

Year 11 Curriculum Overview

Year 11		HT1	HT2	HT3	HT4	HT5	HT6
Mathematics	Topic	Graphs	Algebra	Reasoning	Revision and Communication	Revision	Revision
	Areas of study	Gradients and Lines Non-Linear Graphs Using Graphs	Expanding and Factorising Changing the Subject Functions	Multiplicative Reasoning Geometric Reasoning Algebraic Reasoning	Transforming and Constructing Listing and Describing Show that...	Recap on GCSE content and past paper practice.	Recap on GCSE content and past paper practice.
	Why this and why now?	<p><u>Gradients and Lines</u></p> <p>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 the equations of perpendicular lines.</p> <p><u>Non-Linear Graphs</u></p> <p>Students develop their knowledge of non-</p>	<p><u>Expanding and Factorising</u></p> <p>This block reviews expanding and factorising with a single bracket before moving on to quadratics. The use of algebra tiles to develop conceptual understanding is encouraged throughout. Context questions are included to revisit e.g. area and Pythagoras' theorem.</p> <p><u>Changing the Subject</u></p> <p>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</p>	<p><u>Multiplicative Reasoning</u></p> <p>Students develop their multiplicative reasoning in a variety of contexts, from simple scale factors through to complex equations involving direct and inverse proportion. They link inverse proportion with the formulae for pressure and density. There is also the opportunity to review ratio problems.</p> <p><u>Geometric Reasoning</u></p> <p>Students consolidate their knowledge of angles facts and develop increasingly complex chains of reasoning to solve geometric problems.</p>	<p><u>Transforming and Constructing</u></p> <p>Students revise and extend their learning from Key Stage 3, exploring all the transformations and constructions, 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. Higher tier students extend their learning to explore the idea of invariance and look at trigonometric graphs as a vehicle for exploring graph transformations.</p>	Revision of all GCSE content.	Revision of all GCSE content.

	<p>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 also 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.</p> <p><u>Using Graphs</u></p> <p>This block revises conversion graphs and reflection in straight lines. Students also study other real-life</p>	<p>moving on to rearrangement of both familiar and unfamiliar formulae. Checking by substitution is encouraged throughout. Higher tier students also study solving equations by iteration.</p> <p><u>Functions</u></p> <p>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.</p>	<p>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.</p> <p><u>Algebraic Reasoning</u></p> <p>Students develop their algebraic reasoning by looking at more complex situations. They use their knowledge of sequences and rules to make inferences, and Higher tier students move towards formal algebraic proof. Forming and solving complex equations, including simultaneous equations, is revisited. Higher tier students also look at solving inequalities in more than one variable.</p>	<p><u>Listing and Describing</u></p> <p>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. You can adapt the exact content to suit the needs of your class.</p> <p><u>Show that...</u></p> <p>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</p>		
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	graphs, including speed/distance/time, constructing and interpreting these. Higher tier students also investigate the area under a curve.			communicate in a clear mathematical fashion, and this skill should be transferred to their writing of solutions to any type of question.		
<p>What is the essential knowledge that needs to be remembered?</p> <p>R denotes Recap of prior learning</p> <p>H denotes Higher Only topics</p>	<p><u>Gradients and Lines</u></p> <ul style="list-style-type: none"> Equations of lines parallel to the axis (R) Plot straight line graphs (R) Interpret $y = mx + c$ (R) Find the equation of a straight line from a graph (1) (R) Find the equation of a straight line from a graph (2) 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 (R) Recognise when straight lines are perpendicular (H) 	<p><u>Expanding and Factorising</u></p> <ul style="list-style-type: none"> Expand and factorise with a single bracket (R) Expand binomials (R) 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 <p><u>Changing the Subject</u></p> <ul style="list-style-type: none"> Solve linear equations (R) 	<p><u>Multiplicative Reasoning</u></p> <ul style="list-style-type: none"> Use scale factors (R) Understand direct proportion Construct complex direct proportion equations (H) Calculate with pressure and density Understand inverse proportion Construct inverse proportion equations (H) Ratio problems (R) <p><u>Geometric Reasoning</u></p> <ul style="list-style-type: none"> Angles at points (R) Angles in parallel lines and shapes (R) Exterior and interior angles of polygons (R) Proving geometric facts 	<p><u>Transforming and Constructing</u></p> <ul style="list-style-type: none"> Perform and describe line symmetry and reflection (R) Perform and describe rotation/rotational symmetry (R) Perform and describe translations of shapes (R) Perform and describe enlargements of shapes (R) Perform and describe negative enlargements of shapes (R)(H) Identify transformations of shapes (R) Perform and describe a series of transformations of shapes Identify invariant points and lines (H) 	Recap on GCSE content and past paper practice.	Recap on GCSE content and past paper practice.

	<ul style="list-style-type: none"> ▪ Find the equations of perpendicular lines (H) <p><u>Non-Linear Graphs</u></p> <ul style="list-style-type: none"> ▪ 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) <p><u>Using Graphs</u></p> <ul style="list-style-type: none"> ▪ Reflect shapes in given lines (R) ▪ Construct and interpret conversion graphs (R) ▪ Construct and interpret other real-life straight line graphs (R) 	<ul style="list-style-type: none"> ▪ Solve inequalities (R) ▪ Form and solve equations and inequalities in the context of shape ▪ Change the subject of a simple formula (R) ▪ Change the subject of a known formula ▪ Change the subject of a complex formula ▪ Change the subject where the subject appears more than once (H) ▪ Solve equations by iteration (H) <p><u>Functions</u></p> <ul style="list-style-type: none"> ▪ Use function machines (R) ▪ Substitution into expressions and formulae (R) ▪ Use function notation ▪ Work with composite functions (H) ▪ Work with inverse functions (H) ▪ Graphs of quadratic functions ▪ Solve quadratic inequalities (H) ▪ Understand and use trigonometric functions (R) 	<ul style="list-style-type: none"> ▪ Solve problems involving vectors (R) ▪ Review of circle theorems (H) ▪ Circle theorem: Angle between radius and chord (H) ▪ Circle theorem: Angle between radius and tangent (H) ▪ Circle theorem: Two tangents from a point (H) ▪ Circle theorem: Alternate segment theorem (H) ▪ Review Pythagoras' Theorem and using trig ratios (R) <p><u>Algebraic Reasoning</u></p> <ul style="list-style-type: none"> ▪ Simplify complex expressions ▪ Find the rule for the nth term of a linear sequence (R) ▪ Find the rule for the nth term of a quadratic sequence (R) (H) ▪ Use rules for sequences ▪ Solve linear simultaneous equations (R) ▪ Solve simultaneous equations with one quadratic (R) (H) ▪ Formal algebraic proof (H) 	<ul style="list-style-type: none"> ▪ Perform standard constructions using ruler and protractor or ruler and compasses (R) ▪ 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 graph of a given function (H) <p><u>Listing and Describing</u></p> <ul style="list-style-type: none"> ▪ Work with organised lists ▪ Sample spaces and probability (R) ▪ Use the product rule for counting (H) ▪ Complete and use Venn diagrams (R) ▪ Construct and interpret plans and elevations (R) ▪ Use data to compare distributions (R) ▪ Interpreting scatter diagrams (R) <p><u>Show that...</u></p>		
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	<ul style="list-style-type: none"> ■ 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) 		<ul style="list-style-type: none"> ■ Inequalities in two variables (H) 	<ul style="list-style-type: none"> ■ "Show that" with number ■ "Show that" with algebra ■ "Show that" with shape ■ "Show that" with angles ■ "Show that" with data ■ "Show that" with vectors (H) ■ "Show that" with congruent triangles ■ Formal proof with congruent triangles (H) 		
What is the assessment intent and how will you assess?	<p>The assessment takes place at the end of each week via a low stakes quiz. At the end of each topic students will sit an end of topic assessment. Cumulative half termly assessments will assess learning from class.</p> <p>Teachers check the progress and areas of concern are addressed through whole class teaching with targeted Do Nows and HW.</p> <p>Previous blocks are also assessed each week to assess Covid learning losses so that gaps can be filled whilst continuing with the curriculum.</p>					
What should the end point look like?	<p>Pupils will be fluent in reading and plotting a variety of graphs. They will be able to apply reasoning and will be able to solve problems with these topics.</p>	<p>Pupils will be fluent in basic algebra, factorising, expanding brackets as well as changing the subject and functions. They will be able to apply reasoning and will be able to solve problems with these topics.</p>	<p>Pupils will be able to apply reasoning in a geometric, algebraic and multiplicative manner and will be able to solve problems with these topics.</p>	<p>Pupils will be fluent in transforming and constructing shapes as well as a variety of data handling topics. They will be able to apply reasoning and will be able to solve problems with these topics.</p>	<p>Pupils will be revising for their final GCSE examination.</p>	<p>Pupils will be revising for their final GCSE examination.</p>
<p>Mini mocks and actual Mock Exams will be accompanied by question level analysis to aid in closing any gaps in knowledge. This will be further assessed in the future with "Can you still" questions showing learning embedded into long term learning. These tests will be used weekly to assess Covid learning losses so that gaps can be filled whilst continuing with the curriculum.</p>						

<p>How does it cover the NC?</p>	<ul style="list-style-type: none"> ▪ move freely between different numerical, algebraic, graphical and diagrammatic representations ▪ plot and interpret graphs ▪ interpret the gradient of a straight line graph as a rate of change ▪ use the form $y = mc+c$ to identify parallel {and perpendicular} lines; find the equation of the line through two given points, or through one point with a given gradient ▪ find approximate solutions to two simultaneous equations in two variables (linear/linear {or linear/quadratic}) using a graph ▪ move freely between different numerical, algebraic, graphical and ▪ diagrammatic representations ▪ recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic 	<ul style="list-style-type: none"> ▪ know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments {and proofs} ▪ simplify and manipulate algebraic expressions by: factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares; {factorising quadratic expressions of the form $ax^2 + bx + c$} ▪ know the difference between an equation and an identity; solve quadratic equations {including those that require rearrangement} algebraically by factorising, {by completing the square and by using the quadratic formula} identify and interpret roots; deduce roots 	<ul style="list-style-type: none"> ▪ compare lengths, areas and volumes using ratio notation and/or scale factors; make links to similarity ▪ understand that X is inversely proportional to Y is equivalent to X is proportional to {construct and} interpret equations that describe direct and inverse proportion ▪ extend and formalise their knowledge of ratio and proportion, including trigonometric ratios, in working with measures and geometry, and in working with proportional relations algebraically and graphically ▪ Reason deductively in geometry, number and algebra, including geometrical constructions. ▪ {apply and prove the standard circle theorems concerning angles, radii, tangents and 	<ul style="list-style-type: none"> ▪ describe translations as 2D vectors ▪ reason deductively in geometry, number and algebra, including using geometrical constructions ▪ interpret and use fractional {and negative} scale factors for enlargements {describe the changes and invariance achieved by combinations of rotations, reflections and translations} ▪ recognise, sketch and interpret graphs of {the trigonometric functions (with arguments in degrees) for angles of any size} ▪ {sketch translations and reflections of the graph of a given function} ▪ explore what can and cannot be inferred in statistical and probabilistic settings, and 		
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		<p>functions, the reciprocal function 1/(the exponential function $y = k^x$ for positive values of x)</p> <ul style="list-style-type: none"> plot and interpret graphs (including reciprocal graphs {and exponential graphs}) find approximate solutions using a graph identify and interpret roots, intercepts of quadratic functions graphically {recognise and use the equation of a circle with centre at the origin;} <p>plot and interpret graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration {interpret the gradient at a point on a curve as the instantaneous rate of change; apply the concepts of instantaneous and average rate of change (gradients of tangents and chords) in numerical, algebraic and graphical contexts}</p>	<p>algebraically {and turning points by completing the square}</p> <ul style="list-style-type: none"> solve two simultaneous equations in two variables (linear/linear {or linear/quadratic}) algebraically; find approximate solutions using a graph solve linear inequalities in one variable know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments {and proofs} translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution {find approximate solutions to equations numerically using iteration} 	<p>chords, and use them to prove related results)</p> <ul style="list-style-type: none"> interpret and use bearings apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; {use vectors to construct geometric arguments and proofs} make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples; begin to use algebra to support and construct arguments {and proofs} deduce expressions to calculate the nth term of linear {and quadratic} sequences solve two simultaneous equations in two variables (linear/linear {or linear/quadratic}) algebraically; find approximate solutions using a graph solve linear inequalities in one (or two) variable(s), 	<p>express their arguments formally</p> <ul style="list-style-type: none"> calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions {calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams} apply systematic listing strategies, {including use of the product rule for counting} construct and interpret plans and elevations of 3D shapes know the difference between an equation and an identity; argue mathematically to show algebraic 		
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		<ul style="list-style-type: none"> ▪ {calculate or estimate gradients of graphs and areas under graphs ▪ (including quadratic and other non-linear graphs), and interpret results in cases such as distance-time graphs, velocity-time graphs and graphs in financial contexts} 	<ul style="list-style-type: none"> ▪ interpret simple expressions as functions with inputs and outputs; {interpret the reverse process as the 'inverse function'; interpret the succession of two functions as a 'composite function'} ▪ solve two simultaneous equations in two variables (linear/linear {or linear/quadratic}) algebraically; find approximate solutions using a graph ▪ identify and interpret roots; deduce roots algebraically {and turning points by completing the square} ▪ solve linear inequalities in one {or two} variable{s}, {and quadratic ▪ inequalities in one variable}; represent the solution set on a number line, {using set notation and on a graph} ▪ recognise, sketch and interpret graphs 	<p>{and quadratic inequalities in one variable}; represent the solution set on a number line, {using set notation and on a graph}</p>	<p>expressions are equivalent, and use algebra to support and construct arguments {and proofs}</p> <ul style="list-style-type: none"> ▪ apply the concepts of congruence and similarity ▪ make and use connections between different parts of mathematics to solve problems ▪ {change recurring decimals into their corresponding fractions and vice versa} ▪ apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; {use vectors to construct geometric arguments and proofs} 		
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			<p>of quadratic functions</p> <ul style="list-style-type: none">▪ apply Pythagoras' Theorem and trigonometric ratios to find angles and lengths in right-angled triangles {and, where possible, general triangles} in two {and three} dimensional figures				
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