

Key Stage 4 Schemes of Work

Stage 6

Unit	Lessons	Key 'Build a Mathematician' (BAM) Indicators	Essential knowledge
Numbers and the number system	12	<ul style="list-style-type: none"> • Multiply and divide numbers with up to three decimal places by 10, 100, and 1000 • Use long division to divide numbers up to four digits by a two-digit number • Use simple formulae expressed in words • Generate and describe linear number sequences • Use simple ratio to compare quantities • Write a fraction in its lowest terms by cancelling common factors • Add and subtract fractions and mixed numbers with different denominators • Multiply pairs of fractions in simple cases • Find percentages of quantities • Solve missing angle problems involving triangles, quadrilaterals, angles at a point and angles on a straight line • Calculate the volume of cubes and cuboids • Use coordinates in all four quadrants • Calculate and interpret the mean as an average of a set of discrete data 	<ul style="list-style-type: none"> • Know percentage and decimal equivalents for fractions with a denominator of 2, 3, 4, 5, 8 and 10 • Know the rough equivalence between miles and kilometres • Know that vertically opposite angles are equal • Know that the area of a triangle = $\text{base} \times \text{height} \div 2$ • Know that the area of a parallelogram = $\text{base} \times \text{height}$ • Know that volume is measured in cubes • Know the names of parts of a circle • Know that the diameter of a circle is twice the radius • Know the conventions for a 2D coordinate grid • Know that mean = $\text{sum of data} \div \text{number of pieces of data}$
Checking, approximating and estimating	7		
Calculating	11		
Calculating: division	7		
Visualising and constructing	8		
Investigating properties of shapes	8		
Algebraic proficiency: using formulae	4		
Exploring fractions, decimals and percentages	8		
Proportional reasoning	6		
Pattern sniffing	5		
Measuring space	6		
Investigating angles	4		
Calculating fractions, decimals and percentages	12		
Solving equations and inequalities	4		
Calculating space	8		
Mathematical movement	4		
Presentation of data	4		
Measuring data	4		
Total:	122	Stage 6 BAM Progress Tracker Sheet	

Stage 7

Unit	Hours	Mastery indicators	Essential knowledge
Numbers and the number system	9	<ul style="list-style-type: none"> • Use positive integer powers and associated real roots • Apply the four operations with decimal numbers • Write a quantity as a fraction or percentage of another • Use multiplicative reasoning to interpret percentage change • Add, subtract, multiply and divide with fractions and mixed numbers • Check calculations using approximation, estimation or inverse operations • Simplify and manipulate expressions by collecting like terms • Simplify and manipulate expressions by multiplying a single term over a bracket • Substitute numbers into formulae • Solve linear equations in one unknown • Understand and use lines parallel to the axes, $y = x$ and $y = -x$ 	<ul style="list-style-type: none"> • Know the first 6 cube numbers • Know the first 12 triangular numbers • Know the symbols =, ≠, <, >, ≤, ≥ • Know the order of operations including brackets • Know basic algebraic notation • Know that area of a rectangle = $l \times w$ • Know that area of a triangle = $b \times h \div 2$ • Know that area of a parallelogram = $b \times h$ • Know that area of a trapezium = $((a + b) \div 2) \times h$ • Know that volume of a cuboid = $l \times w \times h$ • Know the meaning of faces, edges and vertices
Counting and comparing	4		
Calculating	9		
Visualising and constructing	5		
Investigating properties of shapes	6		
Algebraic proficiency: tinkering	9		
Exploring fractions, decimals and percentages	3		
Proportional reasoning	4		
Pattern sniffing	3		
Measuring space	5		
Investigating angles	3		
Calculating fractions, decimals and percentages	12		

Solving equations and inequalities	6	<ul style="list-style-type: none"> Calculate surface area of cubes and cuboids Understand and use geometric notation for labelling angles, lengths, equal lengths and parallel lines Stage 7 BAM Progress Tracker Sheet 	<ul style="list-style-type: none"> Know the names of special triangles and quadrilaterals Know how to work out measures of central tendency Know how to calculate the range
Calculating space	6		
Checking, approximating and estimating	2		
Mathematical movement	8		
Presentation of data	6		
Measuring data	5		

Stage 8

Unit	Hours	Mastery indicators	Essential knowledge
Numbers and the number system	9	<ul style="list-style-type: none"> Apply the four operations with negative numbers Convert numbers into standard form and vice versa Apply the multiplication, division and power laws of indices Convert between terminating decimals and fractions Find a relevant multiplier when solving problems involving proportion Solve problems involving percentage change, including original value problems Factorise an expression by taking out common factors Change the subject of a formula when two steps are required Find and use the nth term for a linear sequence Solve linear equations with unknowns on both sides Plot and interpret graphs of linear functions Apply the formulae for circumference and area of a circle Calculate theoretical probabilities for single events Stage 8 BAM Progress Tracker Sheet 	<ul style="list-style-type: none"> Know how to write a number as a product of its prime factors Know how to round to significant figures Know the order of operations including powers Know how to enter negative numbers into a calculator Know that $a^0 = 1$ Know percentage and decimal equivalents for fractions with a denominator of 3, 5, 8 and 10 Know the characteristic shape of a graph of a quadratic function Know how to measure and write bearings Know how to identify alternate angles Know how to identify corresponding angles Know how to find the angle sum of any polygon Know that circumference = $2\pi r = \pi d$ Know that area of a circle = πr^2 Know that volume of prism = area of cross-section \times length Know to use the midpoints of groups to estimate the mean of a set of grouped data Know that probability is measured on a 0-1 scale Know that the sum of all probabilities for a single event is 1
Calculating	9		
Visualising and constructing	8		
Understanding risk I	6		
Algebraic proficiency: tinkering	10		
Exploring fractions, decimals and percentages	3		
Proportional reasoning	8		
Pattern sniffing	4		
Investigating angles	5		
Calculating fractions, decimals and percentages	6		
Solving equations and inequalities	4		
Calculating space	9		
Algebraic proficiency: visualising	9		
Understanding risk II	5		
Presentation of data	4		
Measuring data	6		

Stage 9

Unit	Hours	Mastery indicators	Essential knowledge
Calculating	12	<ul style="list-style-type: none"> Calculate with roots and integer indices Manipulate algebraic expressions by expanding the product of two binomials Manipulate algebraic expressions by factorising a quadratic expression of the form $x^2 + bx + c$ Understand and use the gradient of a straight line to solve problems Solve two linear simultaneous equations algebraically and graphically Plot and interpret graphs of quadratic functions Change freely between compound units Use ruler and compass methods to construct the perpendicular bisector of a line segment and to bisect an angle Solve problems involving similar shapes Calculate exactly with multiples of π Apply Pythagoras' Theorem in two dimensions Use geometrical reasoning to construct simple proofs Use tree diagrams to list outcomes Stage 9 BAM Progress Tracker Sheet 	<ul style="list-style-type: none"> Know how to interpret the display on a scientific calculator when working with standard form Know the difference between direct and inverse proportion Know how to represent an inequality on a number line Know that the point of intersection of two lines represents the solution to the corresponding simultaneous equations Know how to find the nth term of a quadratic sequence Know the characteristic shape of the graph of a cubic function Know the characteristic shape of the graph of a reciprocal function Know the definition of speed Know the definition of density Know the definition of pressure Know Pythagoras' Theorem Know the definitions of arc, sector, tangent and segment Know the conditions for congruent triangles
Visualising and constructing	10		
Algebraic proficiency: tinkering	9		
Proportional reasoning	9		
Pattern sniffing	8		
Solving equations and inequalities I	5		
Calculating space	13		
Conjecturing	6		
Algebraic proficiency: visualising	12		
Solving equations and inequalities II	8		
Understanding risk	8		
Presentation of data	5		

Stage 10

Unit	Lessons	Key 'Build a Mathematician' (BAM) Indicators	Essential knowledge
Investigating properties of shapes	12	<ul style="list-style-type: none"> Manipulate fractional indices Solve problems involving direct and inverse proportion Convert between recurring decimals and fractions Solve equations using iterative methods Manipulate algebraic expressions by factorising a quadratic expression of the form $ax^2 + bx + c$ Solve quadratic equations by factorising Link graphs of quadratic functions to related equations Interpret a gradient as a rate of change Recognise and use the equation of a circle with centre at the origin Apply trigonometry in two dimensions Calculate volumes of spheres, cones and pyramids Understand and use vectors Analyse data through measures of central tendency, including quartiles 	<ul style="list-style-type: none"> Know the convention for labelling the sides in a right-angle triangle Know the trigonometric ratios, $\sin\theta = \text{opposite/hypotenuse}$, $\cos\theta = \text{adjacent/hypotenuse}$, $\tan\theta = \text{opposite/adjacent}$ Know exact values of $\sin\theta$ and $\cos\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° Know the exact value of $\tan\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and 60° Know that $a^{1/n} = \sqrt[n]{a}$ Know that $a^{-n} = 1/a^n$ Know the information required to describe a transformation Know the special case of the difference of two squares Know how to set up an equation involving direct or inverse proportion Know set notation Know the conventions for representing inequalities graphically Know the formulae for the volume of a sphere, a cone and a pyramid Know the formulae for the surface area of a sphere, and the curved surface area of a cone Know the circle theorems Know the characteristic shape of the graph of an exponential function Know the meaning of roots, intercepts and turning points Know the definition of acceleration Know how to construct a box plot
Calculating	8		
Solving equations and inequalities I	9		
Mathematical movement I	6		
Algebraic proficiency: tinkering	12		
Proportional reasoning	7		
Pattern sniffing	4		
Solving equations and inequalities II	6		
Calculating space	10		
Conjecturing	12		
Algebraic proficiency: visualising I	12		
Exploring fractions, decimals and percentages	6		
Solving equations and inequalities III	8		

Understanding risk	6		<ul style="list-style-type: none"> • Know the conditions for perpendicular lines
Analysing statistics	12		
Algebraic proficiency: visualising II	6		
Mathematical movement II	4		
Total:	140		

Stage 11

Unit	Lessons	Key 'Build a Mathematician' (BAM) Indicators	Essential knowledge
Investigating properties of shapes	16	<ul style="list-style-type: none"> • Simplify surds, including rationalising the denominator of a surd expression • Manipulate quadratic expressions by completing the square • Deduce roots and turning points of quadratic functions • Understand the concept of an instantaneous rate of change • Sketch translations and reflections of given functions • Solve quadratic inequalities in one variable • Use the sine and cosine rules to solve problems 	<ul style="list-style-type: none"> • Know that $\sqrt{a \pm b} \neq \sqrt{a} \pm \sqrt{b}$, $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$ and $\sqrt{a \times b} = \sqrt{a} \times \sqrt{b}$ • Know the formula for solving quadratic equations • Know function notation • Know graphs of exponential and trigonometric functions • Know the sine rule, $a/\sin A = b/\sin B = c/\sin C$ • Know the cosine rule, $a^2 = b^2 + c^2 - 2bc \cos A$ • Know area of triangle = $\frac{1}{2}ab \sin C$ • Know that histograms should be plotted using frequency density when groups are of unequal widths
Calculating	6		
Solving equations and inequalities I	12		
Mathematical movement I	3		
Algebraic proficiency: tinkering	5		
Proportional reasoning	5		
Pattern sniffing	4		
Solving equations and inequalities II	6		
Algebraic proficiency: visualising I	7		
Analysing statistics	5		
Algebraic proficiency: visualising II	3		
Mathematical movement II	4		
Total:	76		