Higher Maths

Year 10

William Hulme's Grammar School
The best in everyone™
Part of United Learning

Overview
The purpose of the Maths curriculum is to equip students with uniquely powerful ways to describe, analyse and solve problems and to make them more prepared for the real world. We do this by providing a secure understanding of mathematical concepts, from basic principles of mathematics to complex topics that combine several areas of study into a single question. In Year 10 we continue to concentrate on retention of knowledge and depth of learning. In doing this, all our students have the opportunity to master key skills that might be required in their future development.

	Half Term 1	Half Term 2	Assessment
Autumn Term	**Rearrange Formulae** ■ Rearrange formulae to change the subject in a geometrical context ■ Calculate the radius or diameter when Sector area or Arc length is given ■ Rearrangement complex formulae involving fractions, roots and powers and where the subject appears on both sides of the formula **Linear Graphs** ■ Plot and read Coordinates in all four quadrants ■ Draw, label and scale axes ■ Plot straight line graphs ■ Recognise, sketch and interpret straight line graphs ■ Find approximate solutions using a graph ■ Find the coordinates of the midpoint of a line segment ■ Real life graphs: conversion graphs, fuel bills graphs, fixed charge and cost per unit ■ Identify and interpret gradients and intercepts of straight line graphs ■ Identify and interpret gradient from an equation y = mx + c ■ Plot and draw graphs of straight lines in the form ax + by = c ■ Find the equation of a straight line from a graph ■ Use y = mx + c to identify parallel lines ■ Find the equation of a line through two given points or through one point with a given gradient ■ Identify and interpret the gradient from an equation ax + by = c	**Compound Measures** ■ Interpret distance–time graphs, and calculate: the speed of individual sections, total distance and total time ■ Change between standard and units e.g. time, mass, length, money, volume, area, speed, rates of pay, prices, density and pressure ■ Work out time intervals for graph scales **Quadratics - graphical** ■ Identify roots, intercepts and turning points of a quadratic function ■ Find approximate solutions using a graph ■ Identify the line of symmetry of a quadratic graph ■ Find roots of a quadratic algebraically by factorisation - with rearrangement needed **Quadratics – algebraic** ■ Find roots of a quadratic algebraically by factorisation - with rearrangement needed ■ Factorising quadratic expressions of the form ax2 + bx + c ■ Deduce turning points by completing the square ■ Simplify algebraic fractions ■ Multiply, divide, add and subtract algebraic fractions ■	**Half Term 1.** The week before half term break we have our 1st Foundation GCSE Paper. **Half Term 2.** Just before Christmas Break. Covering content from Autumn Term

Linear Simultaneous Equations
- Solve two simultaneous equations in two variables (linear/linear) algebraically
- Find approximate solutions using a graph
- Derive two simultaneous equations, solve the equation and interpret the solution

Volume 2
- Know and apply formulae to calculate volume of cuboids and other right prisms (including cylinders)
- Find the volume of spheres, pyramids, cones and composite solids

Further Graphs
- Expanding more than two brackets
- Recognise and sketch cubic graphs and the reciprocal graph
- Plot and interpret ... reciprocal graphs
- Recognise and interpret graphs that illustrate direct and inverse proportion
- Sketch and interpret graphs of exponential functions $y = kx$ for positive values of k and integer values of x
- Draw circles, centre the origin, equation $x^2 + y^2 = r^2$
- Sketch graphs of simple cubic functions, given as three linear expressions

	Half Term 3	Half Term 4	Assessment
Spring Term	**Probability 2** ■ Apply systematic listing strategies ■ Describe probability using the probability scale, tables and frequency trees ■ Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments ■ Calculate expected outcomes ■ Experimental and theoretical probability ■ Venn diagrams and appropriate notation ■ Possibility spaces/sample spaces ■ Find a missing probability from a list or table including algebraic terms ■ Unbiased samples and effects of increasing sample size ■ Probability tree diagrams for independent and dependent events ■ Calculate the probability of independent and dependent combined events ■ Sets and combinations of sets using Venn diagrams ■ Calculate and interpret conditional probabilities: ■ Use a two-way table, tree diagram and Venn diagram to calculate conditional probability ■ Tree diagrams with algebraic expressions	**Growth & Decay** ■ Simple interest ■ Set up, solve and interpret the answers in growth and decay problems, including compound interest ■ Identify the interest rate in compound interest questions ■ Set up, solve and interpret the answers in growth and decay problems **Ratio** ■ Solve ratio problems involving the change of a ratio within a question ■ Relate ratios to fractions and to linear functions ■ Solve complex multi-step problems involving fractions, probability and algebraic terms **Similar Shapes** ■ Use formal geometric proof for the similarity of two given triangles ■ Identify the scale factor of an enlargement of a similar shape as the ratio of the lengths of two corresponding sides, using integer or fraction scale factors ■ Relationships between areas and volumes in similar figures ■ enlargement on angles, perimeter, area and volume of shapes and solids	**Half Term 3** The week before half term break we have our 2nd Foundation GCSE Paper. **Half Term 4** Just before Easter Break. Covering content from Autumn Term and Spring Term

Statistics 2
- Mean, mode, median, modal class of discrete and continuous data
- Range and outliers
- Compare the mean, median, mode and range (as appropriate) of two distributions using bar charts, dual bar charts, pictograms and back-to-back stem and leaf
- Recognise the advantages and disadvantages between measures of average
- Scatter graphs - recognise correlation
- Recognise types of data: primary secondary, quantitative and qualitative
- Understand sample and population
- Interpret and construct tables and line graphs for time series data

Cumulative Frequency and Box Plots
- Cumulative frequency graphs
- Draw, interpret and compare box plots
Range, quartiles and inter-quartile range

- Understand the effect of
- Write the lengths, areas and volumes of two shapes as ratios in their simplest form
- Find missing lengths, areas and volumes in similar 3D solids
- Know and use the relationships between linear, area and volume scale factors of mathematically similar shapes and solids
- Solve problems involving frustums of cones where you have to find missing lengths first using similar triangles

	Half Term 5	Half Term 6	Assessment
Summer Term	**Algebraic proportion** - Recognise and interpret graphs that illustrate direct and inverse proportion - Capture and recapture - Identify direct proportion from a table of values, by comparing ratios of values, for x squared and x cubed relationships - Write statements of proportionality for quantities proportional to the square, cube or other power of another quantity - Set up and use equations to solve word and other problems involving direct proportion or inverse proportion - Use $y = kx$ to solve direct proportion problems, including questions where students find k, and then use k to find another value - Solve problems involving inverse proportionality **Surds** - Simplify and manipulate algebraic expressions involving surds - Simplify surd expressions involving squares	**Bounds** - Calculate the upper and lowers bounds of numbers involving the four operations, given to varying degrees of accuracy - Find the upper and lower bounds in real-life situations using measurements given to appropriate degrees of accuracy - Find the upper and lower bounds of calculations involving perimeters, areas and volumes of 2D and 3D shapes **Bearings & Scale drawings** - Interpret maps and scale drawings - Estimate lengths using a scale diagram - Make an accurate scale drawing from a diagram - Know and use compass directions - Use three-figure bearings to specify direction - Mark on a diagram the position of point B given its bearing from point A - Give a bearing between the points on a map or scaled plan - Given the bearing of a point A from point B, work out the bearing of B from A	**Half Term 6.** Summer Exam these exams cover all the topics learnt in year 10 in equal measures.

Summer Term	■ Expand and simplify single and double brackets involving surd manipulation ■ Rationalise denominators **Right angled trigonometry** ■ Trigonometry in right angled triangles ■ Know the exact values of sinθ and cosθ for θ = 0°, 30°, 45°, 60° and 90°. Know the exact value of tanθ for θ = 0°, 30°, 45° and 60°	■ Use accurate drawing to solve bearings problems ■ Solve locus problems including bearings **Transformations 2** ■ Reflection and rotation symmetry ■ Transformations - rotation, reflection, translation, enlargement ■ Identify the equation of a line of symmetry ■ Identify the scale factor of an enlargement of a shape as the ratio of the lengths of two corresponding sides, simple integer scale factors, simple fractions or negative scale factors ■ Describe the changes and invariance achieved by combinations of rotations, reflections and translations	

Useful Resources for Supporting Your Child at Home:	Homework:
https://whgs-academy.sparxmaths.uk/ https://padlet.com/andrewharrison6/ks4-student-resources-e799bycdpno4nmmb	Sparx Homework is set automatically weekly, and students have 7 days to achieve 100%