

# KS4 Maths Higher Curriculum Overview

<b>Intent</b>		<b>Links to KS3</b>	Topics covered at KS3 develop skills needed at KS4. A higher tier pupil will extend their learning and explore more complex topics that link to topics covered at KS3.					
		<b>Statement of Intent</b>	<p>Our aim is for all students to acquire a deep long-term, secure and adaptable understanding of mathematics regardless of starting point or background.</p> <p>A Lydiard Park learner:</p> <ul style="list-style-type: none"> <li>Will fluently and accurately recall, apply and explain facts and concepts using correct mathematical language.</li> <li>Will solve problems and reason mathematically by having a curiosity to explore conjectures, test hypotheses and generalise results.</li> <li>Through mastery, will develop confidence to use mathematics across curriculum areas and in the wider world.</li> </ul>					
		<b>Timeline</b>	<b>Term 1 - 7 Weeks</b>	<b>Term 2 - 7 Weeks</b>	<b>Term 3 - 7 Weeks</b>	<b>Term 4 - 6 Weeks</b>	<b>Term 5 - 5 Weeks</b>	<b>Term 6 - 6 Weeks</b>
<b>Implementation (Year 10)</b>		<b>Year Overview</b>	Pupils study required topics for Edexcel GCSE maths. They cover number, algebra and geometry topics as well as probability. All of these topics build from work done at KS3 and develop more rigorous ways of working. An emphasis is put on written mathematical communication in preparation for writing exam answers.					
		<b>SOW</b>	<b>Circle theorems Probability</b>	<b>Developing algebraic thinking</b>	<b>Direct &amp; Inverse Proportion Pythagoras &amp; Trigonometry</b>	<b>Compound Measures Vectors</b>	<b>Growth &amp; Decay Sequences</b>	<b>Functions &amp; Graphs Area &amp; Volume</b>
		<b>Assessment Type &amp; Unit Focus</b>	<p><b>Assessment by mid topic tickets and end of topic tests.</b></p> <p>Circle theorems - Review using angle facts, including parallel lines. Recall interior and exterior angles in polygons. Identify, use and derive circle theorems.</p> <p>Solve multi-step circle theorem problems. Prove circles theorems geometrically.</p> <p>Probability - Calculate theoretical probability, expected outcomes and relative frequency. Use listing combinations &amp; tree diagrams to solve problems involving independent events and dependent events. Use set notation and Venn diagrams to solve probability problems including conditional probability.</p>	<p><b>Assessment by mid topic tickets and end of topic tests. Milestone assessment given to review progress so far.</b></p> <p>Developing algebraic thinking - Understand the difference between expressions, identities, equations. Manipulate expressions including expanding &amp; factorising single brackets, binomials and polynomials and simplifying algebraic fractions. Solve linear equations and inequalities. Rearrange &amp; Substitute into formulae. Form expressions, equations &amp; inequalities from a range of context including pictures. Solve quadratic equations by factorising, using the formula &amp; completing the square. Solve linear &amp; non-linear simultaneous equation algebraically &amp; graphically. Solve linear &amp; non-linear inequalities. Solve linear programming problems. Use algebraic methods to prove the equivalence of recurring decimals and fractions.</p>	<p><b>Assessment by mid topic tickets and end of topic tests.</b></p> <p>Direct &amp; Inverse proportion - Interpret, simplify and share in a given ratios. Solve more complex ratio problems including combining ratios. Solve problems involving direct proportion including best value calculations. Solve problems involving inverse proportion including person-hour calculations. Form equations for direct proportion and inverse proportion. Recognise and use direct inverse proportion in graphical form.</p> <p>Pythagoras &amp; Trigonometry - Apply Pythagoras' theorem. Recognise that right angled triangles are similar and how this links to trigonometry. Recall how to use trigonometry to find missing sides and angles. Solve Pythagoras and trigonometry problems in 3 dimensions. Derive and use the sine rule, cosine rule and area of triangle formula in non right angled triangles. Read, use and solve problems involving bearings including applying trigonometric rules when needed.</p>	<p><b>Assessment by mid topic tickets and end of topic tests. Milestone assessment given to review progress so far.</b></p> <p>Compound measures - Convert between metric measurements. Use given facts to be able to convert between imperial units and to convert imperial to metric. Calculate speed and solve problems involving speed and time calculations. Use other compound measures including density, pressure, rates of flow &amp; rates of pay.</p> <p>Vectors - Recognise and use Column vector notation to describe a movement. Identify parallel &amp; co-linear vectors. Calculate resultant vectors using vector arithmetic and recognise the link with the vector movements. Use algebraic vector notation to prove properties in 2D shapes.</p>	<p><b>Assessment by mid topic tickets and end of topic tests.</b></p> <p>Growth &amp; Decay - Apply equivalence of fractions, decimals and percentages to compare size and to carry out calculations. Calculate fractions and percentages of amounts including increases &amp; decreases by a percentage or fraction. Calculate compound interest &amp; decay/depreciation. Calculate percentage profit or loss. Solve reverse percentage and fractions problems.</p> <p>Sequences - Identify and use arithmetic, geometric, Fibonacci-style and quadratic sequences. Use &amp; generate position to term rules for linear, quadratic and geometric sequences. Use sequence in real-life contexts and in problem solving. Use iterative methods to find the numerical solution to equations.</p>	<p><b>Assessment by mid topic tickets and end of topic tests. Milestone assessment given to review progress in year 10.</b></p> <p>Functions &amp; Graphs - Recognise and Use function notation. Calculate inverse and composite functions. Recognise &amp; plot quadratic, cubic, reciprocal graphs. Calculate gradient and find the equation of linear graphs. Find the equation of parallel and perpendicular lines. Identify the equation of a circle with centre (0,0). Find the equation of a tangent of a circle.</p> <p>Area &amp; Volume - Recall how to calculate the area of triangles, rectangles, parallelograms &amp; trapezia. Calculate the area and circumference of circles, sectors and segments. Recognise the nets of 3D shapes &amp; calculate surface area of cuboids and prisms. Calculate the volume of prisms, cylinders, pyramids, spheres and cones. Solve problems in context requiring area, volume and surface area calculations.</p>

<b>KS4 Maths Higher Curriculum Overview</b>	<b>Implementation (Year 11)</b>	<b>Year Overview</b>	Pupils study required topics for Edexcel GCSE maths. They cover statistics as well as number, algebra and geometry topics. All of these topics build from work done at KS3 and develop more rigorous ways of working. An emphasis is put on written mathematical communication in preparation for writing exam answers. Time is allocated for revision at the end of the course when students will revisit topics using exam paper practise booklet.				
		<b>SOW</b>	<b>Average Indices &amp; Standard form</b>	<b>Construction &amp; Proof Statistical charts &amp; techniques</b>	<b>Graphs &amp; Algebraic methods</b>	<b>Transformations of Graphs Geometric transformations</b>	<b>Revision</b>
		<b>Assessment Type &amp; Unit Focus</b>	Assessment by mid topic tickets and end of topic tests. Milestone assessment given to assess progress in year 10. Averages - Recall calculating averages of discrete data. Interpret data given in a table and as grouped data. Find the mean, median, mode and range for grouped data and large sets of data given in a table. Solve average problems and use averages to compare sets of data. Indices & Standard Form - Evaluate indices (including fractional and negative) and apply the laws of indices. Manipulate and simplify surds including rationalising the denominator and expanding brackets. Write, interpret and calculate with standard form. Find the upper and lower bounds of calculations and interpret the findings.	Assessment by mid topic tickets and end of topic tests. Mock exams take place in December. Construction & Proof - Recall constructing triangles, angle and perpendicular bisectors. Identify the locus of a point for a range of given conditions. Recognise and use similarity and congruence. Find missing values in similar shapes including area and volume. Prove congruence and similarity in 2D shapes. Statistical charts & techniques - Use Cumulative frequency graphs to calculate median and quartiles. Compare data using box plots. Interpret data in stem and leaf diagrams. Construct and interpret histograms. Read and interpret scatter graphs. Apply capture-recapture methods to estimate a population.	Assessment by mid topic tickets and end of topic tests. Graphs & Algebraic Methods - Recall shapes and key points of linear, quadratic, reciprocal, exponential & circle graphs. Find and interpret the area under graphs. Estimate the gradient of a curve using the tangent. Rearrange algebraic formulae. Carry out algebraic proof.	Assessment by mid topic tickets and end of topic tests. Mock exams take place in March. Transformations of graphs - Recall and use trigonometric graphs. Investigate the effect on a given graph of changing the function. Sketch translations and reflections of the graph of a given function. Geometric transformations - Describe single transformations of 2D shapes. Draw single transformations of 2D shapes including enlargements with a given centre of enlargement. Reason about & identify invariant points after transformations. Investigate the effect of combined transformations.	Pupils work through topic booklets of past paper questions to revise individual topics. They complete past papers to help them prepare for the exams. Teachers selection the topics to study based on analysis of the mock papers.
	<b>Topic Texts</b>	Pupils read and analyse texts that link maths with careers and money and general interest texts about the history of maths.					
	<b>Impact</b>	<b>Year Tracking</b>	Year 11 RP1	Year 10 RP1/ Year 11 RP2	Year 10 RP2/ Year 11 RP3		Year 11 RP4 Year 10 RP3
		<b>literacy and Numeracy links</b>	Literacy skills are developed through a focus on key words and precise language in maths. For each topic, key words are defined and recorded. Pupils then use them when talking and learning about a topic. Pupils are encouraged to talk and write about maths using precise terminology. There is a focus on written communication in maths. Numeracy skills are reviewed when the topics require it. Throughout the 2 year course there are topics require a non-calculator approach and the appropriate techniques are taught and reviewed during these topics. All students practise basic number facts as part of their homework.				
		<b>How It is Used / Skills Set Developed / Outcomes</b>	Pupils continue to develop their use of formal mathematical knowledge to interpret and solve problems. They model situations mathematically and express the results using a range of formal mathematical representations. They learn to select appropriate concepts, methods and techniques to apply to problems.				
		<b>Links to KS5</b>	Higher tier students are encouraged to develop strong formal methods of working with algebra that will support their work in A level maths. All pupils study analysis of data that links to several subject in A level.				
		<b>Careers in the Curriculum</b>	The use of maths in a range of career settings is drawn out when covering relevant topics. In year 10 pupils get the opportunity to attend a maths trip looking at the application of maths to different careers.				