SUBJECT Curriculum Map

Year 10

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. 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. 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 spend time consolidating their understanding, including through additional practice, before moving on. In key stage 4 students are separated into Foundation and Higher Tier pathways. Cross-over topics are taught to both pathways to maximise best outcomes for all students when tiering is finalised in year 11.	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.

Year 10	Half Term 1	Half Term 2	Half Term 3
Key Topics	Unit 1 Congruence Similarity & Enlargement Unit 2 Trigonometry	Unit 3 Representing Solutions Equations & Inequalities Unit 4 Simultaneous Equations Unit 5 Angles & Bearings	Unit 6 Working with Circles Unit 7 Vectors Unit 8 Ratios & Fractions
Substantive Knowledge **(Bold is higher tier only)**	Know how to: • Work with scale factors to enlarge 2D **and 3D** shapes • Use scale factors and ratios to interpret and describe maps and real-life • Describe an enlargement by a positive, fractional, **or negative** scale factor • Recognise the difference and the similarities between similar and congruent shapes • Use linear (**area and volume**) scale factors to determine whether two shapes are similar or to find missing values • Work out missing sides and angles in any pair of given similar shapes (including overlapping and 'twisted' shapes of any fractional scale factor) • Recall and use proof of congruent triangles (SSS, ASA, SAS and RHS) • Recognise and apply known rules to perform transformations of rotations, reflections, enlargements and translations • Recall and use Pythagoras' theorem to find missing sides of right-angled triangles **(including those in 3D shapes)** • Recall and use trigonometric ratios to find both sides and angles (**including those in 3D shapes)** • **Recognise and apply the cosine, sine and area sine rule to find missing sides and angles (including those in 3D shapes)**	Know how to: • Calculate values into a table and plot related straight line graphs from these or from gradients and y-axis intercepts • Solve one and two-step equations and inequalities and represent solutions on a number line using notation • Recognise when some equations can have more than one solution • **Represent solutions to single and multiple inequalities on a graph (H)** • **Solve quadratic inequalities in one variable (H)** • Factorise into a single bracket • Expand and collect like terms from one or more single brackets • **Solve quadratic equations through factorisation (H)** • Change the subject of a formula and rearrange equations into the form *y=mx + c* • Factorise quadratics (including the difference of two squares) • Solve simultaneous equations by elimination and substitution • **Determine whether a given (x,y) is a solution to both a linear and quadratic equation (H)** • **Solve a pair of simultaneous equations (one linear and one quadratic) algebraically and graphically (H)** • Draw and measure angles (and bearings) up to 360° using a protractor, pencil and ruler. • Recall and use basic angle facts to solve angle problems. • Identify and calculate with alternate angles, corresponding angles, co-interior angles in parallel lines. • Use cardinal direction and related angles (measures of turn) to find values. • Use cardinal directions and related angles (R) • Read, measure, represent and calculate with bearings, including those in scale drawings	Know how to: • Label parts of a circle • Use the formula to find the area/sector and circumference/arc of a circle (or part of a circle) in terms of pi and to rounded values, with and without a calculator • Calculate the perimeter of any sector (including in terms of pi or as rounded values) • Calculate the surface area of a cone, sphere, prism, cylinder and pyramid, including composite shapes. • Calculate the volume of a cone, sphere, prism, cylinder and pyramid, including composite shapes. • **Recognise circle theorems reasoning to related problems** • Represent, perform, read and describe translations using vectors both diagrammatically and with column representations • Draw and understand vectors multiplied by a scalar • Draw and understand addition and subtraction of vectors, including vector journeys in shapes • **Recognise quadrilaterals using vectors, including parallel vectors and co-linear points** • **Use vectors to construct geometric arguments and proofs (Points on a straight line)** • Understand and use ratio notation (linked to fractions) to compare and share quantities and combine ratios • Solve problems with currency conversion ratio • Express ratio in their simplest form or as 1:n or n:1 • Understand the gradient of a line and scales as a ratio • Link ratios and direct proportion graphs • Link ratios and algebra (interpret equations) • Compare quantities to solve simple and complex best buy problems • **Work with ratio in area, volume and more complex mixed ratio problems (H)** • **Calculate area and volume scale factors to find missing values (H)**

		• Recall and use trigonometric ratios and Pythagoras to solve bearing problems (**using the Sine and Cosine rules (H)**)	
Disciplinary Knowledge (**Bold is higher tier only**)	Select and apply the most appropriate mathematical method to solve problems, including those , by working with: • Scale factors to enlarge 2D **and 3D** shapes • Scale factors and ratios to interpret and describe maps and real-life problems • Enlargements using a positive, fractional, **or negative** scale factor • Similar and congruent shapes **(including 3D)** • Linear (**area and volume**) scale factors to determine whether two shapes are similar or to find missing values • The missing sides and angles in any pair of given similar shapes (including overlapping and 'twisted' shapes of any fractional scale factor) • Proof of congruent triangles (SSS, ASA, SAS and RHS) • Transformations of rotations, reflections, enlargements and translations • Pythagoras' theorem to find missing sides of right-angled triangles **(including those in 3D shapes)** and with trigonometry • Trigonometric ratios to find both sides and angles (**including those in 3D shapes)** and with Pythagoras • **The cosine, sine and area sine rule to find missing sides and angles (including those in 3D shapes)** and with Pythagoras • Exact trigonometric values key angles in right-angles triangles (exact values)	Select and apply the most appropriate mathematical method to solve problems, including those , by working with: • Understanding what the meaning of a solution is and use or interpret this to solve problems algebraically or graphically • Algebraic methods to form and solve one-and two-step equations and inequalities • Interpreting representations on number lines as inequalities • Methods to form & solve equations and inequalities algebraically and from a graph • Straight line graphs or from gradients and y-axis intercepts • One and two-step equations and inequalities to solve, including represent solutions on a number line using notation • Questions that have more than one solution • **Single and multiple inequalities on a graph (including quadratics) to find solutions, including those (H)** • Identifying factorisation methods for single brackets or **quadratics** (including the difference of two squares) • Interpreting problems to know when to expand and collect like terms from one or more single brackets • Interpreting the change the subject of a formula and rearranging equations into the form y=mx + c • Selecting appropriate methods to work with and solve simultaneous equations by elimination and substitution (including quadratics) • **Identifying when a given (x,y) is a solution to both a linear and quadratic equation (H)** • Identifying angles (and bearings) up to 360° using a protractor, pencil and ruler. • Basic angle facts to solve angle problems. • Identifying alternate angles, corresponding angles, co-interior angles in parallel lines. • Recalling and apply trigonometric ratios and Pythagoras to solve bearing problems (**using the Sine and Cosine rules (H)**)	Select and apply the most appropriate mathematical method to solve problems, including those , by working with: • Parts of a circle and related formulae to find the area/sector and circumference/arc of a circle (or part of a circle) in terms of pi and to rounded values, with and without a calculator, including problems • Formulae to calculate the perimeter of any sector (including in terms of pi or as rounded values) or compound shape, including problems and similar shapes. • Formulae to calculate the surface area and volume of a cone, sphere, prism, cylinder and pyramid, including composite shapes, including problems and similar shapes. • **Circle theorems reasoning to related problems**, including problems . • Vectors - including translations using vectors both diagrammatically and with column representations • Vector calculations, including using scalars and within shapes • **Vector knowledge applied to quadrilaterals, including working with parallel vectors and co-linear points** • **Vector knowledge applied to construct geometric arguments and proofs (Points on a straight line)** • Ratio notation and methods (linked to fractions) to compare and share quantities, combine ratios and work with currency conversion problems • Ratio methods to simplify problems as 1:n or n:1 • Ratio and algebra, including direct proportion graphs, gradients and equations to solve problems . • Formal written to compare quantities to solve simple and complex best buy problems • **Ratio in area, volume and more complex mixed ratio problems, including finding missing values (H)**
Assessment (The methods that	• Check In Tasks are completed the week prior to teaching each unit to assess retained knowledge and starting point.	• Autumn Assessments • 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.

teachers will use to assess the progress of all students)	• Check Out Tasks are completed the week following teaching with a teacher-led feedback and improvement lesson following marking.		• Check Out Tasks are completed the week following teaching with a teacher-led feedback and improvement lesson following marking.		• Check Out Tasks are completed the week following teaching with a teacher-led feedback and improvement lesson following marking.	
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.					
	congruent congruence similar scale factor enlargement centre ray vector length parallel fractional	trigonometry adjacent opposite sine cosine tangent hypotenuse	expression equation inequality number line quadratic factorise solve set notation quadratic inequality	simultaneous equations solve term like coefficient substitution elimination adjusting/scaling scale diagrams scale factor bearings clockwise North parallel alternate corresponding co-interior	semi-circle quarter-circle arc length perimeter pi radius diameter area circumference volume surface area cylinder prism pyramid sector cone sphere circle theorem segment cyclic quadrilateral	vector column vector scalar parallel collinear ratio fraction share direct proportion currency conversion scale factor multiplicative
Numeracy	As defined					
Personal Development	•		•		•	

Year 10

	Half Term 4	Half Term 5	Half Term 6
Key Topics	Unit 9 Percentages & Interest Unit 10 Probability	Unit 11 Data	Unit 12 Non-Calculator Methods Unit 13 Number & Sequences Unit 14 Indices & Roots Unit 15 Manipulating Expressions
Substantive Knowledge **(Bold is higher tier only)**	• Convert and compare Fractions, Decimals and Percentages interchangeably • Express one number as a percentage of another • Perform fraction calculations • Work out percentages of amounts (with and without a calculator) • Increase/decrease values by a given percentages (with and without a calculator) • Calculate simple and compound interest, **including repeated percentage change,** growth and decay • Find the original value after a percentage change • Solve simple problems involving percentages, ratios and fractions • **Perform iterative processes to solve equations (Use trial and error to introduce the topic)** • Use probability language and the probability scale • Find probabilities using equally likely outcomes and recall that probabilities sum to 1 • Read and Create Venn, two-way tables diagrams, frequency trees and tree diagrams and sample space diagrams • Find the probability from Venn, two-way tables diagrams, frequency trees and tree diagrams and sample space diagrams **(including conditional probability** Identify experimental data and use it to estimate probabilities (link to sampling) • **Use the product rule for counting**	• Read and interpret grouped and ungrouped frequency tables • Represent continuous data grouped into equal classes in a frequency table (include tally charts) • Construct, interpret and represent data in a Two-Way table • Construct and interpret scatter graphs, including outliers, extrapolation, describing linear correlation and drawing and using a line of best fit • The different types of data, continuous, discrete, qualitative and quantitative • Construct and represent grouped data into a frequency table using a tally chart • Construct and interpret pictograms, frequency polygons, bar charts, vertical line graphs, pie charts comparative and composite bar charts • Find and interpret the mean/median/mode and range from a grouped table • Identify primary and secondary data is • Construct and interpret stem / leaf and time series graphs • Criticise charts and graphs • Compare distributions using charts and measures • Choose the most appropriate diagram for a given set of data • **Construct a stratified sample (H)** • **Construct and interpret histograms, box plots and cumulative frequency diagrams to find measures (H)** • **Identify and work with quartiles and inter-quartile range (H)** • **Interpret, analyse and compare different distributions using complex charts and measures of average and range (H)**	• Identify Direct proportion problems • Evaluate squares, cubes and their associated roots • Perform calculations which result in answers given in terms of pi • Round numbers to the nearest 10, 100, 100 etc, decimal places or significant figures • Simplify surds and carry out the four operations with surds • Describe the difference between linear and non-linear sequences • Describe the term-to-term rule and continue linear sequences, triangular numbers, square numbers, cube numbers, arithmetic progressions, **quadratic** and geometric progressions both numerically and diagrammatically • Find the missing terms in any sequence • Link graphs of y=mx+c to linear sequences • Find the nth term of an arithmetic, geometric and **quadratic** sequence • Understand and describe place value and powers of 10 • Write ordinary numbers into standard form and vice-versa • Order and compare numbers given in standard form • Perform the 4 operation calculations with standard form • Use a calculator to work in standard form and to check answers • Understand and use basic laws of indices including; multiplying; dividing; and raising to a power • Understand and use (calculate with) the laws of indices including power of zero and negative indices • Understand and use **fractional** indices • Understand and use base numbers to help simplify e.g. calculate 64 x 4^3 = 2^x • Substitute values into 2 step expression and use simple function machines, including those representing area

			and volume, to find missing values (and working backwards) • Expand and factorise single and multiple brackets, including those in identities • Represent numbers algebraically • Form and solve equations and inequalities with fractions • **Perform the 4 operation calculations to algebraic fractions (H)** • **Solve equations with algebraic fractions (H)** • **Perform algebraic arguments and proof**
Disciplinary Knowledge (**Bold is higher tier only)**	Select and apply the most appropriate mathematical method to solve problems, including those, by working with: • Conversion and comparison of Fractions, Decimals and Percentages interchangeably • Interpreting and expressing one number as a percentage of another • Fraction calculations • Percentages of amounts (with and without a calculator) • Increasing/decreasing of values by a given percentages (with and without a calculator) • Selecting methods for calculating simple and compound interest, **including repeated percentage change,** growth and decay • Finding the original value after a percentage change and know when to solve simple problems involving percentages, ratios and fractions • **Iterative processes to solve equations (Use trial and error to introduce the topic) (H)** • Probability language and the probability scale, including using equally likely outcomes • Venn, two-way tables, frequency trees and tree diagrams and sample space diagrams • Finding the probability from Venn, two-way tables diagrams, frequency trees and tree diagrams and sample space diagrams **(including conditional probability H)** • Identifying experimental data and use it to estimate probabilities (link to sampling) • **Using the product rule for counting (H)**	Select and apply the most appropriate mathematical method to solve problems, including those, by working with: • Grouped and ungrouped frequency tables • Continuous data grouped into equal classes in a frequency table (include tally charts) to solve problems • Data in a Two-Way tables to solve problems • Scatter graphs, including outliers, extrapolation, describing linear correlation and drawing and using a line of best fit • Compare and contrast different types of data, continuous, discrete, qualitative and quantitative • Grouped data and frequency tables to solve problems • Pictograms, frequency polygons, bar charts, vertical line graphs, pie charts comparative and composite bar charts to solve problems • Mean/median/mode and range from a grouped table to solve problems • Primary and secondary data • Stem / leaf and time series graphs to solve problems • Criticising charts and graphs and interpret responses • Comparing distributions using charts and measures and interpret responses • Choosing the most appropriate diagram for a given set of data to interpret results • **Stratified sampling (H)** • **Histograms, box plots and cumulative frequency diagrams to solve problems (H)** • **Quartiles and inter-quartile range (H) and interpret results** • **Different distributions using complex charts and measures of average and range (H)**	Select and apply the most appropriate mathematical method to solve problems, including those, by working with: • Direct proportion to solve problems • Squares, cubes and their associated roots to solve problems • Problems which result in answers given in terms of pi • Rounding and estimating to the nearest 10, 100, 100 etc, decimal places or significant figures to solve problems • Surd calculations to solve problems • Term-to-term rule and continue linear sequences, triangular numbers, square numbers, cube numbers, arithmetic progressions, **quadratic** and geometric progressions both numerically and diagrammatically to solve problems • Missing terms in any sequence to solve problems • Graphs of y=mx+c and linear sequences to solve problems • The nth term of an arithmetic, geometric and **quadratic** sequence to solve problems • Ordinary numbers and standard form and associated calculations to solve problems • The laws of indices including; multiplying; dividing; and raising to a power, power of zero and negative and **fractional** indices to solve problems • Base numbers to help simplify e.g. calculate 64 x 4^3 = 2^x • Substitution of values into 2 step expression and use simple function machines, including those representing area and volume, to find missing values (and working backwards) to solve problems

			• Algebraic methods to expand and factorise single and multiple brackets, including those in identities, equations and inequalities to solve problems • **4 operation calculations to algebraic fractions (H)** to solve problems • **Algebraic methods to solve equations with algebraic fractions (H)** • **Algebraic arguments and proof**
Assessment (The methods that teachers will use to assess the progress of all students)	• Check In Tasks are completed the week prior to teaching each unit 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.	• Y10 Mocks • 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.	• 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.
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.		
	percentage multiplier simple interest compound interest growth decay trial and improvement iteration iterative formula	probability event Venn diagram frequency tree sample space independent tree diagram conditional two-way table product rule counting	population sample primary data secondary data frequency polygon bar chart pie chart mean median mode range
	grouped data ungrouped data time series graph quartile(s) inter-quartile range box plot stratified sample histogram class interval	bills bank statements credit debit balance best buy limits of accuracy rational irrational surd bound(s) rationalise denominator sequence linear arithmetic geometric quadratic	Fibonacci nth term standard form index/indices laws of indices base power simultaneous equations solve term like coefficient substitution elimination adjusting/scaling
Numeracy	• As defined		
Personal Development	•	•	•