Curriculum Information

Mathematics

Acting Head of Faculty: Mr B Millington

Mathematics Faculty

Intent

It is the intention of the Mathematics faculty to provide a sound knowledge base of key numeracy and problem solving skills to ensure that students are fully prepared to deal with a literal and numerical modern West Midlands society. The faculty follow the guidance provided by the National Curriculum to ensure that students are equipped with the identified skills needed for the future.

Our lessons will ensure that literacy will be taught to the students so they understand key terms and their meanings, which will help to articulate their understanding in problem solving scenarios. Using the Pixl theme of LORIC, we will be able to show development in organisation by teaching students the importance of showing appropriate working out, and on them being able to select the correct mathematical equipment for a task. Their resilience and independence will be developing by the reassessing of knowledge learnt over time and the requirement of continual practice through the homework we set and use of learning apps provided by the faculty. Student communication will also be developed by them being encouraged to discuss the Mathematics they are studying with each other, using the correct terminology and vocabulary necessary for the skill they are learning.

Mathematics affects many things that students will access in their future lives – the Maths Faculty at Oldbury Academy aim to provide the key skills needed to earn and provide for themselves in the future.

Assessment in Mathematics

Pupils are in set ability groups based on their KS2 baseline scores, where the main skills of Mathematics are covered using a 3 tier approach:

- **Pi** (Knowledge and skills that can be scaffolded to support those struggling with core content)

- **Theta** (Knowledge and skills that all students should aspire to achieve)
- **Delta** (Knowledge and skills that can deepen and stretch able learners)

Students sit a unit of work based around a "big idea". Due to Mathematics being a spiral curriculum, skills are built and developed over a 5 year period – using retrieval based activities and interleaving big ideas to ensure a wide and broad curriculum/set of skills that students build on over the time period.

At the end of each unit, students are assessed based on topics taught – with a lesson devoted to improvement and reflection time (DIRT) where students can learn their misconceptions and how to improve. These units produce an average working at grade for the end of the year. A main end of year assessment is then used to produce progress since the start of a year.

The setting in Mathematics is fluid, meaning students can move between groups to obtain a targeted curriculum to ensure they can access Foundation or Higher content at any point in their journey.

At the end of Year 9, students will sit a GCSE baseline assessment, which enables the faculty to stream sets further and target Foundation or Higher entries. Again, these can be adjusted as late as Christmas of Year 11 so students can aspire to do even better than they expect.

Mock Exams at the end of Year 10, Christmas and Easter of Year 11 enable the faculty to accurately predict outcomes for students and to set relevant interventions for them at different times in their curriculum journey.

Literacy and LORIC In Mathematics

Part of our curriculum intent in Mathematics is to ensure that students are prepared for a literal and numerical life in a West Midlands Society. We aim to do this through the sharing of key Tier 2 and Tier 3 vocabulary at the start of lessons via a verbal repetition exercise designed by our Literacy Champion – Miss Woodward. Students will be taught the definition of the term(s) in question. Throughout a unit, students will be encouraged to use the correct vocabulary – using Freyer Models to represent crucial subject specific vocabulary, which will result in a wordsearch task at the end of a unit – where students will be expected to write an example problem using the taught vocabulary.

In Mathematics, we aim to promote our school theme of LORIC by ensuring students take responsibility for their learning; to be organised in the way they show calculations; to not give up on mastering a new skill when things go wrong. We try to encourage and train initiative through our use of problem solving tasks in lessons – getting students to think "outside the box" when dealing with multi step problems. One of Mathematics' greatest strengths at OA is to get students to speak about Mathematics – to explain how to solve a problem using Tier 2 and Tier 3 vocabulary.

The Maths Curriculum at OA

Our curriculum is based on the key elements of mathematics in the 2014 National curriculum which we call the "Big Ideas":

Number

Algebra

Ratio, proportion and rates of change

Geometry and measures

Probability

Statistics

Throughout KS3 we endeavour to cover all aspects of these elements to solidify the knowledge that pupils will need in order to access the curriculum in KS4. Our KS3 curriculum builds upon the 2014 National Curriculum and deepens their knowledge throughout the course. This allows us to create confident and numerate students able to progress to KS4 and beyond. The fundamental idea behind our curriculum design is to support pupils to be able to perform simpler tasks so they can then move on to perform more complex tasks. For example, we cannot expect pupils to add two numbers together before they understand what each individual number represents.

This thinking gives rise to a typical sequence of 'blocks' of mathematics that you will see in most of our year groups. Within each of these blocks we then have 'small steps' which are again sequenced in order of difficulty and dependency. Our curriculum is designed to use skills that have already been learnt in different contexts (sometimes called 'interleaving') whenever we can. This helps pupils to remember and to make connections between different parts of the curriculum.

Work is taught in short units or blocks and at the end of each block there is an assessment and students are given feedback on the skills that have achieved.

A 5 Year Journey to a Grade 5

The table below shows the typical pathway that a student being able to access Core objectives in Year 7 and Year 8 will progress to being able to sit a Foundation Tier GCSE.

Big ideas are colour coordinated to show that all ideas are built on and strengthened over the 5 year period:

Number   Shape   Data   Algebra   Probability   Graphs   Ratio

	Year 7	Year 8	Year 9	Year 10	Year 11
Autumn	Number Skills *Mental Maths, BIDMAS, Four Operations, FINANCE: Time & Money, Negative Numbers, Factors Multiples & Primes, HCF & LCM by Listing, Square & Triangle Numbers*	Number *Calculations, Calculations with Negative Integers, Powers & Roots, Powers Roots & Brackets, Index Notation, Prime Factor Decomposition, HCF & LCM by Prime Factors*	Number *Calculations & Order of Operations, Rounding to Decimal Places, Multiplying & Dividing Decimal Numbers, Rounding to Significant Figures & Estimating,* *Factors Multiples & Primes, HCF & LCM by Listing, Squares Cubes & Roots, Index Notation & Laws of Indices, Prime Factor Decomposition, HCF & LCM by Prime Factors*	Graphs *Coordinates & Midpoints, Linear Graphs, Gradient, y=mx+c, Real-Life Graphs, Distance-Time Graphs & Rates of Change, More Real-Life Graphs*	Fractions, Indices & Standard Form *Multiplying & Dividing Mixed Numbers, Negative Indices, Standard Form*
	Analysing & Displaying Data *Mode, Median, Range, Displaying Data, Grouping Data, Comparing Data: Mean & Range, Line Graphs & More Bar Charts, Using Spreadsheets*	Area and Volume *Area of Triangles, Parallelogram & Trapezia, Volume of Cubes & Cuboids, 3D Shapes: Nets and Plans & Elevations, Surface Area of Cubes & Cuboids, Problems & Measures*		Transformations *Translation, Reflection, Rotation, Enlargement, Describing Enlargements, Combining Transformations*	Congruence, Similarity & Vectors *Using Similarity, Congruent Triangles, Using Congruence, Vectors*
	Expressions Functions Formulae *Functions, Simplifying Expressions, Expanding Brackets, Writing Expressions, STEM: Substituting into Formulae, Writing Formulae*	Statistics, Graphs & Charts *Pie Charts, Using Tables (Frequency Tables, Mean & Two-Way Tables), Stem & Leaf Diagrams, Comparing Data, Scatter Graphs, FINANCE: Misleading Graphs*	Algebra *Algebraic Notation, Writing Expressions, Simplifying Expressions, Substitution, Expanding Brackets, Factorising Expressions, Using Expressions & Formulae*	Ratio & Proportion *Writing Ratios, Simplifying Ratios, Ratios & Measures, Sharing in a Given Ratio, Comparing Using Ratios (Ratios & Fractions and Unit Ratios), Using Proportion (Unitary Method & Best Buys), Proportion & Graphs, Proportion Problems (Inverse Proportion)*	More Algebra *Graphs of Cubic & Reciprocal Functions, Non-Linear Graphs, Simultaneous Equations Graphically & Algebraically, Rearranging Formulae, Proof*
	Decimals & Measures *Ordering & Rounding, Length Mass & Capacity, Scales & Coordinates, Working with Decimals inc. Mentally, Perimeter, Area, STEM: More Units*	Expressions & Equations *Algebraic Powers, Expressions & Brackets, Factorising Expressions, One-Step Equations, Two-Step Equations, Equations with an Unknown on Both Sides*			
Spring Term	Fractions *Comparing, Simplifying, Adding & Subtracting, Fractions of Amounts, Fractions & Decimals, Understanding Percentages, Percentages of Amounts*	Real-Life Graphs *Conversion Graphs, Distance-Time Graphs, Line Graphs, Complex Line Graphs, STEM: Graphs of Functions, More Real-Life Graphs: Linear & Non-Linear*	Graphs, Tables & Charts *Frequency Tables, Two-Way Tables, Representing Data, Time Series, Stem & Leaf Diagrams, Pie Charts, Scatter Graphs, Line of Best Fit*	Right-Angled Triangles *Pythagoras' Theorem, Trigonometry: Sine, Cosine & Tangent Ratios, Finding Lengths and Angles Using Trigonometry, Exact Values of Sine, Cosine & Tangent*	*Bespoke sequence of lessons based on needs of the class*

	Probability *Language of Probability, Probability Scale, Outcomes, Calculating Probabilities, Experimental Probability, FINANCE: Expected Outcomes*	**Decimals & Ratio** *Ordering & Rounding, Place Value Calculations, Adding Subtracting Multiplying & Dividing by Decimals, Ratio & Proportion with Decimals, STEM: Using Ratios*	**Fractions & Percentages** *Comparing Fractions, Fractions of Amounts, Adding & Subtracting Fractions & Mixed Numbers, Multiplying Fractions, Dividing Fractions, Fractions & Decimals, Fractions & Percentages, Calculating Percentages*	**Probability** *Calculating Probability, Two Events (Sample Space Diagrams), Experimental Probability, Venn Diagrams, Tree Diagrams: Independent & Dependent Events*	
	Ratio & Proportion *Direct Proportion, Unitary Method, Writing Ratios, Simplifying Ratios, Sharing in a Given Ratio, Scale & Measures, Proportions & Fractions, Proportions & Percentages*	**Lines & Angles** *Quadrilaterals: Properties & Angles, Alternate Angles & Proof, Geometrical Problems inc. Corresponding Angles, Angles in Polygons, Solving Geometric Problems*	**Equations, Inequalities & Sequences** *Solving Equations, Inequalities, Substituting into Formulae, Rearranging Formulae, Generating Sequences, Nth Term*	**Multiplicative Reasoning** *Reverse Percentages, Percentage Change, Compound Interest & Depreciation, Compound Measures (Speed, Density & Pressure), Direct & Inverse Proportion*	
Summer Term	**Lines & Angles** *Lines Angles & Triangles, Estimating Measuring & Drawing Angles, Drawing Triangles Accurately, STEM: Calculating Angles, Angles in Triangles, Quadrilaterals*	**Calculating with Fractions** *Adding & Subtracting Fractions, Multiplying Fractions, Fractions Decimals & Reciprocals, Dividing Fractions, Four Operations with Mixed Numbers*	**Angles** *Properties of Shapes: Similarity & Congruence, Angles in Parallel Lines, Angles in Triangles, Angles in Polygons, Geometrical Problems*	**Constructions, Loci, Bearings** *Properties of 3D Solids, Plans & Elevations, Accurate Drawings, Scale Drawings & Maps, Constructions, Loci & Regions, Bearings*	*Bespoke sequence of lessons based on needs of the class*
	Sequences & Graphs *Sequences, Pattern Sequences, Coordinates & Midpoints, Extending Sequences, Linear Graphs, Position-to-Term Rules*	**Straight-Line Graphs** *Direct Proportion on Graphs, Linear Graphs & Gradient, Midpoints, y=mx+c, STEM: Direct Proportion Problems*	**Averages & Range** *Mean & Range, Mode Median & Range, Types of Average, Median & Modal Class, Estimating the Mean & Range, Sampling*	**Quadratic Equations & Graphs** *Expanding Double Brackets, Plotting & Using Quadratic Graphs, Factorising Quadratics, Solving Quadratic Equations Algebraically*	
	Transformations *Congruent Shapes & Enlargements, Symmetry, Reflection, Rotation, Translations & Combined Transformations*	**Fractions Decimals Percentages** *Fraction & Decimals, Equivalent Proportions, Writing Percentages, Increase/Decrease by a Percentage, Simple Interest, Reverse Percentages, FINANCE: Solving Problems*	**Perimeter, Area & Volume 1** *Rectangles Parallelograms & Triangles, Trapezia & Changing Units, Area of Compound Shapes, Surface Area of Cuboids & Prisms, Volume of Prisms, More Measures*	**Perimeter, Area & Volume 2** *Circumference of Circles, Area of Circles Semi-Circles & Sectors, Composite 2D Shapes & Cylinders, Pyramids & Cones, Spheres & Composite Solids*	

A 5 Year Journey to a Grade 9

The table below shows the typical pathway that a student being able to access Core objectives in Year 7 and Year 8 will progress to being able to sit a Higher Tier GCSE.

Big ideas are colour coordinated to show that all ideas are built on and strengthened over the 5 year period:

Number   Shape   Data   Algebra   Probability   Graphs   Ratio

	Year 7	Year 8	Year 9	Year 10	Year 11
Autumn Term	Analysing & Displaying Data *Mode, Median, Range, Displaying Data, Grouping Data, Comparing Data: Mean & Range, Line Graphs & More Bar Charts, Using Spreadsheets*	Number *Calculations, Calculations with Negative Integers, Powers & Roots, Powers Roots & Brackets, Index Notation, Prime Factor Decomposition, HCF & LCM by Prime Factors*	Number *Product Rule for Counting, Rounding to Significant Figures & Estimating, Estimating Powers & Roots, Prime Factor Decomposition, Highest Common Factor & Lowest Common* *Multiple by Prime Factors, Calculating with Powers & Roots, Laws of Indices, Negative & Fractional Indices, Standard Form, Surds*	Equations & Inequalities *Quadratic Equations, Completing the Square, Linear Simultaneous Equations, Linear & Quadratic Simultaneous Equations, Linear Inequalities*	Vectors & Geometric Proof *Vectors & Vector Notation, Vector Arithmetic, Parallel Vectors & Collinear Points, Geometric Problems*
	Number Skills *Mental Maths, BIDMAS, Four Operations, FINANCE: Time & Money, Negative Numbers, Factors Multiples & Primes, HCF & LCM by Listing, Square & Triangle Numbers*	Area and Volume *Area of Triangles, Parallelogram & Trapezia, Volume of Cubes & Cuboids, 3D Shapes: Nets and Plans & Elevations, Surface Area of Cubes & Cuboids, Problems & Measures*		Probability *Combined Events (Product Rule & Sample Space Diagrams), Mutually Exclusive Events, Experimental Probability, Independent Events & Tree Diagrams, Conditional Probability, Venn Diagrams & Set Notation*	
	Expressions Functions Formulae *Functions, Simplifying Expressions, Expanding Brackets, Writing Expressions, STEM: Substituting into Formulae, Writing Formulae*	Statistics, Graphs & Charts *Pie Charts, Using Tables (Frequency Tables, Mean & Two-Way Tables), Stem & Leaf Diagrams, Comparing Data, Scatter Graphs, FINANCE: Misleading Graphs*	Algebra *Algebraic Indices, Expanding & Factorising Expressions, Identities, Solving Equations Involving Brackets & Numerical Fractions, Forming & Solving Equations, Substituting into*	Multiplicative Reasoning *Compound Interest & Depreciation, Compound Measures: Speed, Density, Pressure, Using Kinematics Formulae, Direct & Inverse Proportion*	Proportion & Graphs *Direct & Inverse Proportion, Exponential Functions, Non-Linear Graphs (Gradients of Tangents & Chords and Area Under a Graph),*
	Decimals & Measures *Ordering & Rounding, Length Mass & Capacity, Scales & Coordinates, Working with Decimals inc. Mentally, Perimeter, Area, STEM: More Units*	Expressions & Equations *Algebraic Powers, Expressions & Brackets, Factorising Expressions, One-Step Equations, Two-Step Equations, Equations with an Unknown on Both Sides*	Formulae, *Rearranging Formulae, Linear Sequences, Non-Linear & Quadratic Sequences, Expanding Double Brackets, Factorising Quadratic Expressions*		*Translating Reflecting & Stretching Graphs*
Spring Term	Fractions *Comparing, Simplifying, Adding & Subtracting, Fractions of Amounts, Fractions & Decimals, Understanding Percentages, Percentages of Amounts*	Real-Life Graphs *Conversion Graphs, Distance-Time Graphs, Line Graphs, Complex Line Graphs, STEM: Graphs of Functions, More Real-Life Graphs: Linear & Non-Linear*	Interpreting & Representing Data *Stem & Leaf, Frequency Polygons, Pie Charts, Time Series, Scatter Graphs, Line of Best Fit, Averages & Range, Two-Way Tables, Appropriate Diagrams, Misleading Graphs*	Similarity & Congruence *Congruent Triangles, Geometric Proof & Congruence, Conditions of Similarity, Similarity: Missing Lengths, Similarity: Area, Similarity in 3D Solids*	*Bespoke sequence of lessons based on needs of the class*
	Probability	Decimals & Ratio	Fractions Ratio & Proportion	More Trigonometry	

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	Language of Probability, Probability Scale, Outcomes, Calculating Probabilities, Experimental Probability, FINANCE: Expected Outcomes	*Ordering & Rounding, Place Value Calculations, Adding Subtracting Multiplying & Dividing by Decimals, Ratio & Proportion with Decimals, STEM: Using Ratios*	*Fractions, Ratio, Ratio & Proportion, Percentages (Simple Interest, Percentage Change & Reverse Percentages), FDP, Recurring Decimals to Fractions*	*Accuracy (Bounds), Trigonometric Graphs, Area of Triangle & Sine Rule, Cosine Rule & 2D Problems, Solving Problems in 3D, Transforming Trigonometric Graphs*	
	Ratio & Proportion *Direct Proportion, Unitary Method, Writing Ratios, Simplifying Ratios, Sharing in a Given Ratio, Scale & Measures, Proportions & Fractions, Proportions & Percentages*	**Lines & Angles** *Quadrilaterals: Properties & Angles, Alternate Angles & Proof, Geometrical Problems inc. Corresponding Angles, Angles in Polygons, Solving Geometric Problems*	**Angles & Trigonometry** *Angles in Triangles & Quadrilaterals, Angles in Polygons, Pythagoras' Theorem, Trigonometry*	**Further Statistics** *Sampling, Cumulative Frequency, Boxplots, Histograms, Comparing & Describing Populations*	
Summer Term	**Lines & Angles** *Lines Angles & Triangles, Estimating Measuring & Drawing Angles, Drawing Triangles Accurately, STEM: Calculating Angles, Angles in Triangles, Quadrilaterals*	**Calculating with Fractions** *Adding & Subtracting Fractions, Multiplying Fractions, Fractions Decimals & Reciprocals, Dividing Fractions, Four Operations with Mixed Numbers*	**Graphs** *Linear Graphs, Distance-Time Graphs & Velocity-Time Graphs, Real-Life Graphs, Line Segments (Midpoints, Gradient & Equations of Parallel & Perpendicular Lines), Quadratic Cubic & Reciprocal Graphs*	**Equations & Graphs** *Simultaneous Equations Graphically, Inequalities Graphically, Graphs of Quadratic & Cubic Functions, Quadratic & Cubic Equations Graphically, Iteration, Quadratic Inequalities*	*Bespoke sequence of lessons based on needs of the class*
	Sequences & Graphs *Sequences, Pattern Sequences, Coordinates & Midpoints, Extending Sequences, Linear Graphs, Position-to-Term Rules*	**Straight-Line Graphs** *Direct Proportion on Graphs, Linear Graphs & Gradient, Midpoints, y=mx+c, STEM: Direct Proportion Problems*	**Area & Volume** *Compound Shapes & Trapezia, Units & Accuracy (Error Intervals & Bounds), Prisms, Circles, Sectors of Circles, Cylinders & Spheres, Pyramids & Cones*	**Circle Theorems** *Radii & Chords, Tangents, Angles in Circles, Applying Circle Theorems*	
	Transformations *Congruent Shapes & Enlargements, Symmetry, Reflection, Rotation, Translations & Combined Transformations*	**Fractions Decimals Percentages** *Fraction & Decimals, Equivalent Proportions, Writing Percentages, Increase/Decrease by a Percentage, Simple Interest, Reverse Percentages, FINANCE: Solving Problems*	**Transformations & Constructions** *Plans & Elevations, Reflection & Rotation, Enlargement, Translations & Combinations of Transformations, Bearings & Scale Drawings, c o n structions, Loci*	**More Algebra** *Rearranging Difficult Formulae, Algebraic Fractions, Simplifying Algebraic Fractions, Surds, Solving Algebraic Fraction Equations, Functions, Algebraic Proof*	