

Werneth Mathematics Curriculum KS4

		Year 10	Year 11
Autumn 1	Content (Why)	This unit develops students' mathematical fluency across algebra, geometry, statistics and probability , while strengthening their ability to make connections between different areas of mathematics. Students build on prior knowledge of expressions, equations, shape, data and probability and develop increasingly sophisticated methods for solving problems. Formulae and inequalities strengthen algebraic manipulation; area, perimeter, circles and sectors develop geometrical reasoning; box plots and cumulative frequency extend statistical analysis; and probability develops students' understanding of uncertainty and combined events. The unit provides important foundations for future learning involving Pythagoras' Theorem, functions, graphs, circle theorems, surface area and volume, and more complex algebraic problem-solving.	The majority of GCSE Mathematics content is delivered during Year 10 , with any remaining units continuing into Year 11. This flexible approach allows teachers to use Year 10 teaching time effectively while ensuring that students develop secure understanding before progressing. Year 11 provides opportunities to complete outstanding content, revisit key mathematical concepts and strengthen connections between different areas of mathematics. Smaller general curriculum units, including representing data, number, vectors and simultaneous equations, further develop students' fluency, reasoning and problem-solving in preparation for increasingly complex mathematical problems.
	Content (What)	Students substitute into and rearrange formulae, translate situations into algebraic expressions and solve inequalities, including representing solutions graphically and using upper and lower bounds. They calculate the area and perimeter of 2D and composite shapes before extending this to circles, arcs and sectors. Students interpret and construct box plots and cumulative frequency graphs, using averages and measures of spread to compare distributions. In probability, students investigate theoretical and experimental probability and use systematic listing, sample spaces, frequency trees, Venn diagrams, two-way tables and tree diagrams to solve problems involving independent, dependent and conditional events.	Students complete any remaining GCSE curriculum content before studying and consolidating key areas including representing and interpreting data, number, vectors, and linear and quadratic simultaneous equations . Students revisit prior mathematical knowledge where appropriate and apply this to increasingly complex and unfamiliar problems. Teaching provides opportunities to connect algebra, number, geometry and statistics rather than treating mathematical concepts in isolation.
	Acquire (Knowledge)	- Understand and apply key algebraic methods, including substitution, rearranging formulae, solving inequalities and working with limits of accuracy. - Know and apply key geometrical and statistical principles, including area and perimeter formulae, circle and sector formulae, and measures of central tendency and spread. - Understand key probability principles, including theoretical and experimental probability, mutually exclusive events, independent and dependent events, conditional probability and the use of appropriate representations.	Secure and consolidate essential knowledge from across the mathematics curriculum, identifying connections between number, algebra, geometry and statistics . Understand how data can be represented and interpreted and how vectors can describe magnitude, direction and geometrical relationships. Know appropriate algebraic methods for solving linear and quadratic simultaneous equations and understand how solutions can be represented and interpreted.
	Apply (Skills)	Students apply their knowledge by selecting appropriate mathematical methods to solve increasingly complex and multi-step problems across algebra, geometry, statistics and probability. They manipulate and rearrange formulae, solve and represent inequalities, calculate areas, perimeters, arc lengths and sectors, and interpret statistical distributions using box plots and cumulative frequency graphs. Students select	Students apply their accumulated mathematical knowledge to increasingly complex, unfamiliar and multi-step problems. They select appropriate methods independently, interpret and represent data, manipulate number and algebra accurately, use vectors to solve geometrical problems, and solve linear and quadratic simultaneous equations. Students are expected to make connections

Werneth Mathematics Curriculum KS4

		appropriate probability representations to calculate and interpret outcomes and use mathematical reasoning to justify conclusions. Throughout the unit, students develop fluency, reasoning and problem-solving , making connections between different areas of mathematics and communicating solutions accurately using appropriate mathematical notation and vocabulary.	between different areas of mathematics, justify their chosen approaches and communicate solutions clearly, developing greater fluency, reasoning, problem-solving and mathematical independence .
Autumn 2	Content (Why)	This unit develops students' understanding of key relationships across number, algebra and geometry , strengthening their ability to recognise mathematical structure and apply appropriate methods to increasingly complex problems. Proportion develops understanding of how quantities relate and change, supporting future work with percentages, conversions, ratio and graphs. Expanding triple brackets develops algebraic manipulation and mathematical proof, while percentage work extends proportional reasoning into growth, decay and financial contexts. Pythagoras' Theorem connects algebra and geometry and provides an essential foundation for later work with trigonometry and surds.	This section provides continued curriculum time for the rollover of any outstanding units , giving teachers flexibility to respond to the needs and progress of their classes while ensuring full curriculum coverage. Once outstanding content is secured, students focus on additional general curriculum units selected because they represent high-frequency GCSE mathematical concepts . Constructions, transformations, scale drawings and curved graphs strengthen connections between geometry, algebra and graphical reasoning while developing students' confidence in applying prior knowledge to more complex problems.
	Content (What)	Students solve problems involving direct and inverse proportion , representing relationships algebraically and graphically and interpreting gradients as rates of change. They expand and simplify products involving multiple binomials and use algebra to demonstrate equivalence and construct arguments. Students calculate percentages of amounts, percentage increases and decreases, original values, simple and compound interest, and growth and decay. They also apply Pythagoras' Theorem ($a^2 + b^2 = c^2$) to calculate unknown lengths in right-angled triangles and solve geometrical problems in two and three dimensions.	Students complete any outstanding curriculum content before focusing on constructions, transformations, scale drawings and curved graphs . They use appropriate mathematical equipment to complete accurate constructions and scale drawings, and explore transformations including reflection, rotation, translation and enlargement. Students also develop their understanding of non-linear relationships by plotting, recognising and interpreting curved graphs.
	Acquire (Knowledge)	- Understand direct and inverse proportion, percentage change, growth and decay, and how proportional relationships can be represented numerically, algebraically and graphically. - Know how to expand and simplify algebraic expressions, including products of multiple binomials, and understand the distinction between expressions, equations and identities. - Know and apply Pythagoras' Theorem, understanding the relationship between the sides of a right-angled triangle and how the formula can be rearranged to determine unknown lengths.	- Understand the principles and mathematical conventions involved in constructions, transformations and scale drawings, including the accurate use of appropriate mathematical equipment. - Know the properties of reflection, rotation, translation and enlargement and understand how these transformations affect the position, orientation and size of shapes. - Understand the key features of curved graphs and know how to recognise, plot and interpret different non-linear graphical relationships.
	Apply (Skills)	Students apply their knowledge to increasingly complex and multi-step mathematical problems, selecting appropriate methods and representations. They construct and interpret equations and graphs for proportional relationships, use proportional	Students apply their knowledge by completing accurate constructions and scale drawings and solving geometrical problems using appropriate equipment and mathematical reasoning. They describe and perform transformations using correct

Werneth Mathematics Curriculum KS4

		reasoning to solve percentage and financial problems, and manipulate algebraic expressions accurately through expansion and simplification. Students apply Pythagoras' Theorem to geometrical problems in two and three dimensions and combine their understanding of algebra, number and geometry to justify solutions. Throughout the unit, students develop fluency, mathematical reasoning and problem-solving , preparing them to make connections with later learning involving ratio, graphs, trigonometry, conversions and surds.	mathematical notation and identify combinations of transformations where appropriate. Students generate coordinates, plot and interpret curved graphs and use graphical information to solve problems. Across these high-frequency topics, students develop accuracy, fluency, reasoning and problem-solving , selecting appropriate methods independently and making connections with previously taught mathematical content.
Spring 1	Content (Why)	This unit develops students' understanding of mathematical relationships and how they can be represented, interpreted and applied in different contexts. Straight-line graphs strengthen connections between algebra, coordinates and rates of change , providing foundations for later work with curved graphs, sequences and compound measures. Conversions develop confidence in moving between standard units and support later work involving speed, density, pressure, surface area and volume. Finance allows students to apply numerical skills to meaningful real-life situations, while iteration introduces a numerical method for finding approximate solutions to equations and supports future work with sequences and more advanced algebra.	Following the mock examinations, curriculum time is used responsively to address the specific needs of each teaching group. Question Level Analysis (QLA) enables teachers to identify gaps in knowledge, misconceptions and areas where students require further development. This ensures teaching time is targeted effectively and allows students to revisit and strengthen priority areas from across the mathematics curriculum. Regular retrieval through bell tasks supports the retention of key knowledge and provides students with achievable ' quick wins ' that build fluency and confidence.
	Content (What)	Students work with coordinates in all four quadrants and plot, interpret and form equations of straight-line graphs using $y = mx + c$, including parallel and perpendicular lines. They interpret gradients and intercepts and explore graphs in real-life contexts, alongside circle equations and tangents where appropriate. Students convert between standard units of length, area, volume, capacity, mass and time. They apply the four operations to financial contexts involving money, rates of pay and unit pricing. Students also use iterative processes to find approximate solutions to equations.	Teachers select and reteach priority topics based on the outcomes of mock examinations and QLA for their individual teaching groups. Content will therefore vary between classes according to identified areas for development. Lessons combine focused reteaching with retrieval, modelling, guided practice and application. Bell tasks include short 'quick win' questions targeting specific gaps and misconceptions identified through assessment.
	Acquire (Knowledge)	- Understand the key features of straight-line graphs, including gradient, intercept, the equation $y = mx + c$, and the relationships between parallel and perpendicular lines. - Know how to accurately convert between standard units and apply numerical methods to financial contexts involving money, rates of pay and unit pricing. - Understand how iteration can be used as a repeated numerical process to generate increasingly accurate approximations to solutions of equations.	- Secure essential mathematical knowledge and methods in the priority areas identified through QLA and mock examination performance. - Address misconceptions and gaps in knowledge from previously taught topics across number, algebra, geometry, statistics and probability. - Strengthen recall of key mathematical facts, formulae, procedures and vocabulary through regular and purposeful retrieval practice.
	Apply (Skills)	Students apply their knowledge by plotting, interpreting and forming equations of graphs and using gradients to represent rates of change. They solve coordinate and graphical problems, including those set in real-life contexts, and make connections between algebraic and graphical representations. Students select appropriate	Students apply their improved knowledge to questions targeting their individual and class areas for development. They practise previously less-secure skills through retrieval, guided examples and increasingly independent problem-solving. Students use feedback and assessment information to recognise and correct

Werneth Mathematics Curriculum KS4

		conversion factors and apply them accurately within multi-step measurement and financial problems. They use arithmetic confidently when working with money, compare costs and rates, and apply iterative methods to approximate solutions. Throughout the unit, students develop fluency, reasoning and problem-solving , selecting efficient mathematical methods and clearly communicating and justifying their solutions.	misconceptions, select appropriate mathematical methods and apply their knowledge to familiar and unfamiliar problems. Regular 'quick win' bell tasks provide repeated opportunities to demonstrate improvement, strengthen fluency and build towards more complex mathematical reasoning and problem-solving.
Spring 2	Content (Why)	This unit develops students' ability to apply mathematical reasoning across geometry, number, measures and algebra . Angle facts extend students' understanding of geometrical properties and provide foundations for later work with bearings and more complex geometric reasoning. Compound units connect proportional reasoning, graphs and measures through real-life contexts such as speed, density and pressure. Calculating and estimating strengthens numerical fluency and students' ability to judge whether answers are reasonable, while proof develops algebraic reasoning and the ability to construct logical mathematical arguments. Together, these topics prepare students for increasingly complex problem-solving across the mathematics curriculum.	Following the mock examinations, teaching is adapted to the specific needs of each class using Question Level Analysis (QLA) . This allows teachers to identify gaps in knowledge, misconceptions and priority areas for development, ensuring that curriculum time is targeted effectively. Regular retrieval through 'quick win' bell tasks allows students to revisit less secure knowledge frequently, strengthen recall and build confidence before applying their understanding to more demanding problems.
	Content (What)	Students apply angle properties involving straight lines, points, parallel lines, triangles, quadrilaterals, polygons and circles, including circle theorems and geometrical proof. They calculate with and convert compound measures including speed, density and pressure , interpreting these within numerical, algebraic and graphical contexts. Students strengthen written and mental calculation methods involving positive and negative integers and decimals, use the correct order of operations, and estimate to check the reasonableness of answers. They also distinguish between equations and identities and use algebra to construct and communicate mathematical proofs.	Curriculum content varies between teaching groups according to the priorities identified through mock examination performance and QLA. Teachers select specific topics for reteaching, consolidation and further practice , focusing on areas where students can make the greatest improvement. Bell tasks are used systematically to revisit identified areas for development through short, focused 'quick win' questions alongside more substantial teaching of priority topics.
	Acquire (Knowledge)	- Understand and apply key angle facts and geometrical properties, including angles on parallel lines, polygons, quadrilaterals and circle theorems. - Know how to calculate with and convert compound units, including speed, density and pressure, and use estimation and approximation to check the accuracy and reasonableness of calculations. - Understand the difference between an expression, equation and identity, and know how algebraic manipulation and established mathematical facts can be used to construct a proof.	- Secure key mathematical knowledge, methods and formulae within the priority areas identified through QLA. - Address specific gaps and misconceptions identified through mock examination performance. - Strengthen recall and retention of previously taught content through regular retrieval and spaced practice.
	Apply (Skills)	Students apply their knowledge to increasingly complex and multi-step problems by selecting appropriate geometrical, numerical and algebraic methods. They use angle facts to calculate unknown values and justify geometrical conclusions, including constructing simple proofs. Students calculate and convert compound measures,	Students apply their strengthened knowledge through targeted practice linked directly to areas identified for development. They correct misconceptions, practise appropriate mathematical methods and progress from accessible 'quick win' questions to increasingly complex and unfamiliar problems. Students use feedback

Werneth Mathematics Curriculum KS4

		interpret distance-time and velocity-time graphs, and use gradients and areas under graphs where appropriate. They apply efficient written and mental calculation strategies, use estimation to check solutions and construct algebraic arguments to demonstrate that mathematical statements are true. Throughout the unit, students develop fluency, reasoning and problem-solving , clearly communicating and justifying their mathematical thinking.	and assessment information to improve the accuracy and efficiency of their approaches, developing greater independence in selecting methods, reasoning mathematically and solving problems across the curriculum.
Summer 1	Content (Why)	This unit develops students' ability to make connections across geometry, proportional reasoning, algebra and statistics . Trigonometry builds on Pythagoras' Theorem and students' understanding of right-angled triangles, providing a foundation for later work involving bearings and non-right-angled triangles. Ratio strengthens proportional reasoning and prepares students for similarity and congruence. Surface area and volume extend previous learning about area, circles and compound measures into three-dimensional contexts. Functions develop students' understanding of algebraic relationships and processes, while histograms extend their statistical understanding of grouped and continuous data.	Following the mock examinations, teaching is adapted to meet the specific needs of each teaching group. Question Level Analysis (QLA) is used to identify gaps in knowledge, misconceptions and priority areas for development. This responsive approach ensures curriculum time is focused on the mathematical content where students require the greatest support. Regular ' quick win ' bell tasks provide retrieval of identified areas for improvement, strengthening fluency, recall and confidence.
	Content (What)	Students use sine, cosine and tangent to calculate missing sides and angles in right-angled triangles, including exact trigonometric values and problems in two and three dimensions. They simplify ratios, divide quantities in given ratios and apply ratio to scaling, conversion, mixing and other contexts. Students calculate the surface area and volume of prisms, cylinders, pyramids, cones, spheres and composite solids and interpret plans and elevations. They explore functions as input-output processes, including inverse and composite functions. Students also construct and interpret histograms involving equal and unequal class intervals.	Teachers plan and deliver topics according to the priorities identified through mock examination QLA, meaning curriculum content will vary between teaching groups. Priority topics are revisited through focused reteaching, modelling, guided practice and independent application. Bell tasks contain short 'quick win' questions linked directly to identified areas for improvement, alongside opportunities to revisit previously taught content.
	Acquire (Knowledge)	- Know and apply Pythagoras' Theorem and the trigonometric ratios (sine, cosine and tangent), and understand how ratio and proportion can be used to compare, divide and scale quantities. - Understand the properties of three-dimensional shapes and know the appropriate formulae for calculating surface area and volume, including circles, cylinders, pyramids, cones, spheres and composite solids. - Understand functions and statistical representations, including input-output relationships, inverse and composite functions, and how frequency density is used to construct and interpret histograms.	- Secure key mathematical knowledge, methods and formulae within the priority areas identified through QLA. - Address individual and whole-class gaps in knowledge and misconceptions identified through mock examination performance. - Strengthen retention and recall of previously taught mathematical content through regular retrieval and spaced practice.
	Apply (Skills)	Students apply their knowledge to increasingly complex and multi-step problems across geometry, algebra and statistics. They select and combine Pythagoras and trigonometry	Students apply their strengthened knowledge to targeted questions based on the needs identified through QLA. They progress from accessible ' quick win ' retrieval

Werneth Mathematics Curriculum KS4

		to determine unknown sides and angles, use ratio to solve proportional problems, and calculate surface areas and volumes of simple and composite three-dimensional shapes. Students interpret and manipulate functions, including inverse and composite processes, and construct and analyse histograms to interpret continuous data. Throughout the unit, students develop fluency, reasoning and problem-solving , selecting efficient methods, making connections between mathematical concepts and clearly communicating and justifying their solutions.	questions to more complex, multi-step and unfamiliar problems. Students use feedback to identify and correct misconceptions, select appropriate mathematical methods and improve the accuracy and efficiency of their solutions. This increasingly personalised approach develops fluency, reasoning, problem-solving and independence across the mathematics curriculum.
Summer 2	Content (Why)	This unit develops students' confidence with advanced algebraic manipulation and trigonometric reasoning , bringing together mathematical knowledge developed across earlier units. Expressions build on students' understanding of algebraic notation, expanding, factorising and indices, developing the fluency needed to manipulate increasingly complex expressions and construct mathematical arguments. Trigonometry extends students' previous work with right-angled triangles by introducing methods that can be applied to any triangle. Together, these topics strengthen students' ability to select, combine and justify mathematical methods and provide important foundations for further mathematical study beyond GCSE.	Examination preparation.
	Content (What)	Students simplify and manipulate algebraic expressions by collecting like terms, expanding brackets, factorising expressions and applying the laws of indices. They expand products of binomials, factorise quadratic expressions including the difference of two squares , and distinguish between expressions, equations, formulae and identities. In trigonometry, students extend their previous understanding of sine, cosine and tangent by applying the sine rule, cosine rule and area of a triangle formula to calculate unknown sides, angles and areas in non-right-angled triangles.	Examination preparation.
	Acquire (Knowledge)	- Understand how to simplify, expand and factorise algebraic expressions, including quadratics, the difference of two squares and expressions involving powers and the laws of indices. - Understand the distinction between expressions, equations, formulae and identities, and know how algebraic manipulation can demonstrate equivalence and support mathematical arguments. - Know and apply the sine rule, cosine rule and area of a triangle formula to calculate unknown sides, angles and areas in non-right-angled triangles.	Examination preparation.
	Apply (Skills)	Students apply their knowledge by selecting appropriate algebraic techniques to simplify, expand and factorise increasingly complex expressions and use these methods to construct and justify mathematical arguments. They identify the appropriate	Examination preparation.

Werneth Mathematics Curriculum KS4

		trigonometric method from the information provided and apply the sine rule, cosine rule and area formula to solve multi-step geometrical problems. Throughout the unit, students develop fluency, reasoning and problem-solving , making connections between algebra and geometry and communicating their mathematical reasoning accurately in preparation for further mathematical study.	
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