



Maths curriculum overview

Curriculum intent:

At Reddish Vale High School, our intent is for the mathematics curriculum to be designed to ensure that learners receive a high-quality mathematics education that will: develop their ability to reason mathematically; help to develop an appreciation of the beauty and power of mathematics; and have a sense of the purpose, enjoyment and curiosity about the subject now and into adult life. Our aim is:

- To create a journey of mathematical knowledge and skills that builds on prior knowledge and builds a deeper understanding of topics in the mathematics curriculum.
- To raise, develop and sustain students' mathematical skills, intervening swiftly to help those having difficulty to make sure they keep up, and to stretch and deepen the learning of the 'rapid-graspers'
- To develop skills and knowledge, so learners have the mathematical ability required for future learning and employment.
- To use metacognitive skills to improve independence and resilience in learning
- To address the school focus of low numeracy levels in order for our students to be more numerate across the curriculum and to be ready for adult life.

At Reddish Vale High School, the mathematics curriculum follows the themes and principles of mathematics mastery, where all students are encouraged by the belief that by working hard at mathematics they will succeed and that making mistakes is to be seen not as a failure but as a valuable opportunity for new learning.

The mathematics curriculum allows students to develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. This is achieved through developing procedural fluency and conceptual understanding in tandem, since each supports the other.

Lessons are designed to have a high-level of teacher-student and student-student interaction where all students in the class are thinking about, working on and discussing the same mathematical content. Challenge and the opportunity to deepen understanding of the key

mathematical ideas is provided for all and every attempt is made to keep the whole class learning together through the use of support and challenge to allow every student to fully grasp the concepts and ideas being studied. This ensures that all students gain sufficiently deep and secure understanding of the mathematics to form the foundation of future learning before moving to the next part of the curriculum sequence.

Students who grasp concepts rapidly will be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material will consolidate their understanding, including through additional practice, before moving on.

At Reddish Vale High School, you will see:

- Knowledge and skills are built through a sequential mathematics mastery curriculum over five years.
- New concepts are taught through a mix of concrete, pictorial and abstract examples
- Metacognition strategies are used throughout the curriculum through interleaving of the maths mastery and the skills across each topic area. It is also addressed through retrieval practice 'Do Now' starters and 'MAD' time lessons allocated every 2/3 weeks to ensure learners can fluently recall facts.
- There is less teaching and more learning in lessons – whole class interactive teaching, a slower pace in lessons with a clear focus for learning (one small step at a time), with more time spent on one idea
- Lessons have a clear structure with learners being given the opportunity to use their mathematical knowledge skills and language to recap prior learning. Teachers then develop new learning through discussions, demonstration and practical activities as appropriate. Learners apply their skills independently. The plenary provides opportunities for learners to verbalise their new learning and demonstrate they have understood
- Learners are not left behind or insufficiently challenged - all learners are enabled to keep up during lessons and intervention given where appropriate ensures no-one falls behind. Those who are able to are encouraged to go deeper (lesson structure enables learners needing support or additional challenge to be identified and supported in the lesson and misconceptions can be rapidly addressed)
- Real life applications are given wherever possible to make learning relevant and not always abstract; mathematics is taught with a purpose.

	Autumn Term		Spring Term		Summer term	
Year 7	<u>Understanding magnitude</u>	<u>Understanding abstraction</u>	<u>The four operations and the properties of number</u>	<u>The four operations and the properties of number</u>	<u>Understanding proportion - Fractions</u>	<u>Understanding proportion - Fractions</u>
	Understanding place value	Substituting into algebraic formulae	Properties of number (multiples, factors, primes, squares)	Division and subtraction of integer and decimal numbers and the links between division, subtraction and the properties of number	Understanding the nature of proportion	Understanding addition and subtraction of fractions and mixed numbers
	Comparing the magnitude of positive real numbers	Solving, forming and rearranging one-step equations	Using the rules of BIDMAS	Formal and informal methods of calculation for division	Understanding fractions as parts of an amount, as division and as locations on a number line	Recognising and understanding reciprocals
	Multiplication and division by powers of ten	Using standard scientific formulae	Addition and subtraction of integer and decimal numbers and the links between addition, subtraction and the properties of number	Division and multiplication of integer and decimal numbers and the links between division, multiplication and the properties of number	Understanding fractional equivalence	Understanding multiplication and division of proper fractions, improper fractions and mixed numbers
	Rounding numbers	<u>Understanding magnitude</u>	Using formal and informal methods for addition and subtraction		Comparing the magnitude of fractions	
	Approximating calculations using rounding	Understanding negative numbers	Multiplication, and its links to addition and the properties of number		Finding a fraction of an amount	
	Understanding the limits of accuracy	Understanding and using directed numbers	Formal and informal methods of calculation for multiplication			
	<u>Understanding abstraction</u>					
	An introduction to the language and conventions of algebra					
	Simplifying expressions by collecting like terms					

Year 8	<u>Understanding proportion – Ratio</u>	<u>Understanding proportion – Percentage</u>	<u>Further uses of algebra</u>	<u>Further uses of algebra</u>	<u>Graphing</u>	<u>Graphing</u>
	Recap the definition of proportion	Recap the definition of proportion	Simplify expressions involving the use of index laws	Solving simultaneous equations	Drawing axes	Identifying parallel lines and perpendicular lines from their graphs and their equations.
	Recap the concept of fractions as equality of parts	An introduction to percentage through its relationship with fraction	Multiplying single terms over a bracket	Solving quadratic equations	Plotting co-ordinates in all quadrants	Plotting and understanding quadratic graphs
	An introduction to ratio through its relationship to fractions.	Understanding the relationship between percentage, fraction and ratio	Expanding the product of two (or more) binomials	Solving inequalities	Solving geometric problems involving coordinates	Using quadratic graphs to solve equations
	Understanding equivalence of ratios	Finding percentages of amounts	Factorising quadratic expressions	Understand the definition of, and be able to recognise, types of sequences	Interpreting real life graphs	Understanding functions as input and output
	Understand and use ratio in a variety of circumstances including sharing and problem solving.	Solving problems involving percentages, including percentage change and original value problems	Solving equations with unknowns on both sides (including where brackets are involved)	Using the nth term of sequences, finding the nth term of sequences, and problem solving with sequences	Drawing linear graphs	Plotting cubic, exponential and reciprocal graphs
	Understand the link between ratio and linear functions.	Understanding how to convert between fractions, decimals and percentages			Understanding gradient	

Year 9	<p><u>Understanding data</u></p> <p>Understanding key terms related to data and data handling.</p> <p>Understanding and using measures of spread and central tendency and their utility, and using these to compare samples or populations.</p> <p>Understanding grouped data, and using measures of central tendency and spread to compare populations.</p>	<p><u>Understanding data</u></p> <p>Constructing and interpreting pie charts, bar charts and histograms.</p> <p>Constructing and interpreting scatter graphs.</p> <p>Understanding the dangers of extrapolation.</p> <p>Understanding the difference between correlation and causation.</p> <p>Understanding the ways in which data can be used to inform and to manipulate.</p> <p>Avoiding the dangers of being manipulated by statistics.</p> <p><u>Understanding probability</u></p> <p>Understanding the nature of prediction</p> <p>Understanding the nature of likelihood.</p> <p>Knowing how to put probabilities on a scale</p>	<p><u>Understanding probability</u></p> <p>Utilising fractions, decimals and percentages as measures of likelihood.</p> <p>Using sampling in order to make predictions.</p> <p>Understanding, constructing and using sample space diagrams</p> <p>Understanding, constructing and using Venn diagrams</p> <p>Understanding, constructing and using two-way tables (and their links to Venn diagrams.)</p> <p>Understanding, constructing and using tree diagrams.</p>	<p><u>Understanding standard form</u></p> <p>Understanding how to write numbers in and out of standard form, and performing calculations in standard form</p> <p><u>Geometry 1</u></p> <p>Standard units and unit conversions.</p> <p>The concept of parallel and perpendicular lines.</p> <p>Understanding angles, and measuring angles.</p> <p>Angles in polygons, including the categorisation of shapes using angle properties.</p> <p>Understanding and using bearings.</p>	<p><u>Geometry 2</u></p> <p>Understanding the nature of the 1st, 2nd and 3rd dimensions.</p> <p>Understanding and calculating 1d and 2d measures - perimeter, circumference, area</p> <p>Drawing and interpreting plans and elevations of 3d shapes</p> <p>Understanding and calculating in 3d – surface area and volume</p>	<p><u>Geometry 3</u></p> <p>Understanding and using standard procedures in right angle triangles.</p> <p>Understanding and using scale factor</p> <p>Drawing, and solving problems with, standard constructions (including loci.)</p>
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	<p>Extra curricular: UKMT Maths Challenge Numeracy week (World Numeracy Day) Maths puzzle club</p>					

Year 10 Foundation Tier	<p>Number Ordering and place value. Rounding and estimating. 4 operations including negative numbers. Calculations and problem solving with fractions and decimals. Order and inverse operations. Factors, multiples and primes, including HCF, LCM and prime factorisation. Algebra – types, simplify and graphs Identify different types of algebra. Collect like terms. Expand and factorise brackets. Index laws Substitution. Plot straight line graphs. Understand gradients and intercepts including parallel and perpendicular lines.</p>	<p>Number Powers and roots. Standard form. Ratio and proportion - Percentages Percentage of amount. Percentage change. Reverse percentages. Financial problems. Compare fractions, decimals and percentages. Interpret growth and decay. Algebra - Sequences nth term. Special sequences. Recognise quadratic and geometric sequences. Statistics Types of data, collecting data and sampling. Draw and analysis tables, charts and graphs Two way tables. Pictograms. Line graphs. Bar charts, including comparative and composite. Pie charts. Time series. Scatter graphs.</p>	<p>Ratio and Proportion Use and convert metric measures. Scale factors and maps. Including length, area and volume. Compound measures. Simplify and divide by a ratio. Ratio to fractions and linear functions. Proportion problem solving eg; conversion, scaling, mixing etc Algebra – expressions, graphs, solving and inequalities Change the subject. Mapping Recognise, sketch and interpret linear, quadratic, cubic, reciprocal and real life graphs. Solve linear equations and inequalities. Represent an inequality on a number line.</p>	<p>Statistics Find and compare averages including from a table. Theoretical probability Use correct probability terms. Use the probability scale 0-1. Understand mutually exclusive events equal 1. Experimental probability Record frequency of outcomes. Analysis probability of experiments using tables and frequency trees. Calculate expected outcomes. Sets and diagrams Use tables, grids and Venn diagrams to organise data. Sample space diagrams. Use tree diagrams, two way tables and Venn diagrams from independent and dependent events as well as conditional probabilities.</p>	<p>Geometry Shape properties Geometrical terms. Draw and describe 2d shapes, using the correct property descriptions and notation. As well as parts of a circle. Transformations. Co-ordinates problem solving. Properties of 3d shapes including nets. Plans and elevations. Angles Sum at a point, straight line, triangle and quadrilateral. Angles in parallel lines. Interior and exterior angles in a regular polygon. Sum of interior angles. Bearings</p>	<p>Geometry Transformations. Perimeter and area of 2d shapes including a circle and parts of a circle. Surface area of a cube & cuboid.</p>
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Year 10 Higher Tier	<p>Number Ordering and 4 operations of fractions. Rounding and estimating. Bounds and error intervals. Product rule for counting. 4 operations including negative numbers. Calculations and problem solving with fractions and decimals. Converting recurring decimals. Order and inverse operations. Factors, multiples and primes, including HCF, LCM and prime factorisation. <u>Algebra – types, simplify and graphs</u> Identify different types of algebra. Collect like terms. Expand and factorise brackets. Index laws Substitution. Plot straight line graphs. Understand gradients and intercepts including parallel and perpendicular lines.</p>	<p>Number Powers and roots. Fractional indices. Standard form. <u>Ratio and proportion - Percentages</u> Percentage of amount. Percentage change. Reverse percentages. Financial problems. Compare fractions, decimals and percentages. Interpret growth and decay. <u>Statistics</u> Types of data, collecting data and sampling. <u>Draw and analysis tables, charts and graphs</u> Two way tables. Pictograms. Line graphs. Bar charts, including comparative and composite. Pie charts. Time series. Scatter graphs. Histograms.</p>	<p><u>Ratio and Proportion</u> Use and convert metric measures. Scale factors and maps. Including length, area and volume. Compound measures. Simplify and divide by a ratio. Ratio to fractions and linear functions. Proportion problem solving e.g.; conversion, scaling, mixing etc. Direct and inverse proportion. <u>Algebra – expressions, graphs, solving and inequalities</u> Change the subject. Construct and solve linear equations and inequalities. Represent an inequality on a number line. Solve inequalities with 2 variables including set notation and on a graph. Calculate with Surds.</p>	<p>Number Simplify surds and rationalise the denominator. <u>Statistics</u> Calculate and compare averages including from a table. Quartiles and interquartile range. Box plots and cumulative frequency. <u>Theoretical probability</u> Use correct probability terms. Use the probability scale 0-1. Understand mutually exclusive events equal 1. <u>Experimental probability</u> Record frequency of outcomes. Analysis probability of experiments using tables and frequency trees. Calculate expected outcomes. <u>Sets and diagrams</u> Use tables, grids and Venn diagrams to organise data. Sample space diagrams. Use tree diagrams, two way tables and Venn diagrams from independent and dependent events as well as conditional probabilities. <u>Geometry – circles</u> Understand parts of a circle. Use and Proof Circle theorems.</p>	<p><u>Algebra - Expressions</u> Expand and factorise binomials, including the difference of two squares. Construct algebraic proofs. Inverse and composite functions. <u>Graphs</u> Recognise, sketch and interpret linear, quadratic, cubic, reciprocal, and exponential graphs. Equation of a circle and tangent to a circle. <u>Solving</u> Solve quadratics. Iterative process. <u>inequalities</u> Solve inequalities. Represent an inequality on a number line, using set notation and on a graph. <u>Geometry – transformations and Vectors</u> Draw and describe single and connected transformations including negative and fractional enlargements. Calculate vectors and use a Scaler vectors. Including proofs.</p>	<p><u>Algebra – Solving</u> Solve simultaneous equations algebraically and graphically, including quadratics. <u>Geometry</u> Pythagoras. Trigonometry of right angled triangles. 2D and 3D Know the exact values of sin, cos and tan. Sine rule. Cosine rule. $\frac{1}{2}$ absinc. Bearings.</p>
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Year 11 Foundation Tier	<p>Expressions Expand and factorise binomials, including the difference of two squares.</p> <p>Geometry Congruency proof Volume of a cuboid Volume and surface area of a cylinder, prism, pyramid and sphere. Area of composite shapes, including circles and problem solving. Pythagoras. Trigonometry in right angle triangles.</p>	Revision for November mock	Topics covered based on RAG analysis of the first mock.	Topics covered based on RAG analysis of the first mock.	Topics covered based on RAG analysis of the second mock.	GCSE Paper 1 non-calculator Paper 2 and Paper 3
	<p>Extra-curricular: UKMT Maths Challenge Numeracy week (World Numeracy Day) University Problem solving days University Maths Enrichment</p> <p>Cross-curricular</p>					

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