



Mathematics

Subject Intent

The intent of our mathematics curriculum is to design a curriculum, which is accessible to all and will maximise the development of every child's ability and academic achievement. We deliver lessons that are creative and engaging. We want children to make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. We intend for our pupils to be able to apply their mathematical knowledge to science and other subjects. We want children to realise that mathematics has been developed over centuries, providing the solution to some of history's most intriguing problems. We want them to know that it is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. As our pupil's progress, we intend for our pupils to be able to understand the world, have the ability to reason mathematically, have an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

Core Principles

- **Dignity**

All students have a right to express themselves in a non-judgmental, safe environment in which they feel their aspirations are valued. It is essential that they are supported by our scheme of learning for what they want to achieve. Maths isn't just in the classroom but it is evident in the real world as we building on student's strengths, prior knowledge, and interests will then engage and motivate them as these young people develop the 21st century skills.

- **Respect**

Values such as respect, tolerance of other opinions and positive criticism are embedded in Maths. An underpinning drive to develop students who are resilient, determined and respectful creates a positive set of values to apply to all areas of life and help develop student's character.

- **Wisdom**

The teaching of mathematics helps and enables students to be able to reach their own convictions, as it teaches them that to solve a problem must reach the truth, which there is no doubt because it is objective and logical. Pupils must be encouraged to make connections and develop an inquisitiveness in mathematics learning

- **Knowledge**

Within mathematics, there are rich opportunities for links among different concepts through our 7 year scheme of learning. When children and young people investigate number processes, there will be regular opportunities to develop mental strategies and mental agility. Teachers will make use of opportunities to develop algebraic thinking and introduce symbols. There are many opportunities to develop or deepen mathematical concepts in all other areas of the curriculum to equip students for the 21st century

- **Skills**

Maths helps us think analytically and have better reasoning abilities. Analytical thinking refers to the ability to think critically about the world around us. The skills that you use in framing the problem, identifying the knowns and unknowns, and taking steps to solve the problem can be a very important strategy that can be applied to other problems in life

- **Aspirations**

Throughout the department, our corridors display inspirational messages to immerse every pupil, staff member and visitor in an aspirational environment.! We believe all children have the wish to achieve and we enable this to happen through carefully planned lessons which draw attention to mathematical representations, detail carefully constructed questions and allow time for whole class discussions and encouraging students to set goals which are challenging them. Passion is contagious. Teachers want mathematics to ignite the excitement of learning in their students.

- **Hope**

The mathematics curriculum promotes the British values of tolerance and resilience on a daily basis through problem solving and understanding of complex concepts, encouraging students to persevere and try different methods to arrive at a correct solution. Students are encouraged to builds on and learn from their mistakes in maths lessons.

Key Stage 3 Programme of Study: Mathematics						
Terms	Year 7	Map	Year 8	Map	Year 9	Map
1	Solve word problems (add and subtract) Support Number bonds Convert units Metric Money +/- Measurement Core Place value (including decimals) Add and subtract (including decimals) Estimation Perimeter Word problems Extension Different Counting systems or bases Generalisation Upper and	W	Number Support Factors, multiples and primes Fraction equivalence and calculations \times/\div Bar modelling with factions and problems Fraction +/- Negative numbers Core Primes and indices Prime factorisation to find LCM, HCF, squares, cubes Venn diagrams Enumerating sets Venn diagram set notation Fraction \times/\div \times/\div by powers of 10 Extension Egyptian fractions Continued fractions HCF and LCM generalisation		Graphs and Proportion Support Read scales (MW under number) Linear equations Proportion Percentage increase and decrease Powers of 10 and standard form Review estimation Core Cartesian coordinates Linear graphs Direct and inverse proportion Calculate with scales Standard form Percentage review from year 8 Extension 3-D coordinates Explore linear and non-linear graphs Surds	

	lower bounds			
2	<p>Explain and investigate (multiply and divide)</p> <p>Support</p> <p>Mental strategies</p> <p>Multiplication facts</p> <p>Multiplication strategies</p> <p>Solve number problems</p> <p>Average: Division and the mean</p> <p>Core</p> <p>Factors, HCF, multiples, LCM</p> <p>Multiply and divide (including decimals)</p> <p>Area of rectangle and triangle</p> <p>Calculate the mean</p> <p>Extension</p> <p>Shikaku puzzles (sudoku type puzzles)</p> <p>Different counting systems or bases</p> <p>Alternative methods of multiplication</p> <p>Generalisation</p>	<p>Algebraic Expressions</p> <p>Support</p> <p>Problem solving with fractions</p> <p>Order of operations</p> <p>Form algebraic expressions</p> <p>Substitution</p> <p>Substitution with negatives</p> <p>Core</p> <p>Negative numbers and inequality statements</p> <p>Formulate and evaluate expressions</p> <p>Linear equations</p> <p>Expressions and equations from real-world situations</p> <p>Linear sequences: nth term</p> <p>Extension</p> <p>Explore non-linear sequences</p> <p>T-totals- Investigation</p> <p>http://www.markedbyteachers.com/gcse/maths/t-totals.html</p> <p>https://www.youtube.com/watch?v=1v5BHn78Bak</p>	<p>Algebra Expressions</p> <p>Support</p> <p>Make expressions</p> <p>Expressions and area</p> <p>Substitution</p> <p>Powers and roots</p> <p>Problem solving with a calculator</p> <p>Core</p> <p>Sequences including arithmetic and geometric</p> <p>Algebraic manipulation</p> <p>Change the subject of a formula</p> <p>Expansion</p> <p>Factorisation</p> <p>Extension</p> <p>Algebraic proof</p> <p>Quadratic sequences</p>	
3	<p>Geometry Reasoning</p> <p>Support</p> <p>Lengths and units Metric and imperial</p> <p>Parallel and perpendicular</p> <p>Work with angles</p> <p>Core</p> <p>Draw, measure and name acute and obtuse angles</p> <p>Find unknown angles (straight lines, at a point, vertically opposite)</p>	<p>2-D Geometry</p> <p>Support</p> <p>Angle types</p> <p>Angle facts</p> <p>Problem solving with negative numbers</p> <p>Review multiplication and using a calculator</p> <p>Core</p> <p>Construction: Draw accurate triangles and quadrilaterals (ruler, protractor, compasses)</p> <p>Find unknown angles (including parallel lines)</p> <p>Conversion between length units and between area units</p> <p>Areas and perimeters of composite figures</p>	<p>2-D Geometry</p> <p>Support</p> <p>Area and circumference</p> <p>Angles on lines and in triangles</p> <p>Angles in parallel lines</p> <p>Core</p> <p>Construction and loci</p> <p>Triangles and quadrilaterals (angles on diagonals)</p> <p>Congruence and similarity</p> <p>Angles in polygons</p> <p>Use known angle and shape facts to obtain simple proofs</p>	

	<p>Rigid shapes Properties of triangles and quadrilaterals</p> <p>Extension</p> <p>Tessellating triangles and quadrilaterals</p> <p>Tangram investigations</p> <p>Rigid shapes</p>		<p>Areas of parallelograms and trapeziums</p> <p>Extension</p> <p>Similarity and ratio</p> <p>Complex constructions</p> <p>Simple angle proofs</p>		<p>Extension</p> <p>Geometrical proof</p> <p>Euclidean geometry</p> <p>Complex constructions</p>
4	<p>Fractions Arithmetic</p> <p>Support</p> <p>Equal parts</p> <p>Factors and multiples</p> <p>Tenths and hundredths</p> <p>Word problems</p> <p>Fractional areas</p> <p>Core</p> <p>Negative numbers</p> <p>Equivalent fractions</p> <p>Compare and order fractions and decimals</p> <p>Change mixed numbers to improper fractions and vice versa</p> <p>Fraction of a quantity</p> <p>Multiply and divide fractions</p> <p>Extension</p> <p>Terminating and recurring decimals</p> <p>Fractions of tangrams</p> <p>Shape block challenges (investigation)</p>		<p>Proportional reasoning</p> <p>Support</p> <p>FDP equivalence</p> <p>Percentage increase and decrease</p> <p>Ratio and rate</p> <p>Core</p> <p>Convert between percentages, vulgar fractions and decimals</p> <p>Percentage increase and decrease, finding the whole given the part and the percentage</p> <p>Ratio (equivalent, of a quantity) and rate</p> <p>Speed, distance, time</p> <p>Extension</p> <p>Density</p> <p>Area scale factors</p> <p>Loan repayment</p> <p>Percentage errors</p>		<p>Equations and inequalities</p> <p>Support</p> <p>Linear graphs</p> <p>Sequences</p> <p>Manipulate formulae</p> <p>Problem solving with algebra</p> <p>Core</p> <p>Construct and solve equations and inequalities</p> <p>Graphical solutions to simultaneous linear equations</p> <p>Quadratic and other graphs</p> <p>Extension</p> <p>Regions on graphs</p> <p>Linear programming</p> <p>Modelling</p>
5	<p>Applications of algebra</p> <p>Support</p> <p>Areas of rectangles and triangles</p> <p>Number patterns</p> <p>Algebraic notation</p> <p>Triangle and quadrilateral properties</p>		<p>3-D Geometry</p> <p>Support</p> <p>Rectilinear areas</p> <p>Rectangle and triangle areas</p> <p>Rounding</p> <p>Calculator skills and rounding</p>		<p>Geometry</p> <p>Support</p> <p>Compound areas</p> <p>FDP conversion</p> <p>Averages and the range</p> <p>Fraction review</p>

	<p>Core</p> <p>Order of operations Substitution Simplify algebraic expressions Solve word problems with expressions Sequences (term-to- term, not nth term)</p> <p>Extension</p> <p>Four fours Patterns and generalising Algebraic mean questions</p>		<p>Core</p> <p>Rounding, significant figures and estimation Circumference and area of a circle Review Area of composite shapes. Review Area of a trapezium, parallelogram</p> <p>Extension</p> <p>Platonic solids Plans and elevations</p>		<p>Core</p> <p>Pythagoras' theorem Exploring trigonometry with a 30-60-90 triangle Transformations (translation, rotation, reflection)</p> <p>Extension</p> <p>Further trigonometry Multiple transformations 3-D Pythagoras</p>	
6	<p>Percentages and statistics</p> <p>Support</p> <p>Decimals and problem solving Fractions of shapes Equivalence Order of operations</p> <p>Core</p> <p>Construct and interpret statistical diagrams including pie charts Convert between percentages, vulgar fractions and decimals Percentage of a quantity Find the whole, given the part and the percentage</p> <p>Extension</p> <p>Comparing and converting between representations Applications of percentages</p>		<p>Statistics</p> <p>Support</p> <p>Simple Statistical diagrams The mean 3d shapes Simple volume</p> <p>Core</p> <p>Collect and organise data Interpret and compare statistical representations Mean, median and mode averages The range and outlier Visualise and identify 3-D shapes and their nets Volume of cuboid/prism/ cylinder, composite solids</p> <p>Extension</p> <p>Misleading graphs Equal width histograms Sampling methods</p>		<p>Statistics</p> <p>Support</p> <p>Venn diagrams and two-way tables Number problems with fractions and decimals Problem solving with algebra</p> <p>Core</p> <p>Probability Mean of grouped data Compare two data sets Stem-and-leaf diagrams Scatter graphs Pie charts</p> <p>Extension</p> <p>Probability problems Equations of lines of best fit</p>	

Key Stage 4 Programme of Study- Mathematics

Terms	Year 10	Map	Year 11	Map
1	<p>Number Support Calculate with fractions Convert and solve problems with fractions and percentages Indices</p> <p>Core Calculations with standard form Compound interest Growth and decay Standard non-linear sequences Calculations with and rules of indices</p> <p>Extension Recurrence relations Surds Recurring decimals Fractional indices Quadratic sequences</p>		<p>Algebra and Geometry Support Ratio calculations Direct and inverse proportion Derive and use expressions, formulae and equations</p> <p>Core Arcs and sectors of circles Using angle and shape facts to derive results Proof in algebra and geometry Variation</p> <p>Extension Apply and prove circle theorems Equation of a circle and the tangent to a circle Variation with powers</p>	
2	<p>Geometry Support Reflection, rotation and translation Pythagoras' theorem Ratio notation, links to vulgar fractions, decimals and percentages</p> <p>Core Enlargement Similar shapes Bearings Trigonometry in right angled triangles</p> <p>Extension Negative scale factors of enlargement 3-D trigonometry and Pythagoras' theorem Combine transformations</p>		<p>Number & Statistics Support Simple statistical diagrams Averages and the range Solve number problems</p> <p>Core Represent and describe distributions Identify misleading graphs Time series Correlation and lines of best fit Solve problems involving compound units</p> <p>Extension Histograms with equal and unequal class intervals Cumulative frequency graphs and box plots</p>	

<p>3</p>	<p>Reasoning Support Algebraic notation and substitution, including kinematics formulae Congruence Straight-line graphs Equations and inequalities Rearranging formulae</p> <p>Core Algebraic arguments Loci Key angle and shape facts Coordinates (including midpoints, problems) Equations of parallel & perpendicular lines Vectors</p> <p>Extension Vector proofs Trigonometry graphs Equations of perpendicular lines Further inequalities</p>	<p>Revision and Extension Core and Support Review and revision Use PIXL therapy intervention resources. Use PPE exam and QLA per set. Key to 5 resources Top 7 to 9 resources Higher Gateway PIXL Resources Use PIXL Maths app with all set to launch after PPES and look at QLA grids Using maths box 20 questions (can use first 4 tests per section) Use SMHK regarding structured revision. PIXL maths app Miss B resources</p> <p>Extension Functions and their inverses Composite functions Transformations of functions Use PIXL therapy intervention resources. Use PPE exam and QLA per set.</p>	
<p>4</p>	<p>Geometry & Number Support Decimal calculations and rounding Units Area and perimeter of plane shapes, including composite shapes Angle rules</p> <p>Core Properties of 3-D shapes; their plans and elevations Estimation Surface area and volume of pyramids, cones and spheres (including exact answers) Angle proofs Limits of accuracy</p> <p>Extension Similar areas and volumes Upper and lower bounds Trigonometry in all triangles</p>	<p>Revision & extension Support and Core Review and revision Continue with PIXL therapy resources Top 7 to 9 resources Higher Gateway PIXL resources Post on SMHK past papers practice Using maths box 20 questions first 4 tests per section PIXL maths app PIXL resources target books used as homeworks. From feb half term or just before.</p> <p>Extension Solve equations by iteration Gradients of curves and areas under graphs</p>	

5	<p>Sampling & probability Support Sample spaces The probability scale Vulgar fractions, decimals and percentages</p> <p>Core Populations and samples Theoretical and experimental probability Listing Set notation Venn diagrams Combined events, including tree diagrams</p> <p>Extension Conditional probability</p>	<p>Revision & extension Review and revision Strive for 5 resources Use Exam questions to time before the staples Use multiple choice questions Use PIXI resources powerpoints and books. Look at the teaching and learning spreadsheet</p>	
6	<p>Applications of Algebra Support Real-life graphs Deriving and using expressions, formulae and equations</p> <p>Core Expand and factorise binomials Quadratic equations Cubic and reciprocal graphs Simultaneous equations Graphical solutions of equations</p> <p>Extension Exponential graphs Complete the square; quadratic formula Quadratic inequalities Algebraic fractions</p>	<p>Examinations</p>	

Key Stage 5 Programme of Study- Mathematics

Terms	Year 12			Map	Year 13			Map
	Core	Maths	Further		Statistics	Maths	Further	
1	Introduction to spreadsheets Types of data and collecting data Calculations Fermi- Estimation Representing data	Proof Index laws Expanding brackets and factorising Surds Quadratics equations Quadratic formula Simultaneous equations Inequalities Cubic and quartic graphs Data- collections, presentation and interpretation	Complex numbers Argand Diagrams Matrices Linear Transformations Algorithms Graphs and networks Algorithms on Graphs		Foundations of statistics Numerical measures Data representation and interpretation Probability theory	Combining transformations Sequences and Series Radians Area of sectors and segments Sec, cosec and cot Moments Regression and Correlation Forces at an angle	Allocation problems Flows in Networks Dynamic programming Game theory Decision Analysis	
2	Interest rates Equation of a straight line Collecting and sampling data Normal Distribution Area and Perimeter Similarity and Pythagoras	Reciprocal graphs Transformations Equation of circles Algebraic fractions Factor theorem Quantities and units in mechanics Kinematics – constant acceleration	Series Roots of Polynomials Proof by induction Route inspection Travelling salesman Linear programming		Discrete random variables Binomial distribution Bivariate data Normal distribution	Trig identities Inverse trig functions Differentiating and integrating trig Parametric equations Curve sketching Probability Projectiles	Complex numbers Further algebra functions (series) Revision PPEs	

3	Financial problems Critical analysis Surface area and Similarity Graphical representations Repayments and credit	Binomial expansion Trigonometry – graphs, exact values, identities. Probability Statistical distributions	Volumes of revolution Simplex algorithm Critical path analysis		Data collection Estimation and Approximation Introduction to Hypothesis testing	Parametric differentiation PPES More differentiation and integration techniques Normal Distribution	Polar Coordinates Methods in Calculus Volumes of Revolution	
4	Representing data Correlation and Regression VAT Limits of accuracy	Differentiation Integration Forces and Newton’s Laws Statistical Hypothesis testing	Vectors Algorithms Algorithms on Graphs Route inspection		Methods of hypothesis testing Contingency tables	Solving differential equations Locating roots, Iterations, Newton Raphson 3D vectors Hypothesis testing with the normal distribution Application of forces	Hyperbolic Functions Methods in Differential Equations Modelling with Differential Equations	
5	Probabilities and Estimation Income tax and national insurance	Vectors Exponential and logs Forces and Newton’s Laws	Travelling salesman Linear programming Simplex algorithm Critical path analysis		Non-parametric hypothesis tests Experimental design Revision	Revision 1 st Exam Further Kinematics – rigid bodies, inclined planes, vectors, variable acceleration.	Recurrence relations Revision	

6	Exams	PPEs Proof Partial fractions Functions Kinematics – variable acceleration Moments	Transportation problems Algorithms on graphs		Revision	Revision 2 nd and 3 rd Exams	Revision	
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