

Year groups from Y7
September 2022



THE
BRIAN CLARKE
CHURCH OF ENGLAND ACADEMY

Mathematics Department Curriculum Map (Key Stage 3)

Overall Curriculum Intent

The Brian Clarke Church of England Academy is a place where students, regardless of their background, can access a high quality and challenging mathematics curriculum. We believe that all students can learn and succeed in mathematics given the appropriate learning experiences in and beyond the classroom. Every student is entitled to have the opportunity to master the key mathematical content and as such we have one curriculum for all. The curriculum is sequenced to focus on depth over breadth. We aim to spend more time teaching fundamental concepts to avoid the need to 're-teach'. Our Year 7 curriculum provides students with the foundations of number work to enable them to grasp algebra concepts with greater ease in Year 8 and Year 9. Students are challenged to deepen their understanding of a topic rather than being accelerated through content and children who find a concept challenging are supported within lessons to achieve full understanding.

Our curriculum approach is based around four key principles: conceptual understanding, language & communication, mathematical thinking and problem solving. We aim to develop a deep conceptual understanding through use of various representations (concrete, pictorial and abstract). Clear mathematical communication, verbally and written is essential for students to be able to use mathematical language and notation to express and clarify their thoughts with others. During their time at Brian Clarke, students will have the opportunity to develop habits of mind enabling them to think mathematically. In tandem with this we ensure pupils can develop procedural fluency with knowledge of key facts and techniques. With these key principles students will then be supported to use their learning accurately, efficiently and flexibly to reason mathematically and solve problems in familiar and unfamiliar contexts through question stems such as 'true/false', 'explain why', 'spot the mistake' among others.

We believe that all students should leave school equipped with sufficient knowledge and the core mathematical skills they need for future learning. Through a detailed audit of the national curriculum and through the study of the principal strands (number, algebra, proportional reasoning, geometry & measures, probability and statistics) we have designed and sequenced a 5-year curriculum which allows students to link established ideas to learning of new concepts and supports them in understanding the coherent and connected nature of the subject. Our curriculum is cumulative so that concepts and skills learnt previously are applied and connected throughout the school year to consolidate learning; this continual recapping emphasises how each of the concepts interconnects with others in mathematics.

The curriculum at KS3 is designed to consolidate learning from the KS2 national curriculum whilst building on existing knowledge. Teaching methods consider the way learners have been taught prerequisite topics in the past and how we can successfully integrate these to enable a smooth transition between KS2 and KS3.

The purpose of our curriculum is to develop students into lifelong independent learners who can confidently analyse, deduce, and problem solve, not only within mathematics, but who can apply these skills across the curriculum and to the multifarious aspects of their wider lives. Our rewards program, extra-curricular and co-curricular enrichment opportunities will further encourage pupil's enthusiasm for mathematics.

Year 7

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Knowledge Introduced	<p>Number 1.1 – Place Value</p> <ul style="list-style-type: none"> • Further place value of digits in integers, decimals and measures. • Column headers in exponent and fractional form – expanded form of a number. • Ordering and comparing integer and decimal numbers and measures using inequality notation. • Representations of numbers including using the infinite nature of the number line. • Rounding numbers to the nearest power of 10. • Multiplying & dividing integers and decimals by powers of 10. • Metric units of measure using place value. • Converting units of length, mass & capacity in context. • Mid points and medians. 	<p>Number 1.2 – Number Properties</p> <ul style="list-style-type: none"> • Multiples and factors. • Divisibility rules. • Integer exponents and roots. • Prime numbers. • Writing integers as a product of prime factors. • Using prime factors. • Venn diagrams. • Lowest Common Multiple and Highest Common Factor, including from prime factors. 	<p>Number 2.1 – Addition & Subtraction</p> <ul style="list-style-type: none"> • Using formal written methods to add and subtract integers & decimals. • Efficient mental addition and subtraction strategies for integers and decimals. • Bar models and fact families for addition & subtraction. • Perimeter of rectilinear shapes. • Perimeter problems with other polygons. • Angle rules. • Mean and range. 	<p>Number 2.2 – Multiplication & Division</p> <ul style="list-style-type: none"> • Understand and use the commutative and associative properties of multiplication. • Using place value to calculate multiplication of integers and decimals. • Area model of multiplication. • Multiplying with decimal numbers. • Using place value and multiplication facts to calculate division of integers and decimals. • Understand and use formal methods of division (short division algorithm). • Dividing with decimal numbers. • Method selection through word & money problems. 	<p>Number 2.3 – Order of Operations</p> <ul style="list-style-type: none"> • Applying the commutative law to efficiently and accurately re-order calculations involving the four operations. • Order of operations with all four operations, brackets and exponents. 	<p>Number 2.4 – Directed Number</p> <ul style="list-style-type: none"> • Understanding negative numbers, number lines and applications. • Ordering and comparing negative and positive numbers. • Arithmetic procedures with negative numbers (using zero pairs and vectors on a number line). • Order of operations involving negative numbers.
Key vocabulary/ concepts/ideas students must master	<p>N1: Integer, exponent, power, index, ascending, descending, greater than, less than, unit of measure, length, mass, capacity, volume, convert, multiple, factor, factor pair, lowest common multiple, highest common factor, prime, prime factor decomposition, square number, cube number, square root, cube root, Venn diagram, set.</p> <p>Command words: work out, evaluate, calculate, find, explain.</p>		<p>N2.2/N2.2: recurring, associative, commutative, distributive, exchange, partition.</p>		<p>N2.3: Sum, summand, difference, minuend, subtrahend, product, quotient, divisor, dividend.</p>	
Knowledge revisited	<ul style="list-style-type: none"> • Read, write and compare integers and decimals up to 10 million (KS2) • Multiply and divide by 10, 100, 1000 (KS2) • Convert metric units of length and mass (KS2) • Round whole numbers (KS2) • Use of $< > =$ (KS2) • Identify multiples and factors (KS2) • Identify common multiples and factors (KS2) • Squares, cubes and primes (KS2) • Sorting diagrams (KS2) 		<ul style="list-style-type: none"> • Place value (N1) • Formal written methods for addition, subtraction, multiplication and division of integers (KS2) • Multiply a decimal by a whole (KS2) • Divide with decimal answers (KS2) 		<ul style="list-style-type: none"> • Order of operations (KS2) • Methods for addition, subtraction, multiplication and division (N2) 	
CEIAG Links/ Opportunities	<p>Prime numbers – Applications to jobs in data encryption and cyber security (Gatsby Benchmark 4)</p>					

Year 8

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Knowledge Introduced	<p><u>Algebra 1</u> – Expressions and Equations</p> <ul style="list-style-type: none"> Using letters to represent generalised numbers. Using algebraic notation. Using letters to represent a specific unknown value or a variable. Generalising relationships using algebraic statements. Substituting numeric values and evaluating Identifying a variety of like terms in an expression, including products and indices. Simplify expressions by collecting like terms. Manipulate expressions through adding, subtracting and multiplying. 	<p><u>Geometry 1</u> – Area and Perimeter</p> <ul style="list-style-type: none"> Properties of triangles and quadrilaterals. Perimeter problems with polygons and compound shapes. Area of rectangles, triangles, parallelograms, and trapezia. Area of composite shapes Algebra in perimeter and area problems. <p><u>Algebra 2</u> – Distributive Law</p> <ul style="list-style-type: none"> Recap Algebra 1 Use the distributive law to multiply out a bracket. Use the distributive law to factorise expressions with common factors. 	<p><u>Algebra 3</u> – Coordinates</p> <ul style="list-style-type: none"> Coordinates (including non-integer), in all four quadrants. Geometric problems involving coordinates. Mid-point of a line segment. Equations of vertical and horizontal lines. Graphs of $y = x$ and $y = -x$ <p><u>Number 3.1</u> – Fractions and Decimals</p> <ul style="list-style-type: none"> Structure of fractions, improper fractions and mixed numbers. Conversion between fractions and decimals. Equivalent fractions and simplifying fractions. Order and compare fractions 	<p><u>Number 3.2</u> - Arithmetic Procedures with Fractions</p> <ul style="list-style-type: none"> Addition and subtraction of fractions and mixed numbers. Multiplication with fractions and mixed numbers. Reciprocals. Division with fractions and mixed numbers. 	<p><u>Geometry 2</u> – Transformations</p> <ul style="list-style-type: none"> Translations. Introduction to congruence. Reflections. Rotations. Enlargements. 	<p><u>Number 4.1</u> – Ratios and Multiplicative Relationships</p> <ul style="list-style-type: none"> Scaling and calculating multipliers. Connecting fractions and ratios. Simplifying ratios. Double number lines and ratio table representations. <p><u>Number 4.2</u> – Fractions</p> <ul style="list-style-type: none"> Fractions of an amount. Writing one number as a fraction of another. <p><u>Number 4.3</u> – Applying Ratios</p> <ul style="list-style-type: none"> Dividing into a ratio. Working with ratios and quantities. Connecting ratios and rates
Key vocabulary/ concepts/ideas students must master	<p>A1: term, expression, equation, variable, substitute/substitution, simplify, like terms, coefficient, constant.</p>	<p>A2: distributive law, multiply out, expand, factorise, factor, algebraic factor, simplify, collect like terms, fully factorised.</p> <p>G1: Quadrilateral, isosceles, equilateral, scalene, right-angled triangle, square, rectangle, parallelogram, rhombus, kite, trapezium, perimeter, area, parallel, perpendicular, rectilinear, composite, diagonal, base, perpendicular height.</p>	<p>A3: Coordinate axes, x-axis, y-axis, coordinate pair, quadrant, origin, mid-point, line segment, vertical, horizontal, graphically, algebraically.</p> <p>N3: Fraction, numerator, denominator, mixed number, improper fraction, proper fraction, terminating decimal, recurring decimal, equivalent fraction, simplify, simplest form, common denominator, reciprocal.</p>	<p>G2: Transformation, translate, column vector, reflect, mirror line, symmetry, rotate, clockwise, anti-clockwise, centre of rotation, enlarge, scale factor, centre of enlargement, vertex, invariant point.</p>	<p>N4: Additive relationship, multiplicative relationship, whole, quantity, multiplier, ratio table, simplify (a ratio), simplest form (of a ratio), rate, per, conversion rate, proportional.</p>	
Knowledge revisited	<ul style="list-style-type: none"> Using order of operations (N1) Using simple formulae (KS2) Expressing missing number problems algebraically (KS2) Enumerate possible number combinations for two variables in an equation (KS2) 	<ul style="list-style-type: none"> Distributive law and numbers (N2) Letters as numbers (A1) Expressions & Equations (A1) Convert units of length (N1) Addition, subtraction, multiplication and division strategies (N2) Perimeter of polygons (KS2) Area of rectangles, parallelograms, triangles (KS2) Use standard units of area (KS2) 	<ul style="list-style-type: none"> Describing positions on the full coordinate grid (KS2) Find missing vertices of polygons on a coordinate grid (KS2) Place value (N1) Equivalent fractions and simplifying fractions (KS2) Convert between decimals and fractions (KS2) Mixed numbers and improper fractions (KS2) HCF and LCM (N1) Compare and order integers and decimals (N1) Add and subtract fractions and mixed numbers (KS2) Multiply with fractions (KS2) Divide fraction by integer (KS2) 	<ul style="list-style-type: none"> Solve problems with similar shapes using scale factors (KS2) Basic translations and reflections (KS2) Line symmetry (KS2) Rotation as turns and angles (KS2) 	<ul style="list-style-type: none"> Solve problems involving the relative sizes of two quantities using integer multiplication and division facts (KS2) Solve problems with unequal sharing and grouping using fractions and multiples (KS2) 	
CEIAG Links/ Opportunities	<p>Area and perimeter – Use in interior design and decorating jobs (Gatsby Benchmark 4)</p>				<p>Ratio and proportion – Use in currency exchange (Gatsby Benchmark 4)</p>	

Year 9

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Knowledge Introduced	<p><u>Algebra 4</u> – Solving Linear Equations</p> <ul style="list-style-type: none"> Using function machines to write expressions and equations to express a relationship. Balancing equations and understanding equality with numbers and algebraic terms. Solve a one-step linear equation with a single unknown on one side. Solve a two-step (or more) linear equation with a single unknown, including equations where the unknown appears on both sides. Solve a linear equation with a single unknown involving brackets in an efficient way. 	<p><u>Number 5</u> – Estimating and Rounding</p> <ul style="list-style-type: none"> Rounding to a given number of decimal places. Significant figures and rounding to significant figures. Estimate/check calculations. Overestimates and underestimates. Calculate possible errors using inequality notation. <p><u>Algebra 5</u> – Sequences</p> <ul style="list-style-type: none"> Numerical and pictorial sequences and patterns. Term-term rules. Position-to-term rule. Properties of arithmetic sequences. Nth term rules. 	<p><u>Number 6</u> – Percentages and Proportion</p> <ul style="list-style-type: none"> Graphs to represent multiplicative relationships. Describe one number as a percentage of another. Find a percentage of a quantity. Calculate percentage changes (increases and decreases). Direct and inverse proportion <p><u>Algebra 6</u> - Graphical representations</p> <ul style="list-style-type: none"> Express relationships between coordinates graphically and algebraically. Work with rates of change (gradients) and intercept point. Linear equations in the form $y = mx + c$. 	<p><u>Geometry 3.1</u> – Circles</p> <ul style="list-style-type: none"> Circumference of a circle Area of a circle Find radius/diameter given circumference or area <p>Perimeter and area of composite shapes including part or whole circles.</p> <p><u>Geometry 3.2</u> – 3D Shapes</p> <ul style="list-style-type: none"> Surface area of 3D shapes Prisms Volume and capacity of prisms 	<p><u>Geometry 4</u> – Properties of Angles and Polygons</p> <ul style="list-style-type: none"> Draw and measure angles, use standard angle vocabulary. Geometrical proof using properties of angles around a point, angles adjacent on a straight line, vertically opposite angles, interior angle sum of a triangle. Properties of special quadrilaterals and regular polygons. Properties of angles and parallel lines. Interior and exterior angles in polygons. 	<p><u>Statistics 1.1</u> – Discrete Data and Representations</p> <ul style="list-style-type: none"> Types of data, collecting data and sampling. Frequency tables. Pictograms, line & bar graphs. Representing data and reading data in pie charts. Choose appropriate statistical measures and representations. Compare data sets. <p><u>Statistics 1.2</u> – Summary Statistics</p> <ul style="list-style-type: none"> Mean, median, mode & range from un-grouped discrete data. Using summary statistics to compare and analyse data. Summary statistics from frequency tables. Misleading data
Key vocabulary/ concepts/ideas students must master	A4: Solve, linear equation, unknown, balance, inverse operation.	N5: Rounding, decimal place, significant figure, overestimate, underestimate, approximation, rounding error, error interval. A5: Sequence, term, nth-term, term-term rule, position-term rule, arithmetic, linear.	N6: Percentage, percent, increase, decrease, profit, loss, decimal multiplier, direct proportion, inverse proportion. A6: Gradient, intercept, parallel, rate of change, graphical	G3: Circumference, diameter, radius, arc, sector, prism, cylinder, surface area, volume, capacity.	G4: Parallel, perpendicular, transversal, corresponding, alternate, supplementary, congruent, interior angle, exterior angle, regular polygon, irregular polygon.	S1: discrete, continuous, qualitative, quantitative, sample, population, class, frequency, mean, median, mode, range.
Knowledge revisited	<ul style="list-style-type: none"> Express missing number problems algebraically (KS2) Understand and use the conventions and vocabulary of algebra (A1) Simplify expressions (A1) Manipulate algebraic expressions using the distributive law (A2) 	<ul style="list-style-type: none"> Rounding numbers to the nearest power of 10 (N1). Generate and describe linear number sequences (KS2) Algebraic expressions (A1) Expanding brackets (A1) 	<ul style="list-style-type: none"> The percent symbol (%) and definition (KS2) Write percentages as fractions and decimals (KS2) Solve problems involving percentages (KS2) Describe positions on the full coordinate grid (KS2, A2) Find pairs of numbers that satisfy an equation with two unknowns (KS2, A2) Use/recognise horizontal and vertical line graphs and $y = x$, $y = -x$ (A2) 	<ul style="list-style-type: none"> Similar shapes and scale factors (KS2, G2) Perimeter (KS2, N2, G1) Area of rectangles, parallelograms, triangles and trapeziums (KS2, G1) Areas of composite shapes (G1) Estimate, calculate and compare volume and capacity of cubes/cuboids (KS2) 	<ul style="list-style-type: none"> Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles (KS2) Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons (KS2) 	<ul style="list-style-type: none"> Mean average (KS2) Bar charts, pictograms, pie charts, line graphs (KS2)
CEIAG Links/ Opportunities						Interpreting data – data analyst, ecologist, meteorologist, scientist (Gatsby Benchmark 4)