MATHEMATICS Year 11 Curriculum Overview

Year 11 Overview Higher	In Years 10 & 11, the new mathematics GCSE will demand deeper and broader mathematical understanding. It will provide all students with greater coverage of key areas such as ratio, proportion and rates of change and requires students to apply their knowledge and reasoning to provide clear mathematical arguments. It will focus on ensuring that every student masters the fundamental mathematics that is required for further education and future careers. It will provide greater challenge for the most able students by thoroughly testing their understanding of the mathematical knowledge needed for higher level study and careers in mathematics, the sciences and computing.

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Week Number	Themes/ Topics	Key Knowledge & Skills	Key Assessments
1-6 (Autumn 1)	• Unit 1 Gradients And Lines • Unit 2 Non-Linear Graphs • Unit 3 Using Graphs	This block builds on earlier study of straight-line graphs in years 9 and 10. Students plot straight lines from a given equation and find and interpret the equation of a straight line from a variety of situations and given information. There is the opportunity to revisit graphical solutions of simultaneous equations. Higher tier students also study equations of perpendicular lines. • Equations of lines parallel to the axis • Plot straight line graphs • Interpret y=mx+c • Find the equation of straight-line graph • Equation of a straight-line graph given one point and gradient • Equation of a straight-line graph given two points • Determine whether a point is on a line • Solve linear simultaneous equations graphically • Find the equations of perpendicular lines (H) Students develop their knowledge of non-linear graphs in this block, looking at quadratic, cubic and reciprocal graphs so they recognise the different shapes. They find the roots of quadratics graphically and will revisit this when they look at algebraic methods in the Functions block during Autumn 2, where they will look at turning points. Higher tier students also look at simple exponential graphs and the equation of a circle. Note that the equation of the tangent to a circle is covered later when the circle theorem of tangent/radius is met. Higher students also extend their understanding of gradient to include instantaneous rates of change considering the gradient of a curve at a point. • Plot and read from quadratic graphs • Plot and read from cubic graphs • Plot and read from reciprocal graphs • Recognise graph shapes • Identify and interpret roots and intercepts of quadratics • Understand and use exponential graphs (H) • Find and use the equation of a circle centre (0,0) (H) • Find the equation of the tangent to any curve (H)	Unit 1 assessment DIRT work following assessment Unit 2 assessment DIRT work following assessment Unit 3 assessment DIRT work following assessment

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		This block revises conversion graphs and reflection in straight lines. Students also study other real-life graphs including speed/distance/time, constructing and interpreting these. Higher tier students also investigate the area under a curve. • Reflect shapes in given lines • Construct and interpret conversion graphs • Construct and interpret other real-life straight line graphs • Interpret distance/time graphs • Construct distance/time graphs • Construct and interpret speed/time graphs • Construct and interpret piece-wise graphs • Recognise and interpret graphs that illustrate direct and inverse proportion • Find approximate solutions to equations using graphs • Estimate the area under a curve (H)	Walking talking mocks Mock exams Pinpoint learning booklets following mock exams
7-13 (Autumn 2)	• Unit 4 Expanding and Factorising • Unit 5 Changing the Subject	. This block reviews expanding and factorising with a single bracket before moving onto quadratics. The use of algebra tiles to develop conceptual understanding is encouraged throughout. Contect questions are included to revisit e.g. area and pythagoras theorem. • Expand and factorise with a single bracket • Expand binomials • Factorise quadratic expressions • Factorise complex quadratic expressions (H) • Solve equations equal to 0 • Solve quadratic equations by factorisation • Solve complex quadratic expressions by factorisation (H) • Complete the square (H) • Solve quadratic equations using the quadratic formula (H) Students consolidate and build on their study of changing the subject in Year 9. The block begins with a review of solving equations and inequalities before moving on to rearrangement of both familiar and unfamiliar formular. Checking by substitution is encouraged throughout. Higher tier students also study solving equations by iteration.	Mock exams Pinpoint learning booklets following mock exams Unit 4 assessment DIRT work following assessment Unit 5 assessment DIRT work following assessment

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	• Unit 6 Functions	• Solve linear equations • Solve inequalities • Form and solve equations and inequalities in the context of shapes • Change the subject of a simple formula • Change the subject of a known formula • Change the subject of a complex formula • Change the subject where the subject appears more than once • Solve equations by iteration As well as introducing formal function notation, this block brings together and builds on recent study of quadratic functions and graphs. This is also an opportunity to revisit trigonometric functions, first studied at the start of year 10. • Use function machines • Substitution into expressions and formulae • Use function notation • Work with composite functions (H) • Work with inverse functions (H) • Graphs of quadratic functions • Solve quadratic inequalities • Understand and use trigonometric functions	Unit 6 assessment DIRT work following assessment
14-18 (Spring 1)	Unit 7 Multiplicative Reasoning Unit 8 Geometric Reasoning	Students develop their multiplicative reasoning in a varirty of contexts, from simple scale factors through to complex equations involving direct and inverse proportion. They link inverse proportion with the formulae from pressure and density. There is also the opportunity to review ratio problems. • Use scale factors • Understand direct proportion • Construct complex direct proportion equations (H) • Calculate with pressure and density • Understand inverse proportion • Construct inverse proportion equations (H) • Ratio problems	Unit 7 assessment DIRT work following assessment Unit 8 assessment DIRT work following assessment

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	Unit 9 Algebraic Reasoning Mock exams	Students consolidate their knowledge of angles facts and develop increasingly complex chains of reasoning to solve geometric problems. Higher tier students revise the first four circle theorems studied in year 10 and learn the remaining theorems. Students also revisit vectors and the key topics of Pythagoras' theorem and trigonometry. • Angles at points • Angles in parallel lines and shapes • Exterior and interior angles of polygons • Proving geometric facts • Solve problems involving vectors • Review of circle theorems • Review Pythagoras' theorem and using trig ratios Students develop their algebraic reasoning by looking at more complex situations. They use their knowledge of sequences and rules to made inferences, and higher tier students move towards formal algebraic proof. Forming and solving complex equations, including simultaneous equations, is revisited. Higher students also look at solving at solving inequalities in more than one variable. • Simplify complex expressions • Find the for the nth term of a linear sequence • Find the rule for the nth term of a quadratic sequence (H) • Use rules for sequence • Solve linear simultaneous equations • Solve simultaneous equations with one quadratic (H) • Formal algebraic proof (H) • Inequalities in two variables (H)	Unit 9 assessment DIRT work following assessment Walking talking mocks Mock exams
19-24 (Spring 2)	Mock exams Unit 10 Transforming and Constructing	Students revise and extend their learning from key stage 3, exploring all the transformations and contructions, relating these to symmetry and properties of shapes when appropriate. There is an emphasis on describing as well as performing transformations as using the language promotes deeper thinking and understanding.	Mock exams Pinpoint learning booklets following mock exams Unit 10 assessment DIRT work following assessment

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	Unit 11 Listing & Describing	Higher tier students extend their learning to explore the idea of invariance and look at trigonometric graphs as a vehicle for exploring graph transformations. • Perform and describe line symmetry and refection • Perform and describe rotation/rotational symmetry • Perform and describe translations of shapes • Perform and describe enlargements of shapes • Perform and describe negative enlargements of shapes (H) • Identify transformations of shapes • Perform and describe a series of transformations of shapes • Identify invariant points and lines • Perform standard constructions using ruler and proctractos • Solve loci problems • Understand and use trigonometrical graphs (H) • Sketch and identify translations of the graph of a given function (H) • Sketch and identify reflections of the graphs of a given function (H)	Unit 11 assessment DIRT work following assessment
	Unit 12 Show That..	This block is another vehicle for revision as the examinations draw closer. Students look at organisation information, with higher tier students extending this to include the product rule for counting. Links are made to probability and other aspects of Data Handling such as describing and comparing distributions and scatter diagrams. Plans and elevations are also revised. • Work with organised lists • Sample spaces and probability • Use the product rule for counting (H) • Complete and use Venn diagrams • Construct and interpret plans and elevations • Use data to compare distributions • Interpreting scatter diagrams This is another block designed to be adapted to suit the needs of your class. Examples of communication in various areas of mathematics are provided in order to highlight gaps in knowledge that need addressing in the run up to the examinations. “Show that” is used to encourage students to communicate in a clear mathematical fashion, and this skill should be transferred to their writing of solutions to any type of question.	Unit 13 assessment DIRT work following assessment

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		• Show that with number • Show that with algebra • Show that with shapes • Show that with angles • Show that with data • Show that with vectors • Show that with congruent triangles • Formal proof with congruent triangles	
25-30 (Summer 1)	Preparation for GCSE exams		
31-38 (Summer 2)			

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