Mathematics

KS3

Year 7		Year 8		Year 9	
HT1: .	**HT2: Fractions and Number Skills** Pupils learn about equivalent fractions and how to do the four basic operations with fractions (+-x÷). Pupils build upon KS2, learning how to work with improper fractions and mixed numbers. Pupils carry out the four basic operations with integers and decimals, before learning about factors, multiples and primes.	**HT1: Fractions, Decimals and Percentages, Lines and Angles** Pupils apply skills developed in Year 7 to convert between fractions, decimals and percentages (including recurring decimals). Pupils develop further skills in finding percentages of amounts and practise increasing and decreasing by a required percentage. Pupils learn about angle properties and how to find missing angles in parallel lines, triangles, quadrilaterals and polygons.	**HT2: Linear Graphs, Ratio and Proportion** Pupils practise plotting co-ordinates, then draw straight line graphs, applying skills in substitution and plotting co-ordinates. Pupils learn to simplify ratios and share amounts in a ratio, applying these skills to problem solving and real-life application. Pupils learn the basics of direct and inverse proportion and apply to recipes and other real-life situations.	**HT1: Probability and Indices and Standard Form** Pupils will go on to consider probability of single events and combined events. Pupils will use sample space diagrams, two-way tables, Venn diagrams, frequency trees and probability trees. Pupils explore the rules of indices and learn how to convert numbers between standard form and ordinary numbers.	**HT2: Data Handling 2 and Pythagoras** Pupils build on the skills developed in Year 7 to analyse data using scatter graphs, cumulative frequency curves and box plots. Pupils will then be able to find more complex averages using these diagrams. Pupils learn how to find the length of a hypotenuse or side of a right-angled triangle using Pythagoras' theorem.
HT3: Number Skills and Basic Algebra Pupils explore mental and calculator methods for finding powers and roots in readiness for future units. Pupils learn the order of operations using Priority of Operations and revisit how to round to the nearest decimal place and significant figures. Pupils acquire basic skills in algebra: collecting like terms, simplifying expressions, and using correct algebraic notation.	**HT4: Basic Algebra and Data Handling 1** Pupils learn how to expand brackets and factorise expressions. Pupils also learn how to solve linear equations including brackets and with the unknown on both sides, and substitute into expressions and formulae. All of this is essential for future algebra units. Pupils learn how to collect and organise data.	**HT3: Sequences and Circles 1** Pupils explore how to continue and generate sequences, building on these skills to find the nth term of a sequence and understand special sequences. Pupils also learn to solve equations using skills gained in previous algebra units. Pupils then learn about parts of a circle and how to find the area and circumference of a circle and apply this to cylinders.	**HT4: 2D Representation of 3D and Real-Life Graphs** Pupils go on to drawing plans and elevations of 3D shapes, before exploring exchange rates and conversion graphs in Real Life Graphs.	**HT3: Trigonometry, Circles 2 and Scale Drawings** Pupils learn how to find missing angles and sides of right-angled triangles using trigonometry. Following this, pupils build on skills acquired during the circles unit in Year 8 to find area of sectors and lengths of arcs. Pupils learn how to interpret scale drawings and how to construct diagrams. This builds upon skills gained in the lines and angles unit. .	**HT4: Number Skills** Pupils will revisit and practise using BIDMAS to solve problems, round numbers to a given decimal place and significant figure, understand the laws of indices, find primes, factors, multiples, including highest common factor and lowest common multiple and find the prime factors of a given number.
HT5: Data Handling 1 and Measures Pupils will practise displaying data in frequency tables, pie charts, pictograms, bar charts, line graphs and stem and leaf diagrams. Pupils learn how to find mean, mode, median and range from sets of data, including those in frequency tables. Pupils revisit the different units of length, mass, capacity and make conversions. Following this, pupils learn about speed, distance and time.	**HT6: Perimeter, Area and Volume** Pupils learn correct geometrical terms – properties of triangles, quadrilaterals etc. Pupils learn how to calculate the perimeter of 2D shapes including extending to algebraic expressions. Pupils find the area and volume of different 2D and 3D shapes including rectangles, triangles, circles, cuboids, and prisms, applying skills learnt in the Basic Algebra unit (HT4).	**HT5: Equations, Inequalities and Rearranging** Pupils recap the basics of algebra and solving equations before moving on to learn how to use inequality symbols, how to list and illustrate values which satisfy inequalities and how to solve inequalities. Pupils learn to apply algebraic principles to rearrange formulae. Pupils also learn how to expand double brackets and factorise quadratics.	**HT6: Transformations and Probability** Transformation of shapes – translation, reflection, rotation, enlargement. Pupils will be introduced to the basics of probability including scale, experimental vs theoretical probability, expected outcomes, and bias.	**HT5: General Algebra** Pupils will be learning to simplify expressions, including adding, subtracting, dividing and multiplying using the correct notation. They will learn to expand brackets, factorise expressions and substitute values into expressions and formulae.	**HT6: Data** Pupils will learn to derive formula from a worded problem. Pupils will then learn how to find the mean, median, mode and range from a data set. They will look at which is the most appropriate average to use in different contexts.

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Mathematics

KS4 – Higher GCSE

Year 10		Year 11	
HT1: Analysing & Displaying Data, Fractions, Ratio & percentages Pupils explore various ways of displaying data including bar charts, pie charts, frequency polygons and scatter graphs. Methods of analysing data, such as averages and measures of spread, are also explored. Pupils revisit and build upon skills from KS3 e.g. converting recurring decimals into fractions, solving problems with combined ratios and evaluating multi-step problems, involving fractions, ratio and percentages.	**HT2: Geometry, Angles, Pythagoras and Trigonometry** Pupils will revisit and build on knowledge from Year 9 using Pythagoras to find missing sides, determining if a triangle is right-angled, applying Pythagoras to solve worded real-life problems. They will use trigonometry to find missing sides and angles and look at trigonometry in the wider world. Pupils will then investigate tackling problems using Pythagoras and trigonometry in 3D as well as 2D.	**HT1: Advanced Trigonometry, Representing Data** Pupils learn methods to deal with non-right-angled triangles, drawing upon algebraic skills and geometrical knowledge developed in Year 10. Pupils learn the sine and cosine rules and the trigonometric graphs. Pupils also learn how to construct, interpret and compare cumulative frequency curves, box plots and histograms. Cumulative frequency.	**HT2: Algebraic Graphs and Iteration** Pupils revisit quadratic and cubic graphs in more detail, studying key features such as turning points using methods learned. Pupils learn the key features of circular graphs. Pupils extend skills in algebra to algebraic fractions, rearranging formulae and iteration.
HT3: Graphs and Geometry Pupils learn to identify, plot and read values from linear and non-linear graphs - including real-life graphs - making links between the equation of a graph and its key features. Pupils explore perimeter and area of 2D shapes, then extend this learning to circles and sectors before progressing to 3D shapes, studying volume & surface area including real life applications.	**HT4: Accuracy, Transformations, Inequalities and Equations** Pupils cement an understanding of rounding gained at KS3 and move on to study upper & lower bounds and their use in real-life calculations. Pupils look at combining the four transformations previously studied and extend these to negative and fractional scale factors. Pupils learn the key elements of quadratic and simultaneous equations, studying a range of methods for solving these, before moving on to solving inequalities.	**HT3: Circle Theorems, Functions and Proof** Pupils learn the circle theorems and then combine the knowledge learnt in the previous unit to find the equation of a tangent and the equation of a circle. Pupils will further develop skills in algebra by learning about function notation, inverse, composite functions and proof.	**HT4: Vectors, Further Algebraic Graphs, Direct & Inverse Proportion** Pupils investigate the calculations of column vectors to solve problems. Reciprocal and exponential graphs are plotted by pupils to identify key features of curves. Pupils learn how to find the area under a curve, particularly useful when dealing with the velocity-time graphs which pupils studied during KS3. Direct and inverse proportion are revisited, and pupils now combine proportional relationships.
HT5: Probability, Multiplicative Reasoning and Surds Pupils explore how to find probabilities from a range of data sets. Pupils convert between units including compound measures, e.g. speed. Proportional relationships, including best value problems, and real-life growth & decay models are explored. Pupils are introduced to the manipulation of surds including rationalising denominators, equipping pupils to move on to the study of formal proofs.	**HT6: Multiplicative Reasoning, Similarity & Congruence, Trigonometry** Pupils convert between units including compound measures, e.g. speed. Proportional relationships, including best value problems, and real-life growth & decay models are explored. Similarity & congruence is revisited in greater detail (to include area and volume) as is Trigonometry, in readiness for Year 11 study.	**HT5: Constructions, Loci and Higher-Level Problem Solving, Revision and Past Paper Practise** Pupils will be able to confidently use mathematical equipment to construct; a perpendicular bisector, a 60^{o} angle, an angle bisector etc. Pupils will learn about loci and bearings and use what they learn to solve real-life problems. Staff will then consolidate pupils' learning and strengthen understanding of the links between various topics. Strategies to break down complex problems are explored in greater depth. Pupils apply themselves to practising past examination papers.	**HT6: Higher Level Problem Solving, Revision and Past Paper Practise** Time to consolidate any areas where we have identified a lack of security or misconceptions. Strategies to break down complex problems are explored in greater depth. Pupils apply themselves to practising past examination papers.

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Maths

KS4 – Foundation GCSE

Year 10		Year 11	
HT1: Analysing and Displaying Data Pupils will consolidate and expand on knowledge gained in KS3 to use timetables appropriately, use and create two-way tables, draw and read from bar charts, histograms, pictograms and line graphs, draw and read from stem and leaf diagrams and pie charts, understand correlation and draw and read from scatter graphs.	**HT2: Fractions, Decimals, Percentages and Ratio** Pupils will understand the use of equivalent fractions, decimals and percentages. They will change between each one and be able to order them. Pupils will consolidate their understanding of the four operations of fractions, understanding how to add and subtract when there is the same and different denominators and mixed numbers. Pupils will then explore ratio, through; simplifying, sharing in a ratio and combining ratios before building on their skills, with multi-step problems, linked to real-life concepts.	**HT1: Multiplicative Reasoning and Quadratic Equations** Pupils explore how to convert between units of length, area and volume. Formulas for speed, density and force will be learnt. Pupils will deepen their learning and knowledge of algebra taught in Year 10 - expanding, factorising and solving quadratic equations.	**HT2: Geometry Circles and Fractions** Pupils build on knowledge of probability to find probabilities using sample space, Venn and frequency trees diagrams. Pupils learn the difference between mutually exclusive and exhaustive events. Formulas for speed, density and force are learned and pupils use knowledge from Year 10 to solve simple and compound interest problems.
HT3: Geometry and Graphs Pupils learn about angle properties and how to find missing angles in parallel lines, triangles and quadrilaterals, before using this knowledge to investigate how to find the interior and exterior angles in a polygon. Pupils investigate Pythagoras' Theorem and how this links to right angled triangles, they find the formulae through investigative learning and use this to find the missing side length. Pupils learn to identify, plot and read values from a graph – including conversion graphs and real-life graphs – making links between the equation of a graph and its key features.	**HT4: Geometry, Measures and Transformations** Pupils find the perimeter of a given shape and areas of; triangles, rectangles, circles, parallelograms, trapeziums and compound shapes, using this knowledge to then find the surface area and volume of prisms. Building on knowledge gained in Year 8 pupils also draw and describe the four transformations: reflection, rotation, enlargement and translation.	**HT3: Indices, Standard Form, Similarity and Congruence** Pupils will revisit the indices rules from Year 9 and build on their knowledge of standard form to solve problems, including those in real-life contexts, looking at which careers may use standard form. Pupils will learn the rules of congruency and investigate how to find missing sides in similar shapes.	**HT4: Vectors, Inequalities and Formulae** Building on HT4 in Year 10, pupils will revisit the column vectors used in the topic of translation and learn how to add, subtract, multiply and divide these. They will also investigate how to get from one point to another using column vectors and solve multi-step problems. Pupils will form and solve inequalities and re-arrange formulae to make a given letter the subject.
HT5: Ratio and Proportion Pupils further explore links between ratio and proportion, linking their work to the wider world, including studying proportion through recipes and finding the best value between items in a supermarket. Pupils will solve problems with ratio and proportion and then extend this to explore algebraic representations of direct and inverse proportion.	**HT6: Pythagoras, Trigonometry and Probability** Pupils will revisit and build on knowledge from Year 9 using Pythagoras to find missing sides, determining if a triangle is right-angled, applying Pythagoras to solve worded real-life problems. They will use trigonometry to find missing sides and angles and look at trigonometry in the wider world. Pupils will build on their knowledge of probability to find probabilities using sample space, Venn and frequency trees diagrams. Pupils will know the difference between mutually exclusive and exhaustive events.	**HT5: Further Graphs, Simultaneous Equations and Constructions** Pupils will know what a non-linear graph is and be able to sketch quadratic and cubic graphs. Pupils will be able to find the solution of two simultaneous equations from graphing them. Pupils will be able to confidently use mathematical equipment to construct; a perpendicular bisector, a 60^{o} angle, an angle bisector etc. Pupils will learn about loci and bearings, and use what they learn to solve real-life problems.	**HT6: Complex Problem Solving, Revision and Past Paper Practise** Pupils will apply knowledge from all areas to explore more complex problem-solving type questions and practise past questions using past exam papers. Pupils will develop their understanding of the examinations and practise examination skill to fully prepare them for their GCSEs.

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