

Maths Curriculum Overview

Our department's vision

Our department's vision is to give students the knowledge and skills that allow them to be numerate and logical when making decisions in the real world with the aim of becoming creative problem solvers.

What knowledge have we selected in our curriculum and why?

Our maths curriculum is driven by the whole-school vision to give students the skills, attributes and academic qualifications to go on to live lives of choice and opportunity. In selecting and sequencing knowledge for our curriculum, we are guided by the national curriculum and led by our whole-school curriculum design principles.

1. Knowledge-rich:

All through our school, we prioritise teaching fluency in inflexible knowledge (learning key facts to automaticity) before exposing students to reasoning and problem-solving activities. Once students can recall and apply knowledge rapidly and accurately, they can build flexible knowledge that allows them to make connections, choose efficient strategies in more complex tasks and spot deeper connections. We rigorously atomise our learning objectives in schemes of work to ensure students are led from novice to expert via the chunking of new knowledge, and our homework setting via Century and Times Tables Rockstars in Primary and Sparx in Secondary ensures further individualised practice that allows pupils to develop rapid recall of facts and retrieves prior knowledge systematically.

2. Backwards planned:

In our all-through sequencing of our curriculum, we prioritise number/number sense and algebra (from Y7) at the start of each year given their centrality to key concepts within our curriculum. While our curriculum is based in the Maths Mastery Scheme, we have adapted it to suit our context and cohorts. Across phases and years we sequence units to ensure we build on prior knowledge, space the practice of concepts and teach students the relationships between and deeper structures within mathematical topics. We teach forward-facing methods in Maths to ensure, for instance, that our Year 3 curriculum avoids embedding misconceptions about fractions that create barriers to understanding mixed numbers in Upper Key Stage 2, manipulating algebraic fractions in Year 10 or expressing remainder as fractions when completing algebraic long division in Year 12. We build a shared, rigorous vocabulary so that students refer to numerators, denominators and reciprocals from the first time they are taught fractions in Year 3; they will still be using that language in Year 13!

3. Carefully resourced:

We continually improve the central resources on our drive each year; we adapt them to the learning needs of our groups, co-plan for mixed attainment groups and use our Schemes of Work to ensure every learning objective is delivered. All-through our school we are aligned about what excellent Maths teaching looks like: employing explicit instruction, modelling with worked examples and multiple representations (Concrete-Pictorial-Abstract), and using systematic assessment for learning in lessons - our resources reflect this.

4. Aspirational, inclusive and diverse:

Aspiration in our curriculum is seen in our high expectations of pupils, the depth we expose our students to in lessons - stretch and challenge is not just an add-on to a worksheet, it is embedded in the rigour of our Schemes of Work - and our explicit teaching of reasoning and problem-solving problems. We draw from NCETM, UKMT, White Rose Maths and Maths No Problem to enrich our students' mathematical experience. At Reach, we have a school culture where learning, working hard and succeeding is viewed positively by the pupil body. Pupils are encouraged to believe that they 'can do' maths and mistakes are seen as an opportunity to learn and grow. There is a sense of joy in maths lessons and this is evident through the pace of lessons, the use of choral response, partner talk, songs to learn times tables in primary and the celebration of pupil work.

We support and ensure our curriculum is inclusive for pupils with a range of needs first and foremost through high quality teaching: this means explicit instruction, scaffolding, adapting teaching according to assessment for learning to help more pupils learn, providing learners with worked examples and using diagrams to accompany explanations (dual coding). Our scaffolding is evident in our exposition, questioning and through use of concrete aids where appropriate. We differentiate by time, not task, by pitching high and scaffolding up. As a small school, we know our pupils and their needs very well, using the Graduated Approach to trial in-lesson interventions with our SENCo.

Diversity in the curriculum can be achieved by taking opportunities to teach students about the history of Mathematics and its diverse origins; from our numerals, the development of algebra and the source of our place value systems. Hooks at the start of topics provide the key way to ensure diversity in our curriculum is not tokenistic, but embedded in our practice.

5. Rigorously assessed:

We systematically assess pupils in lessons by teaching responsively through a range of AFL strategies; through low-stakes assessments; and in formal assessments at the end of every half-term after which we deliver whole-class feedback.

Our 'Do Nows' are a means of retrieval practice used to recap previously taught topics and are planned meticulously, considering spacing and interleaving of practice. Our low-stakes assessments are a key way of seeking and, via whole class feedback (WCF), closing gaps in knowledge.

Formal assessments provide robust student data that can be used formatively to re-teach content identified in QLAs through WCF and summatively to consider the snapshot of attainment and progress at that time.

6. Regularly evaluated and reflected upon.

We use structures such as subject management, department meeting time and pupil progress meetings after formal assessments to frequently reflect on our curriculum. We consider its design, its resourcing, its implementation and its impact; making changes immediately or logging them for the next academic year. Constant reflection on our implementation takes place through our instructional coaching system, in which every teacher receives a weekly action step to improve their implementation of the curriculum.

Curriculum Maps

Primary			
	Autumn	Spring	Summer
1	Number to 10 Addition and subtraction within 10 Shape and Patterns Numbers to 20 Addition and subtraction within 20	Time Exploring calculation strategies within 20 Numbers to 50 Addition and subtraction within 20 Fractions Measures: length and mass	Numbers 50 to 100 and beyond Addition and subtraction Money Multiplication and division Measures: capacity and volume
2	Numbers within 100 Addition and subtraction of 2-digit numbers Addition and subtraction problems Measures: Length Graphs Multiplication and division: 2, 5 and 10	Time Fractions Addition and subtraction of 2-digit numbers Money Face, shapes and patterns; lines and turns	Numbers within 1000 Measures: Mass Exploring calculator strategies Multiplication and division : 3 and 4
3	Number sense and exploring calculation strategies Place value Graphs Addition and subtraction Length and perimeter	Multiplication and division Deriving multiplication and division facts Fractions Time	Angles and shape Measures Securing multiplication and division Exploring calculation strategies and place value
4	Reasoning with large numbers Addition and subtraction Securing multiplication facts Multiplication and division Time	Discrete and continuous data Fractions Decimals Area and perimeter	Solving measures and money problems Shape and symmetry Position and direction 3-D shape Reasoning with patterns and sequences

5	Reasoning with large whole integers Integer addition and subtraction Line graphs and timetables Multiplication and division Perimeter and area	Fractions and decimals Angles Fractions and percentages Transformations	Calculating with whole numbers and decimals Converting units of measure 2-D and 3-D shape Volume Problem solving
6	Integers and decimals (10 lessons) Multiplication and division (15 lessons) Fractions (10 lessons) Fractions (5 lessons) Missing angles and length (5 lessons)	Coordinates and shapes (10 lessons) Decimals and measure (15 lessons) Percentage and statistics (10 lessons) Calculation problems (10 lessons) Proportion problems (10 lessons)	Year 7 Unit 1 Place Value, Addition and Subtraction of Integers (5 lessons) (Summer 2) Year 7 Unit 2 Place Value, Addition and Subtraction of Decimals (5 lessons) Year 7 Unit 3 Multiplication and Division (10 lessons) Year 7 Unit 4 Order of Operations (5 lessons)

Secondary Curriculum

Year 7

C1- Topic	C2- Topic	C3- Topic
Unit 1: Place Value and Number - Place value, reading and writing numbers - Comparing and ordering numbers - Base 10 tricks - Rounding Unit 2: Addition and Subtraction - Addition - Subtraction - Perimeters - Angle rules	Unit 4: Indices - Squares, powers and roots - Index rules Unit 5: Order of operations - Calculating with GEMS - Applications of the order of operations: the mean average, midpoints and compound shapes Unit 6: Negatives - Understanding negative numbers	Unit 7: Number theory - Factors - Primes and prime factors - Multiples - HCF and LCM Unit 8: Fractions - Fractions conceptually - Equivalent fractions - Adding and subtracting fractions - Fractions of amounts - Multiplying and dividing with fractions - GEMS with fractions and worded contexts

Unit 3: Addition and Subtraction • Multiplication • Area • Division • Multiplication and division in context	• Addition and subtraction with negatives • Adding and subtracting efficiently • Multiplication, division, indices and GEMS with negatives	
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Year 8

C1- Topic	C2- Topic	C3-
Unit 1: Manipulating terms • Collecting like terms • Multiplying and dividing terms Unit 2: Simplifying expressions • Substitution • Expanding single brackets • Factorisation • Double and triple brackets Unit 3: Algebraic fractions • Multiplying and dividing • Adding algebraic fractions • GEMS and solving problems with algebraic fractions	Unit 4: Forming expressions and proofs • Forming expressions from worded and geometry contexts • Proof Unit 5: Solving equations • Principles of solving equations • Solving one and two step equations • Solving complex equations • Applied equation solving Unit 6: Formulae • Forming equations • Rearranging formulae • Using formulae • Formulae to learn by heart	Unit 7: Inequalities • Plotting inequalities • Solving inequalities Unit 8: Sequences • Understanding sequences • Linear sequences • Patterns and problem solving Unit 9: Graphs • The Cartesian plane • Plotting linear graphs • Finding the equations of linear graphs • Graphing linear inequalities

Year 9

C1-	C2-	C3-
Unit 1: Percentages • Expressing values as percentages • Percentage change • Original amounts • Simple and compound	Unit 4: Similarity and congruence • Congruence • Reflection and rotation • Similarity	Unit 6: Area • Area conceptually and simple shapes • Areas of circles • Areas of compound

interest Unit 2: Angles - Angles on lines - Angles in polygons - Circle theorems - Circle theorems and tangents - Proofs Unit 3: Euclidean geometry - Principles and vocabulary - Properties of shapes - Measuring angles - Construction with a protractor - Bearings	- Enlargement Unit 5: Triangles - Pythagoras' theorem - Pythagoras' theorem in context - Trigonometry and ratios - Trigonometry: solving problems - Non-right angle triangles - Trigonometric graphs	shapes Unit 7: Surface area and volume - Nets, plans and elevations - Surface area of prisms and cylinders - Surface area of complex shapes - Volume of prisms and cylinders - Volumes of other solids
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Year 10

C1-	C2-	C3-
Unit 1: ratio - sharing parts and wholes in a ratio - comparing ratios - relating ratios and fractions Unit 2: alternative representations of values - Surds - Standard index form - Recurring decimals and fractions Unit 3: probability - Counting rules - Relative frequency - Independent events - Conditional probability - Venn diagrams and set notation	Unit 4: 3D solids - Plans and elevations - Nets and surface area - Volume of prisms and of curved objects - Scale factors in different dimensions Unit 5: quadratics - Factorising - Sketching quadratics - The quadratic formula - Advanced manipulation to solve equations	Unit 6: simultaneous equations - Solving simultaneous equations - Modelling situations to form equations - Solving graphically Unit 7: statistics - Types of data - Reading and constructing charts and diagrams - Processing data - Interpreting graphs and results

Year 11		
C1-	C2-	C3-
Unit 1: accuracy • *Estimation • *Bounds • Limits of accuracy Unit 2: vectors • Vectors as movement • Interpreting diagrams of vectors • Forming proofs Unit 3: graphs • *Compound measures • *Linear graphs: interpretation • Modelling situations using graphs Unit 4: roots • Completing the square • Sketching turning points • Interpreting the roots of an equation or graph	Unit 5: curves and circles • Equation of a tangent to a curve • Area under a curve • *Equation of a circle Unit 6: algebra – advanced applications • Graphical inequalities • Quadratic simultaneous equations (including as graphs) • Nth term of a quadratic sequence Unit 7: functions • Interpreting functions • Sketching • Transforming Unit 8: advanced proof • *Geometric proof • Circle theorems • *Algebraic manipulations	
Year 12		
C1-	C2-	C3-
Pure Maths Core Knowledge: • Algebraic Expressions, Equations and	Pure Maths Core Knowledge: • Introduction to differentiation: using	Pure Maths Core Knowledge: • Exponentials functions and modelling

- Inequalities - Quadratics and the discriminant - Algebraic Methods and proofs - Binomial Expansion - Straight-Line Graphs and linear/quadratic models - Circle problems - Vectors with geometric problems and modelling - Graphs and Transformations Applied Maths Core knowledge: - Sampling Methods - Statistical Measures - Central Tendency and Spread, Standard Deviation and Variance - Statistical Diagrams - Histograms, Cumulative Frequency, Reading and Interpreting Diagrams - Basic principles of mechanics - modelling assumptions, components. - Constant acceleration formulae - SUVAT - involving gravity. - Newton's Second Law of Motion - Pulleys, Connected Particles, Reaction Forces	the gradient function and modelling - Integration: indefinite, definite and area under curves - Trigonometric ratios and transforming trigonometric graphs - Trigonometric identities and equations Applied Maths Core knowledge: - Binomial Distribution - Modelling Using the Binomial Distribution, Finding Probabilities for Repeated Independent Events - Hypothesis Testing for PMCC - Hypothesis Testing for Positive/Negative Correlation of a Population from a Sample - Probability - Laws of Probability, Probability Diagrams, Two Way Tables, Venn Diagrams 2D Vectors - component forms, angles above/below axes - Variable Acceleration - Differentiating, Integrating, solving problems involving graphs.	- Laws of and solving logarithms - Natural logarithms - Proofs and Partial Fractions - Functions and mappings - Graphing inverse and composite functions - The modulus function - Combining transformations Applied Maths Core knowledge: - Modelling problems, graphical problems - Moments - uniform bodies, tilting problems, variable centre of mass. - Probability Distributions - Tabular Distributions, Probability Mass Functions - Correlation and Linear Regression - Product Moment Correlation Coefficient, Equation of Regression Line, Interpreting Coefficients
Year 13		
C2-	C2-	C3-

Pure Maths Core Knowledge:	Pure Maths Core Knowledge:	Pure Maths Core Knowledge:
• Radian measure • Inverse and reciprocal trigonometric functions • Addition & double angle formulae • Differentiating all functions • Product, chain and quotient rule • Differential equations • Integrating all functions • Integrating by substitution and parts • Trapezium rule Applied Maths Core knowledge: • Friction - horizontal plane, inclined planes, involving components • Projectiles - horizontal projection, projection at any angle, general projectile formulae. • Application of Forces - static particles, rigid bodies, dynamics & inclined planes. • Further kinematics - differentiating vectors, vectors in 3D, integrating vectors	• Parametric equations • Arithmetic & geometric sequences • Further binomial expansion • Binomial expansion with partial fractions • Numerical methods • Vectors Applied Maths Core knowledge: • Normal Distribution - Finding Probabilities, Inverse Normal Distribution, Finding Unknown Parameters. • Hypothesis Testing for 'p' for a Binomial Distribution, Finding Critical Values, One-Tailed Tests, Two-Tailed Tests • Normal Distribution - Standard Normal Distribution, Approximating a Binomial Distribution with Large n, Hypothesis Testing for the Mean of a Normal Distribution.	• Revision for A-Level examinations