Subject: Maths

Year11 Standard Higher Scheme of Work

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 11 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. The Higher Scheme of work gives students access to the Higher content.

Autumn Term

Half Term 1

Algebraic Proof

- Language of proof: odd, even, product, sum, integer, consecutive, square, difference etc.
- Solve 'Show that' and proof questions using consecutive integers (n, n + 1), squares a2, b2, even numbers 2n, odd numbers 2n +1

Solving Quadratics & Further SE

- Solve quadratic equations algebraically by factorising (no rearrangement required)
- Find approximate solutions to quadratic equations using a graph
- Solve quadratic equations (that also require rearrangement) by factorising, completing the square and by using the quadratic formula
- Solve linear/quadratic simultaneous equations
- Solve quadratic equations arising from algebraic fraction equations
- Be able to identify from a graph if a quadratic equation hasy real roots
- Solve linear/circles simultaneous equations

Functions

- Find f(x) + g(x) and f(x) – g(x), 2f(x), f(3x) etc. algebraically
- Find the inverse of a linear function
- Know that f –1(x) refers to the inverse function
- Composite functions - for two functions f(x) and g(x), find gf(x)

Half Term 2

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
- Use accurate drawing to solve bearings problems
- Solve locus problems including bearings

Circle Theorems

- Apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results:
  - the angle subtended by an arc at the centre of a circle is twice the angle subtended at any point on the circumference
  - the angle in a semicircle is a right angle
  - the perpendicular from the centre of a circle to a chord bisects the chord
  - angles in the same segment are equal
  - alternate segment theorem

Assessment

In Year 11 we do a past paper assessment every fortnight, these are a mix of seen and unseen papers.

Half Term 2
At the end of November, we do United Learning Mock GCSE 1 (this consists of 3 papers)

Autumn Term

Iteration

- Find approximate solutions to equations numerically using iteration
- Use iteration with simple converging sequences

Quadratic Inequalities

- Sketch a graph of a quadratic function, by factorising or by using the formula, identifying roots, y-intercept and turning point by completing the square
- Solve quadratic inequalities in one variable, by factorising and sketching the graph to find critical values

Represent the solution set for inequalities using set notation, i.e. curly brackets and 'is an element of' notation

- opposite angles of a cyclic quadrilateral sum to 180°
- understand and use the fact that the tangent at any point on a circle is perpendicular to the radius at that point

Spring Term

Half Term 3

Statistics (Further)

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

Transformations

- Reflection and rotation symmetry
- Transformations - rotation, reflection, translation, enlargement (with a positive scale factor)
- 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, or simple fractions
- Enlargements with a fractional scale factor
- Enlargement negative scale factors
- Describe the changes and invariance achieved by combinations of rotations, reflections, and translations

Congruence

- Identify congruent shapes by eye
- Understand that distances and angles are preserved under reflections, so that any figure is congruent under this transformation
- Congruence criteria for triangles (SSS, SAS, ASA, RHS)
- Solve angle problems involving congruence

Half Term 4

Gradients (Further), and area under a graph

- Recognise and use the equation of a circle with centre at the origin
- Find the equation of a tangent to a circle at a given point, by:
- finding the gradient of the radius that meets the circle at that point
- finding the gradient of the tangent perpendicular to it
- Estimate area under a quadratic or other graph by dividing it into trapezia. Interpret the results in cases such distance–time graphs, velocity–time graphs and graphs in financial contexts
- Interpret the gradient of linear or non-linear graphs, and estimate the gradient of a quadratic or non-linear graph at a given point by sketching the tangent and finding its gradient
- Interpret the gradient of non-linear graph in curved distance–time and velocity–time graphs
- Kinematics
- Use kinematics formulae from the formulae sheet to calculate speed, acceleration, etc. (with variables defined in the question)
- Graphical transformations
- Translations and reflections of functions:
  - transformations $y = -f(x)$, $y = f(-x)$ for linear, quadratic, cubic functions
  - transformations $y = f(x) + a$, $y = f(x + a)$ for linear, quadratic, cubic functions

Assessment

In Year 11 we do a past paper assessment every fortnight, these are a mix of seen and unseen papers.

Half Term 4
Just before Easter Break. We do United Learning Mock 2 (this consists of 3 papers.

	Vectors ■ Addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors ■ Be able to represent information graphically given column vectors ■ Identify two column vectors which are parallel ■ Solve geometric problems in 2D where vectors are divided in a given ratio ■ Produce geometrical proofs to prove points are collinear and vectors/lines are parallel	• transformations y = –f(x), y = f(–x) for sine, cosine and tan functions f(x) • transformations y = f(x) + a, y = f(x + a) for sine, cosine and tan functions f(x)	

Summer Term	**Half Term 5** ***Constructions & Loci*** ■ Draw circles and arcs to a given radius or given the diameter ■ Measure and draw lines, to the nearest mm ■ Measure and draw angles, to the nearest degree ■ Use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle) ■ Construct angles of 90°, 45° ■ Use constructions to construct given figures and solve loci problems; know that the perpendicular distance from a point to a line is the shortest distance to the line ■ Construct: • a region bounded by a circle and an intersecting line • a given distance from a point and a given distance from a line • equal distances from two points or two line segments • regions which may be defined by 'nearer to' or 'greater than'		**Assessment** In Year 11 we do a past paper assessment every fortnight, these are a mix of seen and unseen papers.

Useful Resources for Supporting Your Child at Home:	Homework:
■ hegartymaths.com ■ drfrostmaths.com ■ curriculum.unitedlearning.org.uk ■ ttrockstars.com ■ www.bbc.co.uk/bitesize/subjects/zqhs34j ■ mmerevise.co.uk	Hegarty Maths is used as the main homework platform and 2 tasks are set each week. On top of this web resources like Dr Frost are used to set more GCSE style questions. Pinpoint booklets are regularly set.