectors by adding, subtracting and multiplying vectors by a scalar, before using vectors to describe journeys with shapes.	between lengths in right-angle triangles. They will then use these ratios to find missing lengths and angles in right-angled triangles. Later in the module, higher students will look at how tribometry can be used for non-right-angled triangles by using the sine and cosine rule. **Simultaneous Equations:** Students will find the solutions of simultaneous equations by both algebraic and graphical methods. The method of substitution will be dealt with before elimination, considering the substitution of a known value and then an expression. This module will include solving a pair of linear simultaneous equations as well as solving a pair of simultaneous equations involving a quadratic.

Year 11

Autumn Term		Spring Term		Summer Term
HT1	HT2	HT3	HT4	HT5
Simultaneous Equations: Students will find the solutions of simultaneous equations by both algebraic and graphical methods. The method of substitution will be dealt with before elimination, considering the substitution of a known value and then an expression. This module will include solving a pair of linear simultaneous equations as well as solving a pair of simultaneous equations involving a quadratic. **Ratio and Proportion** This topic develops students' understanding of proportional reasoning in real-life and algebraic contexts. Students solve ratio problems, compare value through best-buy calculations, interpret conversion graphs and exchange rates, and work with direct and inverse proportion. They learn to form and use proportional equations, including more complex relationships involving powers and roots, and interpret direct	**Sequences and Proof** This topic develops students' understanding of numerical and algebraic patterns. Students investigate different types of sequence, generate sequences from rules, and find the nth term of linear and quadratic sequences. The topic also introduces mathematical proof, where students use algebra to represent numbers, construct logical arguments, and prove mathematical statements using algebraic reasoning. **Circle Theorems** This topic explores the key geometric properties of circles and how they can be used to solve angle problems. Students learn and apply 8 key circle theorems, including angles at the centre and circumference, angles in a semicircle, angles in the same segment, cyclic quadrilaterals, and properties involving chords, radii and tangents. They combine these theorems with other angle facts to solve increasingly complex	**Functions and Graphs** This topic extends students' understanding of algebraic functions and graphical representations. Students work with function notation, composite and inverse functions, and explore quadratic, cubic, reciprocal, exponential and trigonometric graphs. They learn to sketch, interpret and transform graphs, using these skills to solve equations, analyse relationships and understand how changes to functions affect graph shape and position. **Equations and Formulae** This topic develops students' algebraic problem-solving skills by forming and solving equations and inequalities in a range of contexts. Students work with linear, quadratic and simultaneous equations, explore quadratic inequalities, and use iterative methods to find approximate solutions. They also learn to interpret and rearrange formulae, applying	**Rates** This topic focuses on compound measures and their applications in real-world situations. Students calculate and interpret speed, distance and time, work with distance–time and velocity–time graphs, and solve problems involving density and pressure. They also learn to convert between different compound units and use rates to model and analyse practical scenarios. **Angles, Bearings and Trigonometry** This topic develops students' understanding of navigation, geometry and trigonometric methods. Students learn to interpret and calculate bearings, draw and use scale diagrams, apply angle facts, and solve problems involving right-angled triangles using Pythagoras' theorem and trigonometric ratios. They also use the sine and cosine rules to solve problems involving non-right-angled triangles and bearings.	**Transformations** This topic focuses on the geometric transformations of shapes. Students explore enlargements using positive, fractional and negative scale factors, as well as reflections, rotations and translations on coordinate grids. They learn to describe transformations accurately, determine centres of enlargement and rotation, and investigate how multiple transformations can be combined. Higher-tier students also study invariant points and lines within transformations. **Revision** Following the January mock assessments, question level analysis will inform which topics are focused on during the final weeks of lesson time leading into the summer GCSE exams.

and inverse proportion graphically **Similarity and Congruence** This topic focuses on the relationships between shapes that are similar or congruent. Students find unknown lengths and angles using scale factors, identify and prove triangle similarity, and apply similarity to solve problems involving lengths, areas and volumes. They investigate how scale factors affect area and volume, distinguish between similarity and congruence, and use formal congruence conditions (SSS, SAS, ASA and RHS) to justify and prove that triangles are congruent.	geometric problems and develop formal mathematical reasoning **Set Notation and Venn Diagrams** Students learn to represent and interpret sets using Venn diagrams, work with unions, intersections and complements, and solve probability problems involving overlapping groups. They also apply these skills to more complex problems and, at Higher Tier, explore conditional probability using Venn diagrams and two-way tables. **Vectors** This topic introduces vectors as quantities with both magnitude and direction. Students perform vector calculations, use vectors to solve geometric problems, and investigate parallel vectors, ratios and collinear points. They develop formal geometric arguments and proofs using vector methods to justify mathematical relationships and properties.	algebra to solve increasingly complex mathematical problems.	**Constructions and Loci** This topic develops students' accuracy and reasoning in geometrical constructions. Students learn to draw triangles and polygons accurately using rulers, protractors and compasses, construct angle and perpendicular bisectors, and create perpendicular lines. They then apply these skills to loci problems, investigating paths and regions that satisfy given conditions, such as points equidistant from lines or points, and solving complex geometric problems involving multiple loci.	