

# Bilton School Planning for Progress Over Time

## Programme of study

**INTENT**  
The ambitious curriculum in Mathematics will provide students with opportunities to develop skills

**The bigger picture:**  
We look to develop the following skills in our mathematicians:  
FLUENCY • Quick and accurate recall of key facts • Knowledge/selection of appropriate techniques/strategies.  
REASONING • Applying logical thinking to a situation to derive the correct problem solving strategy • The bridge between fluency and problem solving.

<b>Progress and assessment</b>	End of topic assessments completed using end points as the assessment criteria.
<b>Homework</b>	Set on Classcharts and will re-enforce the work completed in class. Also set on DrFrost based on what has been learnt in class.
<b>Literacy (including reading)</b>	Key words issued at the start of every topic. 'Two for Two' and 'Three for Three' shared with students. Problem solving questions integrated into lessons.
<b>Social, Moral, Spiritual and Cultural Development</b>	To develop independence and problem-solving strategies that extend their learning in GCSE maths.
<b>British Values and Cultural Capital</b>	Use MWB in classrooms to develop independence, self-esteem and build confidence. Within lessons, respect is encouraged and anything other than this is challenged. Mistakes are welcomed and used as discussion points to address misconceptions. A variety of approaches to solving problems are taught and discussed. Students are encouraged to develop resilience (linked to developing life-long learners). Students are given a choice of tasks in lessons (red, amber, green/bronze, silver, gold) often linked to their levels of learning. E-safety is promoted through blended learning opportunities (MathsWatch)

<b>GCSE Further Maths</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>Topic</b>	Number	Algebra	Coordinate geometry	Calculus	Matrix transformations	Geometry

<p style="text-align: center; font-size: 24px; font-weight: bold;">End points</p>	<p>Knowledge and application with the use of numbers and the number system including fractions, decimals, percentages, ratio, proportion and order of operations</p>	<p>Knowledge and application with the use of basic skills in manipulative algebra including use of the associative, commutative and distributive laws</p>	<p>Know and use the definition of a gradient</p>	<p>Know that the gradient function gives the gradient of the curve and measures the rate of change of y with respect to x</p>	<p>To multiply matrices</p>	<p>Knowledge of perimeter and area of rectangles and circles; and of the area of triangles, parallelograms and trapezia; and of the surface area and volume of prisms, cylinders, spheres, cones and pyramids</p>
	<p>Know and use the product rule for counting</p>	<p>Know the definition of a function, domain and range and be able to state these</p>	<p>Know the relationship between the gradients of parallel and perpendicular lines</p>	<p>Know that the gradient of a function is the gradient of the tangent at that point.</p>	<p>To know and use the identity matrix</p>	<p>Knowledge of angle properties of parallel and intersecting lines, triangles, all special types of quadrilaterals and polygons</p>
	<p>To manipulate surds including rationalising the denominator</p>	<p>To understand composite and inverse functions</p>	<p>Use Pythagoras' theorem to calculate the distance between two points</p>	<p>To differentiate <math>kx^n</math> where n is an integer, and the sum of such functions</p>	<p>To find fraction of a quantity</p>	<p>Understand and use circle theorems: Angle at the centre is twice the angle at the circumference; angles in the same segment are equal; opposite angles in cyclic quadrilateral add up to 180°; alternate segment theorem</p>
		<p>To expand brackets and collect like terms, including <math>(a + b)^n</math> for positive integer n</p>	<p>Use ratio to find the coordinates of a point on a line given the coordinates of two other points</p>	<p>To find the equation of a tangent and normal at any point on a curve</p>	<p>To do transformations of the unit square in the x-y plane</p>	<p>Understand and construct geometrical proofs using formal arguments</p>
		<p>To factorise and complete the square</p>	<p>To find the equation of a straight line <math>y = mx + c</math> and <math>y - y_1 = m(x - x_1)</math> and other forms and be able to draw a straight line from information given</p>	<p>To find whether a function is increasing or decreasing</p>	<p>To combine transformations</p>	<p>Use the sine and cosine rules in scalene triangles; area of a triangle = <math>\frac{1}{2} ab \sin C</math></p>
		<p>To manipulate rational expressions including algebraic fractions, expressions and formulae</p>	<p>Understand that <math>x^2 + y^2 = r^2</math> is the equation of a circle with centre (0, 0) and radius r</p>	<p>Understand and use the notation <math>\frac{d^2y}{dx^2}</math></p>		<p>Use of Pythagoras' theorem in 2D and 3D</p>

		To use of the factor theorem for rational values of the variable for polynomials	Understand that $(x - a)^2 + (y - b)^2 = r^2$ is the equation of a circle with centre (a, b) and radius r	Use of differentiation to find maxima and minima points on a curve		Be able to apply trigonometry and Pythagoras' theorem to 2 and 3 dimensional problems
		To draw, sketch and interpret graphs.	To find the equation of a tangent at a point on a circle	Using calculus to find maxima and minima in simple problems		Sketch and use graphs of $y = \sin x$ , $y = \cos x$ and $y = \tan x$ for angles of any size
		To solve linear and quadratic equations including equations with three unknowns		Sketch/ interpret a curve with known maximum and minimum points		Be able to use the definitions $\sin \theta$ , $\cos \theta$ and $\tan \theta$ , for any positive angle up to $360^\circ$ (measured in degrees only)
		To find algebraic and graphical solution of simultaneous equations in two unknowns, where the equations could both be linear or one linear and one second order				Knowledge and use of $30^\circ$ , $60^\circ$ , $90^\circ$ triangles and $45^\circ$ , $45^\circ$ , $90^\circ$ triangles
		To solve linear and quadratic inequalities				Know and use $\tan \theta = \sin \theta / \cos \theta$ and $\sin^2 \theta + \cos^2 \theta = 1$
		To use index laws, including fractional and negative indices and the solution of equations				Solve simple trigonometric equations in given intervals
		To write algebraic proof				
		To find and use the nth term of linear and quadratic sequences and understand the limit as n tends to infinity				