DUKE'S
ALDRIDGE ACADEMY

Department Vision - Our vision is to develop students who are fluent in the fundamentals of mathematics, have enthusiasm for learning and a desire to apply this to new contexts. Students will gain in-depth knowledge which they can recall quickly and accurately. Through varied and frequent practice students will reason mathematically, solve problems and apply skills to diverse situations. Students will display their high aspirations, combining independent risk taking with collective curiosity.

	Implementation						
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**	
Year 7	**Algebraic Thinking** The focus of this term is to develop a deep understanding of the basic algebraic forms, with more complex expressions being dealt with later. **1.Sequences** ➢ Move freely between different numerical, algebraic, graphical and diagrammatic representation. ➢ Generate terms of a sequence. **2.Algebraic Notation** ➢ Inverse operation. ➢ Substitute values in expressions. ➢ Produce graphs of linear functions. **3. Equality & Equivalence** ➢ Simplify and manipulate algebraic expressions. ➢ Collect like terms. ➢ Solve linear equations	**Place Value & Proportion** Students will build on the recent work on decimals, the key focus is for students to gain a deep understanding of the links between fractions, decimals and percentages so that they can convert fluently between those most used in real-life. **4. Place Value and Ordering integers & Decimals** ➢ Use place values for decimals, measures and integers of any size. ➢ Order positive and negative integers, DF. ➢ Round numbers. ➢ Standard form. **5. Fractions, Decimals & percentage Equivalence** ➢ Move freely between numerical representation. ➢ Express one quantity as a fraction of another. **6. Solving Problems with Addition & Subtraction**	**Applications of Number** The focus for the first two weeks is to build on the formal methods of addition and subtraction students have developed at KS2. The rest of term is dedicated to the study of multiplication and division, so allowing for the study of forming and solving equations. **6. Solving Problems with Addition & Subtraction** ➢ Inverse operations. ➢ Perimeter. ➢ Frequency tables, bar charts and pictograms. **7. Solving problems with Multiplication & Division** ➢ Factors, multiples, HCF, LCM. ➢ Change freely between related standard units. ➢ Substitute into formulae ➢ Solve linear equations. ➢ Fractions **8.) Fractions & percentages of an amount**	**Directed Number** Students will only have had limited experience of directed number at primary school, so this block is designed to extend and deepen their understanding of this. **9. Operations & Equations with Directed Number** ➢ Inverse operations ➢ use square and square roots ➢ Substitution ➢ vocabulary of expressions, equations, inequalities. ➢ Expressions **10. Addition & Subtraction of Fractions** ➢ express one quantity as a fraction ➢ order positive and negative integers, decimals and fractions ➢ use the symbols =, ≠, , ≤, ≥ ➢ fractions	**Lines & Angles** Students will build on their KS2 skills using rulers, protractors and other measuring equipment to construct and measure increasingly complex diagrams using correct mathematical notation. **11. Constructing Measuring & Geometric Notation** ➢ Use language and properties precisely to analyse 2-D shapes. ➢ line segments and angles. ➢ Pie charts ➢ Identify and construct triangles **12. Developing Geometric Reasoning** ➢ Properties of triangles, quadrilaterals, circles, and other plane figures. ➢ Sum of angles in a triangle and use it to deduce the angle sum in any polygon. ➢ Solving equations.	**Reasoning with Number** Students will review and extend their mental strategies with a focus on using a known fact to find other facts. The skills gained in working with number facts will be extended to known algebraic facts. **14. Sets & Probability** ➢ Record, describe and analyse. ➢ Probabilities ➢ Using tables, grids and Venn diagrams. ➢ FDP equivalence ➢ Solving equations. ➢ Fractions **15. Prime numbers & Proof** ➢ Prime numbers, factors, multiples. ➢ Generate and describe sequences. **13. Developing Number Sense** ➢ The number system and place value. ➢ Reason deductively in number and algebra.	

Year 8						
	Proportional Reasoning This unit focuses initially on the meaning of ratio and the various models that can be used to represent ratios. It moves on to sharing. We also explore the links between ratio and fractions. Students will have had a little experience of multiplying and dividing fractions in year 6; here we seek to deepen understanding. **1.Ratio & Scale** ➢ Use scale factors, scale diagrams and maps. ➢ Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction ➢ Division of a quantity into two parts as a ratio ➢ solve problems involving direct and inverse proportions. **2. Multiplicative Change** ➢ Direct and inverse proportional. ➢ move freely between different numerical, algebraic, graphical and algebraic representations **3. Multiply & Divide Fractions**	**Representations** Building on their knowledge of coordinates from KS2 students will look formally at algebraic rules for straight lines. The focus at this stage is using the equations to produce lines rather than interpretation. **4. Working in the Cartesian Plane** ➢ Move freely between different numerical, algebraic and diagrammatic representations ➢ Develop algebraic and graphical fluency. ➢ substitute ➢ Graphs of linear functions. **5. Representing Data** ➢ Tables, charts and diagrams. ➢ Use language and properties precisely to analyse probability and statistics. **6. Tables & Probability** ➢ Sample space **Algebraic Techniques** **7.Brackets, equations & Inequalities** ➢ identify var ➢ Substitute	**Algebraic Techniques** Building on students understanding of equivalence from year 7, students will explore expanding over a single bracket and factorising. All students will revisit and extend their knowledge of solving equations, now to include those with brackets**.** **7.Brackets, equations & Inequalities** ➢ understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors ➢ understanding and use standard mathematical formulae ➢ use algebraic methods to solve linear equations in one variable. **Developing Number** **10. Fractions & Percentages** ➢ Develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics ➢ Work interchangeably with terminating decimals and their corresponding fractions ➢ Interpret fractions and percentages as operators.	**Algebraic Techniques** The groundwork for simplifying expressions with powers. **9. Indices** **Developing Number** This block focuses on the relationships between fractions and percentages, including decimal equivalents, and using these to work out percentage increase and decrease. **11. Standard Form Index** ➢ use integer powers and associated real. **12. Number Sense** ➢ Use standard unit of mass, length, time, money and other measures. ➢ Round numbers. ➢ Use approximation. **Developing Geometry** **13. Angles in parallel lines & Polygons** ➢ Angles at a point, angles at a point on a straight line, vertically opposite angles. ➢ Sum of angles and polygons. ➢ derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures.	**Developing Number** This block builds on KS2 and Year 7 understanding of angle notation and relationships, extending all students to explore angles in parallel lines and thus solve increasingly complex missing angle problems. Links are then made to the closely connected properties of polygons and quadrilaterals. **Developing Geometry** **14. Area of Trapezia & Circles** ➢ Derive and apply formulae to calculate and solve problems involving perimeter and area of triangles, parallelograms, trapezia. ➢ Calculate and solve problems involving perimeters of 2D shapes (including circles), areas of circles and composite shapes. **15. Line Symmetry** ➢ Describe, sketch and draw using conventional terms and notions. ➢ Identify properties of and describe the results of reflections applied to given figures.	**Reasoning with Number** Much of the statistics content in Key Stage 3 is a continuation of that studied at primary school, and many of the charts and graphs in this block have been used in Year 7 and earlier in Year 8. A particular focus is using charts to compare different distributions. We also explore when graphs may be misleading, an important real-life consideration. **16. The handling Data Cycle** ➢ Mean, mode, median and spread (range, consideration of outliers). ➢ construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data **17. Measures of Location** ➢ Numeracy Activities & Games

Year 9	All pupils begin year 9 by reviewing, recapping and building upon the underlying content from years 7 and 8 with a particular focus on mathematical fluency.: **Higher** - Basic number (decimals, HCF, LCM, negatives). - Fractions and percentages. - Statistical diagrams and averages **Foundation** - Basic number (negatives, place value, order of operation, inequalities, number line) - Geometry, measures and scale drawing. - Statistics (tally charts and frequency tables)	In this module students further develop their understanding of several topics while recapping others. **Higher** - Statistical diagrams and averages - Number and sequences - Ratio and proportion **Foundation** - Statistics – (finding mean, median, range, mode). - Geometry and measures: Angles (Angles at a point, on a straight line, parallel lines, polygons and bearings) - Numbers (factors, multiples, primes, HCK and LCM).	This is a very significant half term in year 9. Students will build on their knowledge of ratio and proportion from years 7&8 along with other key topics such as rounding and approximation. **Higher** - Ratio and proportion - Angles (facts, triangles, angles in a polygon, regular polygons, angles in parallel lines, scale drawings and bearings) **Foundation** - Numbers (squares, square roots, calculator usage) - Numbers (rounding to a given decimal place, significant figure, approximation, calculating with decimals, fractions)	When a major new train line is planned, people often voice objections – from proximity to their village to avoiding areas of natural beauty – so the path traced out for a new rail route has to satisfy specific conditions, such as missing a village or a forest. **Higher** - Transformations, constructions and loci (congruent triangles, rotational symmetry, transformation, loci) **Foundation** - Numbers (convert fractions to decimals, fractions of an amount, add, subtract, multiply and divide fractions) - Algebra (use flow diagrams to draw graphs, find equations of vertical and horizontal lines)	Algebra is the way that the language of mathematics is expressed. Algebra comes from the Arabic al-jabr which means something similar to 'completion'. Mathematics is the only universal language. If you write the equation $3x = 9$, it will be understood by people in all countries. **Higher** - **Algebraic manipulation** (substitution, factorisation, expanding, change subject of a formula) **Foundation** - Algebra (draw linear graphs. $Y = mx + c$, real-life uses of graphs, finding equation of lines, solve simultaneous equations using graphs) - Algebra: Expressions and formulae	End of year assessment	From earliest times, farmers have wanted to know the area of their fields to see how many crops they could grow or animals they could support. One of the oldest units of area used in England was the acre. **Higher** - Length, area and volume (circumference and area of circle, parallelogram, trapezium, sectors, prism, pyramids, cylinders, spheres, cones). **Foundation** - Algebra: Expressions and formulae. - Ratio and proportion
Assessments - Students will be given an assessment at the end of every chapter. Students are expected to complete two assessments each half term.				Homework - One piece of homework given each week (Mathswatch task, past paper questions, worksheets)			

	Autumn 1	Autumn 2		Spring 1	Spring 2	Summer 1	Summer 2	
Year 10	At the start of year 10 students will review three key areas and build upon ratio and algebra. **Higher** – Algebra and Length, area, volume **Foundation** – Algebra **Higher** - Linear graphs (draw linear graphs, gradient, equation of line, solve simultaneous equations using graphs) **Foundation** - Ratio and proportion and rates of change: Ratio, speed and proportion - Geometry and measures (rectangles, compound shapes, area of triangles)	Students will be introduced to how they can use Pythagoras' rule and trigonometric functions to solve a variety of problems involving right-angled triangles. **Higher** - Right- angled triangles (use Pythagoras' theorem to find missing lengths, use trigonometric ratios to find lengths and angles, angles of elevation and depression). **Foundation** - Geometry and measures (area of trapezium, parts of a circle, area and circumference of circles) - Geometry and measures: Transformations	Assessment	**Higher** - Similar shapes (find scale factor for two similar shapes, work out lengths of sides in similar shapes, work out areas and volumes of similar shapes). - Exploring and applying probability (work out the probabilities, recognise mutually exclusive, exhaustive and complementary outcomes, use Venn diagrams). - Review sequences - Indices (introduction to indices) **Foundation** - Probability: Probability and events - Review Numbers (factors, multiples, primes, HCF, LCM). - Geometry and measures (Volume and surface area of prisms).	**Higher** - Indices (calculate using powers, write numbers in standard form, calculate with standard form) - Equations and inequalities (linear equations, simultaneous equations, inequality, number line, region on a graph). - **Foundation** - Geometry and measures (volume and surface area of cylinders) - Algebra: Linear equations (linear equations, set up linear equations from real-life problems) - Ratio and proportion and rates of change: Percentages and compound measures	Percentages are used a lot in everyday life. Banks lend money but will charge you a percentage of the loan. Governments use percentages to explain what is happening in the country. For example, 'unemployment and the cost of living. Understanding percentages will help you make the right choices about loans, buying houses and many other aspects of your life in the future. **Higher** - Equations and inequalities (graphical inequality) - Counting, accuracy, powers and surds (reciprocal, recurring decimals, estimate powers and roots, negative and fractional powers, surds, error interval, limits of accuracy, product rule for counting). **Foundation** - Ratio and proportion and rates of change: Percentages and compound measures - Ratio and proportion and rates of change: Percentages and variation	This term we extend statistical representation by introducing pie charts and scatter diagrams. Students will learn ways of writing numbers accurately and how to manipulate numbers written this way. **Higher** - Counting, accuracy, powers and surds (surds, error interval, limits of accuracy, product rule for counting). - Revision. **Foundation** - Ratio and proportion and rates of change: Percentages and variation. - Statistics presentation and interpretation. - Revision	End of year Mocks
	Assessments - Students will be given an assessment at the end of every chapter. Students are expected to complete two assessments each half term.				Homework - One piece of homework given each week (Mathswatch task, past paper questions, worksheets)			

	Autumn 1	Autumn 2		Spring 1		Spring 2	Summer 1	Summer 2
Year 11	At the start of year 11 students will review four key areas. 1. Equations and Inequalities. 2. Counting, accuracy, powers and surds. 3. Percentage and compound measures. 4. Ratio, proportion and rates of change. **Higher** ➢ Quadratic equations. ➢ Sampling and more complex diagrams. ➢ Combined events. **Foundation** ➢ Statistics: Representation and interpretation ➢ Geometry and measures: Constructions and loci. ➢ Geometry and measures: Curved shapes and pyramids. ➢ Algebra: Number and sequences.	During this term, students will dedicate two weeks to focusing on their mock examinations across all subjects. Following this, the Maths team will analyse the Question Level Analyses (QLAs) to identify areas requiring improvement and subsequently plan and reteach key topics. Addressing learning gaps is an integral part of the Maths team's daily, weekly, and termly practices. **Higher** ➢ Combined events. ➢ Properties of circles. ➢ Variation ➢ Triangles **Foundation** ➢ Geometry and measures: Right-angled triangles. ➢ Geometry and measures: Congruency and similarity. ➢ Probability: Combined events.	Year 11 Mock 1	All students complete their GCSE curriculum this term and are focussing on consolidating their mathematical fluency and developing their ability to problem solve and tackle applied questions. **Higher** ➢ Graphs ➢ Algebraic fractions and functions. ➢ Vector geometry **Foundation** ➢ Number: Powers and standard form. ➢ Algebra: Simultaneous equations and linear inequalities. ➢ Algebra: Non-linear graphs.	Year 11 Mock 2	Revision – Dukes 16 weeks plan	Revision – Dukes 16 weeks plan	
	Students will be given a Mini Mock assessment every two weeks focussing on topics covered and GCSE past papers. Teachers will collect the data, analyse, plan a reteach lesson to close the gaps and give students a retest.							