SUBJECT Curriculum Map

Year 8

Carnforth High School

Rationale and Links to The National Curriculum	
Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject. • To be **fluent** in the fundamentals of mathematics so that pupils have a deep conceptual understanding and are able to recall and apply mathematics skills quickly. • To **reason mathematically** by following lines of enquiry, developing arguments, drawing conclusions and generalisations from their findings. • To **solve problems** by applying their mathematical understanding to a variety of contextual and abstract problems. • To **communicate mathematically** using correct mathematical terminology and notation. • To recognise and appreciate the interlinking nature of mathematics and **make connections** through the different areas of maths. Year 8 students are taught elements of each topic area that build on knowledge acquired in year 7. The expectation is that the majority of students will progress through the scheme of learning at broadly the same pace. However, decisions about when to progress will always be based on the security of students' understanding and their readiness to progress. Decisions about student progression will be based on the security of students' understanding and their readiness to progress to the next stage. Students who grasp concepts rapidly will be challenged through being offered rich and sophisticated problems before any acceleration through new content in preparation for year 9. Those who are not sufficiently fluent should consolidate their understanding, including through additional practice, before moving on.	Throughout the five years, students will cover a range of topics within the following areas of mathematics: • Number • Algebra • Ratio, Proportion and Rates of Change • Geometry & Measures • Probability • Statistics The exact content within each area will differ depending on the students' recall of previous learning.

	Half Term 1	Half Term 2	Half Term 3
Key Topics	Unit 1 Ratio & Scale Unit 2 Multiplicative Change Unit 3 Multiplying & Dividing Fractions	Unit 4 Working in the Cartesian Plane Unit 5 Data Unit 6 Tables & Probability	Unit 7 Brackets Equations & Inequalities Unit 8 Sequences
Substantive Knowledge **(Bold is higher tier only)**	• Understand the meaning of and represent ratio with formal notation • Express ratios in their simplest integer form (including fractions and decimals) • Solve proportional problems involving the ratio m:n. • Divide a value into a given ratio (including a 3-part ratio) • Compare ratios and fractions e.g. a:b = : • Express a ratio in the form 1:n or n:1 • **Solve problems involving ratios …1:n or n:1 where n is an integer** • **Understand the gradient of a line as a ratio** • **Express fractional and algebraic ratios in their simplest form** • Solve problems using direct proportion • Interpret conversion graphs • Convert between currencies • Interpret maps using simple scale factors and ratios • Draw and interpret scale diagrams and maps using any scale factor • Understand scale factors as multiplicative representations • Calculate missing sides in a similar shape with an integer scale factor • **Explore direct proportion graphs** • Represent multiplication of fractions diagrammatically • Multiply fractions by an integer • Find the product of a pair of any fraction • Understand and use the reciprocal of fractions • Divide an integer by a fraction • Divide a fraction by a unit fraction	• Work with coordinates in all four quadrants • Identify and draw lines that are parallel to the axes • Recognise and use the line y=x • Identify the gradient of the line y= kx • Recognise and use lines of the form y= x + a • Plot graphs of the form y=mx + c • Link y = kx to direct proportion problems (and graphs) • Link graphs of y=mx + c to linear sequences • Interpret graphs with a negative gradient (including those needing rearrangement) • **Identify non-linear graphs, including a quadratic** • **Find the midpoint of a line segment** • Identify different types of data (discrete, continuous, quantitative & qualitative) • Read and interpret ungrouped and ungrouped frequency tables • Represent grouped discrete and continuous data (include tally charts) into a frequency table • Draw and interpret scatter graphs • Understand and describe linear correlation • Draw and use a line of best fit • Construct and interpret two-way tables • Identify non-linear relationships • Understand interpolation and extrapolation • Construct sample spaces for one or more events • Find probabilities from a sample space, two-way tables and from Venn diagrams • **Use the product rule for finding the total number of possible outcomes**	• Form and simplify algebraic expressions • Use directed number with algebra • Multiply out a single bracket • Expand and simplify multiple single brackets • Factorise into a single bracket • Solve equations, including with brackets • Identify and use formulae, expressions, identities and equations • Form and solve equations with brackets • Understand and solve simple inequalities • Form and solve inequalities • Expand two binomials **(including the difference of two squares)** • **Solve equations and inequalities with unknowns on both sides** • Generate sequences given a sequence in words (include arithmetic, geometric, Fibonacci and quadratic) • Generate sequences given a simple or complex algebraic rule • **Find the nth term rule for a linear sequence**

	• Divide any pair of fractions (including mixed numbers) • **Multiply and divide algebraic fractions**		
Disciplinary Knowledge (**Bold is higher tier only**)	Select and apply the most appropriate mathematical method to solve problems, including those, by working with: • Ratio with formal notation • Ratios in their simplest integer form (including fractions and decimals) • Solve proportional problems involving the ratio m:n and dividing a value into a given ratio (including a 3-part ratio) • Ratios and fractions e.g. a:b = **:** • Ratio in the form 1:n or n:1 • **The gradient of a line as a ratio** • **Fractional and algebraic ratios in their simplest form** • Direct proportion • Conversion graphs • Conversions between currencies • Maps using simple scale factors and ratios • Draw and interpret scale diagrams and maps using any scale factor • Understand scale factors as multiplicative representations • Calculate missing sides in a similar shape with an integer scale factor • **Explore direct proportion graphs** • Represent multiplication of fractions diagrammatically • Multiply fractions by an integer • Find the product of a pair of any fraction • Understand and use the reciprocal of fractions • Divide an integer by a fraction • Divide a fraction by a unit fraction • Divide any pair of fractions (including mixed numbers) • **Multiply and divide algebraic fractions**	Select and apply the most appropriate mathematical method to solve problems, including those, by working with: • Coordinates in all four quadrants • Lines that are parallel to the axes • The line y=x • The gradient of the line y= kx • Lines of the form y= x + a • Graphs of the form y=mx + c • y = kx and links to direct proportion problems (and graphs) • Graphs of y=mx + c and links to linear sequences • Graphs with a negative gradient (including those needing rearrangement) • **Non-linear graphs, including a quadratic** • **Midpoints of a line segment** • Different types of data (discrete, continuous, quantitative & qualitative) • Ungrouped and ungrouped frequency tables • Grouped discrete and continuous data (include tally charts) into a frequency table • Scatter graphs • Linear correlation and a lie of best fit • Non-linear relationships • Interpolation and extrapolation • Two-way tables and sample spaces for one or more events • Probabilities from a sample space, two-way tables and from Venn diagrams • **The product rule for finding the total number of possible outcomes**	Select and apply the most appropriate mathematical method to solve problems, including those, by working with: • Simple algebraic expressions • Directed number with algebra • Multiply out and expand into a single bracket and multiple single brackets • Solving equations, including with brackets • Formulae, expressions, identities and equations • Understand and solve simple inequalities • Form and solve inequalities • Two binomials **(including the difference of two squares)** • **Equations and inequalities with unknowns on both sides** • Sequences given in words (include arithmetic, geometric, Fibonacci and quadratic) • Sequences given as a simple or complex algebraic rule • **Find the nth term rule for a linear sequence**
Assessment (The methods that	• Autumn assessment consisting of one calculator and one non-calculator paper	• Check In Tasks are completed the week prior to teaching to assess retained knowledge and starting point.	• Check In Tasks are completed the week prior to teaching to assess retained knowledge and starting point.

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<tr><td>teachers will use to assess the progress of all students)</td><td colspan="2">• Check In Tasks are completed the week prior to teaching each unit to assess retained knowledge and starting point.
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The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof.
Students are assisted in making their thinking clear to themselves as well as others and explicit modelling is a key priority for classroom teaching. Teachers ensure that pupils build secure foundations by using discussion and whiteboard assessment to probe and remedy any misconceptions.</td></tr>
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Year 8

	Half Term 4	Half Term 5	Half Term 6
Key Topics	Unit 9 Indices Unit 10 Fractions & Percentages Unit 11 Standard Index Form	Unit 12 Number Sense Unit 13 Angles in Parallel Lines &Polygons	Unit 14 Area of Trapezia & Circles Unit 15 Line Symmetry & Refection Unit 16 Data Unit 17 Measure of Location
Substantive Knowledge **(Bold is higher tier only)**	• Add and subtract expressions with indices • Simplifying expressions by multiplying and dividing indices • Using the addition and subtraction laws for indices • **Identify powers of powers (brackets) (H)** • Convert fluently between fractions, decimals and percent • Calculate key fractions, decimals and percentages of amounts without a calculator • Understand fractions as division • Express one number as a fraction or percentage of another (with and without a calculator) • Calculate percentage increase and decrease using a multiplier • Convert between FD&P greater than 1 • **Work with percentage change** • **- find the original amount, given the percentage increase or decrease** • **Solve complex percentage problems** • Investigate positive powers of 10 (i.e. 10=100, 100^3 = 1000…) • Work with numbers greater than 1 in standard form • Compare and order numbers in standard form • Add and subtract numbers in standard form (including with)	• Round numbers to any given number of d.p. • Round numbers to powers of 10 and 1 S.F. • Estimate the answer to a calculation • Calculate using the order of operations (BIDMAS) • Calculate with money • Solve problems involving time and calendar • Convert metric measures of length • Convert metric units of weight and capacity • **Convert metric units of area and volume** • **Understand and use error interval notation** • Understand and use basic angle rules & notation • Reason with angles between parallel lines and the transversal • Identify and calculate with co-interior, alternate and corresponding angles • Construct triangles and special quadrilaterals • Reason with the properties of special quadrilaterals • Calculate and use the sum of exterior angles of any polygon • Calculate and use the sum of interior angles of any polygon • Calculate missing interior angles in regular polygons • **Prove simple geometric facts** • **Construct an angle bisector and a perpendicular bisector of a line segment** • **Solve complex problems with parallel line angles**	• Calculate the area of triangles, rectangles, parallelograms and trapezia • Calculate the perimeter and area of compound shapes • Calculate the area of a circle and parts of a circle with and without a calculator • **Solve problems to find missing lengths/radius with triangles, rectangles, circles and trapezia** • Recognise line symmetry • Reflect a shape in a horizontal, vertical or diagonal line where shapes are touching or not touching the line • **Describe a shape that has been reflected in a horizontal or vertical line** • **Understand variance and invariance in the context of reflections** • Set up a statistical enquiry • Design and criticise questionnaires • Draw and interpret pictograms, bar charts and vertical line charts • Draw and interpret line graphs, multiple bar charts and pie charts • Choose the most appropriate diagram for a given set of data • Identify misleading graphs • Represent and interpret grouped quantitative data • Find, interpret and compare the range, mean, median and mode from raw data or those in diagrams, tables and charts • Identify outliers and suggest causes

	• Multiply and divide numbers in standard form (including with) • Use a calculator to work in standard form and to check calculations • **Understand and use negative and fractional indices**		• **Find the mean (and mode/modal class) from a grouped and an ungrouped frequency table**
Disciplinary Knowledge (**Bold is higher tier only**)	Select and apply the most appropriate mathematical method to solve problems, including those, by working with: • Indices • **Identify powers of powers (brackets) (H)** • Fractions, decimals and percent • Key fractions, decimals and percentages of amounts without a calculator • Fractions as division • Expressing one number as a fraction or percentage of another (with and without a calculator) • Calculating percentage increase and decrease using a multiplier • Converting between FD&P greater than 1 • **Percentage change**, including **finding the original amount, given the percentage increase or decrease** • **Complex percentage problems** • Positive powers of 10 (i.e. 10=100, 100^3 = 1000…) • Numbers greater than 1 in standard form • Standard form (including those with negatives powers) • Work in standard form and to check calculations • **Negative and fractional indices**	Select and apply the most appropriate mathematical method to solve problems, including those, by working with: • Rounding numbers to any given number of d.p. • Round numbers to powers of 10 and 1 S.F. • Estimating the answer to a calculation • Order of operations (BIDMAS) • Money, time and calendar conversions • Metric measures of length, weight and capacity • **Metric units of area and volume** • **Error interval notation** • Basic angle rules & notation • Angles between parallel lines and the transversal • Calculate with co-interior, alternate and corresponding angles • Constructions of triangles and special quadrilaterals • Reasoning with the properties of special quadrilaterals • Calculating and use the sum of exterior angles of any polygon • Calculating and use the sum of interior angles of any polygon • Calculating missing interior angles in regular polygons • **Proof and simple geometric facts** • **Constructing an angle bisector and a perpendicular bisector of a line segment** • **Complex problems with parallel line angles**	Select and apply the most appropriate mathematical method to solve problems, including those, by working with: • Area of triangles, rectangles, parallelograms and trapezia • Perimeter and area of compound shapes • Area of a circle and parts of a circle with and without a calculator • **Missing lengths/radius with triangles, rectangles, circles and trapezia** • Line symmetry • Reflections of a shape in a horizontal, vertical or diagonal line where shapes are touching or not touching the line • **A shape that has been reflected in a horizontal or vertical line** • **Variance and invariance in the context of reflections** • A statistical enquiry • Questionnaires • Pictograms, bar charts and vertical line charts • Line graphs, multiple bar charts and pie charts • Misleading graphs • Grouped quantitative data • The range, mean, median and mode from raw data or those in diagrams, tables and charts • Outliers and suggest causes
Assessment (The methods that teachers will use to assess	• Spring assessment consisting of one calculator and one non-calculator paper • Check In Tasks are completed the week prior to teaching each unit to assess retained knowledge and starting point.	• Check In Tasks are completed the week prior to teaching to assess retained knowledge and starting point. • Check Out Tasks are completed the week following teaching with a teacher-led feedback and improvement lesson following marking.	• Summer assessment consisting of one calculator and one non-calculator paper • Check In Tasks are completed the week prior to teaching to assess retained knowledge and starting point.

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Reading, Writing and Vocabulary	The national curriculum for mathematics reflects the importance of spoken language in students' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. Students are assisted in making their thinking clear to themselves as well as others and explicit modelling is a key priority for classroom teaching. Teachers ensure that pupils build secure foundations by using discussion and whiteboard assessment to probe and remedy any misconceptions.		
	index indices power square cube root operations brackets laws exact approximate zero negative reciprocal standard form index / indices order compare	fraction percentage equivalent place value proper improper mixed number change increase decrease multiplier profit loss original simple interest	truncate round number digit decimal place significant figure estimate estimation accuracy error interval inequality standard form compare order
	angle measure protractor properties triangle quadrilateral solve polygon interior exterior parallel alternate corresponding co-interior prove construct compasses bisector perpendicular	Trapezium / trapezia Radius Circumference Pi Diameter Sector Perpendicular height reflect reflection describe variant invariant transformation line symmetry symmetrical order centre data quantitative qualitative discrete continuous tally chart Frequency	grouped class interval scatter graph correlation line of best fit interpolation extrapolation comparative composite measure average mean median mode frequency appropriate spread range outlier anomaly compare distribution grouped class interval modal class
Numeracy	• As defined		
Personal Development	•	•	•