



Learning Aims and Curriculum Intent:

The aims of the mathematics programme at GCSE are to develop fluent knowledge, skills and understanding of mathematical methods and concepts. To acquire, select and apply mathematical techniques to solve problems. Use mathematical reasoning to make deductions and inferences and draw conclusions. To comprehend, interpret and communicate mathematical information in a variety of forms appropriate to the information and context.

Term	Content, Key Questions and Knowledge	Skills	Assessment
Michaelmas	<p>How to express and solve real life problems using more advanced numbers and algebra skills?</p> <ol style="list-style-type: none"> How to carry out operations using indices and surds, solve problems and analyse the error in an estimation (e.g. side length of a square, interest rate of a compound interest, diameter of bacterium, maximum true value of a measurement)? <ul style="list-style-type: none"> Rounding and estimation Bounds Power Laws Standard form Surds How to model a real life problem with more advanced algebra skills and how to solve the problems by algebraic manipulation? (e.g. possible lengths of a quadrilateral and other problems) <ul style="list-style-type: none"> Writing and solving equations Rearranging formulae Completing the square Solving quadratic equations 	<ul style="list-style-type: none"> Rounding to significant figures BIDMAS Applying the index laws Conversion between standard form and ordinary form Operations with numbers in standard form Prime product factorisation Simplifying surds Operations with surds Expanding brackets involving surds Rationalising denominators Rearrange formulae Solving equations by rearranging Modelling using equation Completing the square Solving quadratic equations by factorisation Solving quadratic equations by completing the square Solving quadratic equations using the quadratic formula 	<p>CDA's every half term to assess understanding of topics taught.</p> <p>Students self-assess and attempt to improve upon misconceptions or extend knowledge.</p> <p>End of Michaelmas assessment.</p>
Lent	<p>Algebra continued, and...</p> <p>How to model and solve problems using more advanced geometry?</p> <ol style="list-style-type: none"> Continued: How to model a real life problem with more advanced algebra skills and how to solve the problems by algebraic manipulation? (e.g. angles and lengths related to circles, model and compare taxi fares, interpret possible ranges of values, interpret and predict different trends) <ul style="list-style-type: none"> Circle theorems Straight line graphs Gradients and y-intercepts Equation of straight lines Parallel and perpendicular lines Inequalities Sketching quadratics Quadratic inequalities Graphing inequalities Algebraic fractions Quadratic, cubic and reciprocal graphs Ratio and proportion 	<ul style="list-style-type: none"> Applying Circle theorems to find angles and lengths related to circles Identifying the y-intercept and gradient of a line from an equation. Write the equation of a given line Sketch the graph given an equation of a line Finding gradient of parallel or perpendicular lines Writing equations of parallel or perpendicular lines Showing inequalities on number line Writing values satisfying an inequality Solving linear inequalities algebraically Sketching graphs of inequalities (area) Solving linear inequalities graphically Solving quadratic inequalities Simplifying quadratic fractions Operations with quadratic fractions Simplifying and finding equivalent ratios Solving direct and indirect proportion problems using ratios Solving direct and indirect proportion problems by forming equations ("fish" notation) Finding area of sectors 	<p>CDA's every half term to assess understanding of topics taught.</p> <p>Students self-assess and attempt to improve upon misconceptions or extend knowledge.</p>

Term	Content, Key Questions and Knowledge	Skills	Assessment
	<p>2. What are the properties of different shapes and how to solve problems by modelling complex shapes as simple shapes (e.g. area of shot put fields, orienteering, length of casted shadow)?</p> <ul style="list-style-type: none"> • Circles and sectors • Pythagoras's Theorem • Simple trigonometric ratios (SOH CAH TOA) • Trigonometric graphs • Trigonometry for non-right-angled triangles • 3D trigonometry • Bearings 	<ul style="list-style-type: none"> - Finding arc lengths - Finding perimeter of sectors - Finding radius of a sector - Finding the angle subtended by the arc of a sector - Finding lengths of a right-angled triangle by applying the Pythagoras' theorem - Finding lengths or angles in right-angled triangles using the trigonometric ratios - Finding lengths or angles of any triangle using the sine rule or cosine rule - Finding area of any triangle using the area sine rule - Finding lengths and angles in a 3D object - Applying trigonometry to solve problems related to bearings - Identifying types of graphs (linear, quadratic, cubic, reciprocal and the trigonometric graphs) 	
Trinity	<p>How to apply various prior knowledge and skills to solve problems?</p> <p>1. How to solve complex problems involving more than one variable (e.g. deciding optimum price from supply and demand curves, moment when a car overtakes another)?</p> <ul style="list-style-type: none"> • Simultaneous equations • Functions • Composite functions • Inverse functions <p>2. How to use ratios and proportions to solve geometric problems and probability?</p> <ul style="list-style-type: none"> • Congruence and similarity • Areas of similar shapes • Volumes of similar shapes • Congruence and similarity problems <p>3. Sets</p> <ul style="list-style-type: none"> • Sets • Venn diagrams • Unions and intersections • Complement of a set • Subsets <p>3. Probability</p> <ul style="list-style-type: none"> • Listing outcomes • Theoretical probabilities • Experimental probabilities • The AND rule for independent events • The OR rule • Tree diagrams • Conditional probability 	<ul style="list-style-type: none"> - Solving simultaneous equations by substitution - Solving simultaneous equations by elimination - Evaluating the value of a function given an input - Writing down the domain and range of a function - Finding and simplify an expression for a composite function - Evaluating a function given an input - Finding and simplify the expression of an inverse function - Identifying congruent and similar triangles - Find the length scale factor between two similar objects - Find the area and volume scale factor between two objects using their length scale factor - Finding lengths, area and volume of two similar objects given non-linear scale factor - Understand set notations - Completing Venn diagrams - Listing the elements in the union, intersection and complement subsets - Listing the sample space of an experiment - Drawing sample space diagrams - Finding probabilities using sample space diagrams - Finding the experimental probabilities in an experiment - Describe how to get a value of experimental probability closer to the theoretical probability - Using Venn diagrams to find probabilities - Applying the AND or OR rule to find probabilities related to multiple events - Identifying independent events - Identifying mutually exclusive events - Drawing tree diagrams - Using tree diagrams to find probabilities for multiple events - Find conditional probabilities 	<p>CDA's every half term to assess understanding of topics taught.</p> <p>Students self-assess and attempt to improve upon misconceptions or extend knowledge.</p> <p>End of Year assessment.</p>

What consolidation looks like in this subject	Interleaved “do now” questions in class, independent revision using MathsWatch videos and practices.	
Examples of Homework	Interleaved homework tasks every two-week cycle, practising a variety of skills needed for GCSE. Electronic homework tasks.	
Key terminology	Solve, show that, evaluate, verify, explain, prove, analyse, hence or otherwise	
Super-curricular enrichment and scholarly extension	Read: Secondary Students (maths.org) Watch: Numberphile: Numbers and free will The opposite of infinity TED talks Maths in unexpected places Listen: https://podcasts.apple.com/us/podcast/perfect-numbers/id1540114027 , Radio 4 mathematics collection Visit: The Science museum, The Winton Gallery Mathematics	
Useful websites	Sample Questions Higher Tiers Maths Genie BBC Bitesize Mathematics	
Who can I contact?	Head of Department	
	Teachers	