Ark Blake Academy

Maths KS3 Curriculum Map

Year	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 7 The first term of year 7 focusses on developing understanding of the axioms and structures of number that are fundamental to mathematics. This underpins understanding of the algebraic notation developed in this term and in subsequent years. The spring term of year 7 focusses on geometry, an important area of mathematics for students to engage with. The cumulative nature of the curriculum means that students apply algebraic reasoning in new contexts. Students' understanding of fractions, decimals and percentages from KS2 is built upon throughout the year. This is developed more formally in the summer term where time is spent linking different interpretations of fractions and introducing ratio.	**Making generalisations about the number system 1** **Knowledge Content** **Number systems and axioms:** Place value systems including base 10 and other bases; laws of commutativity, associativity and distributivity **Number properties:** factors, primes and multiples; square and cube numbers; representing the structure of number; establishing the order of operations **Threshold Concepts** • Humans have not always used base 10 and in specific situations other bases are preferential. • A prime number has exactly two factors **Link to Prior Learning** Builds on knowledge of basic number properties and calculation strategies from KS2 **Enquiry Question** *If a number has an odd number of factors, what does that tell us about it?*	**Making generalisations about the number system 2** **Knowledge Content** **Positive and negative numbers:** negative numbers in context; using negative numbers with all operations **Basic algebra:** writing expressions; equivalent expressions; forming equations; forming inequalities **Threshold Concepts** • Negative values do exist in the real world in various contexts. • It is convention to put the number ahead of the unknown e.g. 2y instead of y2 **Link to Prior Learning** Builds on knowledge of calculating with negative numbers from KS2 **Enquiry Question** *Explain the difference between* *a + a and a x a*	**2-D Geometry** **Knowledge Content** **Angles:** measuring and drawing angles; angles on a straight line and around a point; angles in parallel lines; creating expressions from angle facts **Classifying 2-D shapes:** classifying polygons according to their properties; rotational and line symmetry; interior angle sum of triangles and quadrilaterals **Constructions:** Using a ruler, protractor and compass to construct 2-D shapes; using properties of quadrilaterals and triangles to explore standard constructions **Threshold Concepts** • The rules for angles in parallel lines can be derived from the basic angle facts. • Several shapes can share the same property e.g. having 4 right angles **Link to Prior Learning** Revisits and builds on knowledge of basic angle facts from KS2 **Enquiry Question** Can you find the solution to this angle problem using a different method?	**The Cartesian plane** **Knowledge Content** **Coordinates:** Plotting points in all 4 quadrants; horizontal and vertical lines; midpoints of line segments; problem solving on a coordinate grid **Area of 2-D shapes:** area of triangles and quadrilaterals; formulae and solving equations **Transformations:** translation, rotations and reflection of objects on a cartesian plane; enlargements by a positive scale factor **Threshold Concepts** • Co-ordinates require two pieces of information to fully map their location. • The formula for the area of a triangle is directly linked to that of a rectangle. • There can be several ways of describing a shape's transformation. **Link to Prior Learning** Revisits and builds on knowledge of basic area formulae from KS2 **Enquiry Question** If you know a coordinate and a midpoint is it possible to find the other coordinate?	**Fractions** **Knowledge Content** **Number properties:** Prime factor decomposition; LCM and HCF; square roots and cube roots **Fractions:** equivalent fractions; fraction/decimal conversion; recurring decimal; multiply and divide fractions; fractions of amounts; mixed numbers and improper fractions; addition and subtraction of fractions **Threshold Concepts** • Every positive integer (greater than 1) has a unique prime factor decomposition. • A fraction is a convenient way of representing one value being divided by another. **Link to Prior Learning** Builds on Autumn 1 number properties **Enquiry Question** How can we use the prime factor decomposition to find the HCF and LCM of two numbers?	**Ratio and proportion** **Knowledge Content** **Ratio**: ratio notation; understand the ratio-fraction relationship; work with ratios and quantities; **Percentages**: percentage/fraction conversion; percentage of an amount; percentage change; finding the original amount; use fractions, decimals and percentages in different contexts including probability **Threshold Concepts** • Ratios are inherently linked to fractions. • A percentage can easily be converted to a fraction with a denominator of 100. **Link to Prior Learning** Builds on Summer 1 fractions **Enquiry Question** If the fraction of red marbles to green marbles in a bag is 2:3, what fraction of the marbles are blue?

Ark Blake Academy

Year 8	Equations and inequalities	Graphs	Proportional reasoning	Representations and reasoning with data	Angles	Area, volume and surface area
The Autumn term begins with a focus on algebraic thinking. This expands on the algebraic manipulation learnt in year 7 and requires students to problem solve using equations. Not only studying it in its most obvious form, algebra is used in other contexts such as with linear graphs allowing students to make the natural connections between different topics. Spring term looks to build on the number work from year 7 with students learning of estimation, working with proportion and learning how to evaluate a set of data using averages. The summer term focuses on geometry with more complex angle problems being explored. Students build an understand of circle properties and use sophisticated formulae to find areas and volumes.	**Knowledge Content** **Equations:** Review Y7 algebra; forming algebraic equations; solving equations with unknowns on both sides; solve equations involving algebraic fractions **Inequalities:** language and symbols; using a number line; forming algebraic inequalities; solving algebraic inequalities with unknowns on both sides; use graphical representations **Threshold Concepts** • To solve an equation, the same operation must be done to both sides of the equation. **Link to Prior Learning** Builds on *Algebra* from Year 7, Autumn 2 **Enquiry Question** Solve the inequality and represent the solution on a number line 3a + 4 < 12 - a	**Knowledge Content** **Linear graphs:** plot coordinates to generate straight lines; identify key features of a linear graph; make links between algebraic and linear representations; identify parallel lines from algebraic equations **Accuracy and estimation:** Rounding to a given number of decimal places and significant figures; upper and lower bounds; estimation **Threshold Concepts** • A minimum of two points are required to draw a straight line. • It is convention to round up with a '5' as the decisive digit. There is no mathematically sound reason as to why – it is purely convention. **Link to Prior Learning** Builds on *Coordinates* from Year 7, Spring 2 **Enquiry Question** Which of the following lines are parallel to y = 4x + 3 a) y = 3x + 4 b) y = 4x + 4 c) y = 4x - 4 d) 4x = y	**Knowledge Content** **Real-life graphs:** Review Y7 ratio; scales and reading maps; read and interpret real life graphs; rates of change including SDT **Proportion:** Similarity as an examples of direct proportion; represent proportional relationships algebraically in a table and on graphs **Threshold Concepts** • If two of speed, distance or time are known, the third can be found. • Two values that are directly proportional have a fixed ratio. **Link to Prior Learning** Builds on *Ratio* from Year 7, Summer 2 **Enquiry Question** Driving at 90 mph, how far a distance would be travelled in 270 minutes	**Knowledge Content** **Univariate data:** construct and interpret charts and graphs; mean, mode, median and range; examine outliers **Bivariate data:** scatter graphs; correlation; constructing a line of best fit; interpolation and extrapolation **Threshold Concepts** • The mean, mode and median are three different ways of finding and average. In real life, each has its own benefits depending on the situation. • Using a line if best fit is a form of estimation. It is not exact but will give a fairly accurate answer. **Link to Prior Learning** **Enquiry Question** Give an example of two variables that would have: a) Positive correlation b) Negative correlation c) No correlation	**Knowledge Content** **Angles in parallel lines:** Review Y7 **Angles in polygons:** define the sum of interior and exterior angles of polygons; solve problems involving angles in polygons **Bearings:** understand the conventions of bearings; calculate and measure **Threshold Concepts** • The interior and exterior angle of a polygon will sum to 180°. • Bearings are always taken from North and in the clockwise direction. **Link to Prior Learning** Builds on *Angles* from Year 7, Spring 1 **Enquiry Question** Which regular polygon has an exterior angle of 36° ?	**Knowledge Content** **Circles:** explore relationship between circumference and diameter; calculate area and circumference; area and perimeter of composite shapes **Volume of prisms:** use the formulae to calculate the volume of cubes, prims and composite solids; changing between units of volume **Surface area of prisms:** recognising and drawing nets of prisms; use the formulae to calculate the surface area of cubes, prisms and composite solids **Threshold Concepts** • Pi (π) is a fixed number that is the constant ratio between the circumference and diameter of any circle. • The volume of a prism is the area of the cross section multiplied by the length. V = A x L • The surface area is the area of the net of the 3-D shape. **Link to Prior Learning** Builds on *Area of 2-D Shapes* from Year 7, Spring 2 **Enquiry Question** Derive/explain the formula for the surface area of a cylinder.

Ark Blake Academy

Year 9	Probability	Quadratics	Geometry of triangles	Ratio and proportion	Linear simultaneous equations	Reasoning with number
Year 9 acts as the final year in the KS3 mathematics journey. Students will be exposed to what are considered to be the crossover topics in the GCSE syllabus. The Autumn term explores probability in its various representations and quadratic expressions/equations. The spring term will focus on shapes – in particular on triangles. Pythagoras' theorem and trigonometric ratios will be taught in fairly close proximity. Students start the summer term by using their knowledge of algebraic manipulation and equation solving to solve simultaneous equations. The year concludes with students applying their knowledge of number to problem solving and reasoning topics.	**Knowledge Content** **Probability:** FDP review; theoretical and experimental probability; probability of single events; probability of combined events **Sample spaces:** venn diagrams; sample spaces; two way tables; tree diagrams **Threshold Concepts** • Probably can be represented a fraction, decimal or percentage. • Samples spaces represent different ways of interpreting probability problems. **Link to Prior Learning** Builds on previous knowledge of FDP equivalence **Enquiry Question** When calculating with probabilities, is it easier to use the fraction, decimal or percentage?	**Knowledge Content** **Quadratics:** creating quadratic expressions; expanding and factorising binomials; plotting quadratic graphs; solving quadratic equations; completing the square and turning points **Threshold Concepts** • A quadratic expression is a polynomial of degree 2. **Link to Prior Learning** Builds on *Equations and inequalities* from Year 8, Autumn 1 **Enquiry Question** Given a quadratic equation, how would you go about sketching it along with its key features?	**Knowledge Content** **Constructions:** ruler and compass constructions; congruence; loci **Pythagoras' theorem:** use Pythagoras to find missing sides in right-angled triangles; use Pythagoras to solve problems with 3D objects **Threshold Concepts** • The loci is the set of all points, whose location satisfies the given conditions. • If two side lengths of a right-angled triangle are known, the third can always be found. **Link to Prior Learning** Builds on *Constructions* from Year 7, Spring 1 **Enquiry Question** How can we use Pythagoras' theorem to find the distance between two coordinates on a cartesian plane?	**Knowledge Content** **Similar shapes:** review ratio; similar and enlargement; area and volume of similar shapes **Surds and trigonometry:** surds; using trigonometric ratios to find unknown angles and sides; solving problems using trigonometric ratios **Threshold Concepts** • When comparing 3-D objects there are three scale factors to consider: length; area; volume. • A surd is a radical (square root) that cannot be reduced to an integer. **Link to Prior Learning** Builds on *Ratio* from Year 7, Summer 2 **Enquiry Question** How are the scale factors for length, area and volume related to each other?	**Knowledge Content** **Solving graphically:** Setting up simultaneous equations; finding solutions graphically to a set of one or more simultaneous equations **Solving algebraically:** setting up simultaneous equations; using algebraic methods to solve simultaneous equations **Threshold Concepts** • The intersection point of two straight lines is the solution to the simultaneous equations. • To solve algebraically, students can choose to use the elimination method or the substitution method. **Link to Prior Learning** Builds on *Equations and inequalities* from Year 8, Autumn 1 **Enquiry Question** Is it possible to have a pair of simultaneous equations with no solution? If so, give an example.	**Knowledge Content** **Indices:** index notation and rules; fractional and negative indices; comparing and ordering numbers in standard form; calculating in standard form **Growth and decay:** compound percentage change; reverse percentage change; other growth and decay contexts **Threshold Concepts** • The laws of indices apply to numerical indices and also algebraic indices. • A multiplier greater than 1 represents a percentage increase. A multiplier less than 1 represents a percentage decrease. **Link to Prior Learning** Builds on previous knowledge of powers and roots. **Enquiry Question** The price of an item increases by 50% and then decreases by 50%. Is the final price the same, lower or higher than the original price?