KS4 COURSE STRUCTURE

Course Title	Mathematics
Qualification (GCSE, BTEC etc)	GCSE
Exam Board	Edexcel

	Units Delivered		
	Year 9	Year 10	Year 11
Autumn 1	• 9.01: Straight line graphs • 9.02: Forming and solving equations	• 10.01: Congruence, similarity and enlargement • 10.02: Trigonometry	• 11.01: Trigonometry • 11.02: Gradients and lines
Autumn 2	• 9.03: Three-dimensional shapes • 9.04: Construction and Congruency	• 10.03: Representing solutions of equations and inequalities • 10.04: Simultaneous Equations	• 11.03: Non-linear graphs • 11.04: Using Graphs • 11.05: Expanding and Factorising
Spring 1	• 9.05: Numbers • 9.06: Percentages and Money	• 10.05: Angles and Bearings • 10.06: Working with Circles	• 11.06: Changing the Subject • 11.07: Vectors • 11.08: Functions
Spring 2	• 9.07: Deductions • 9.08: Rotations and Translations	• 10.07: Vectors • 10.08: ratios and Fractions	• 11.09: Working with Circles and Circle Theorems • 11.10: Algebraic Fractions • 11.11: Graphs
Summer 1	• 9.09: Pythagoras • 9.10: Enlargement and similarity • 9.11: Ratio and Proportion • 9.12: Rates	• 10.09: Percentages and Interest • 10.10: Probability • 10.11: Collecting, representing and Interpreting Data	Revision
Summer 2	• 9.13 Probability • 9.14 Algebraic Representations	• 10.12: Non-Calculator Methods • 10.13: Types of Number& Sequences	

	Progress Assessment Task Schedule		
	Year 9	Year 10	Year 11
Autumn 1	1) EOU for 9.01 2) EOU for 9.02	1) EOU for 10.01 2) EOU for 10.02	1) EOU for 11.01 2) EOU for 11.02
Autumn 2	1) EOU for 9.03 2) EOU for 9.04 3) End of Term	1) EOU for 10.03 2) EOU for 10.04 3) End of Term	1) EOU for 11.03 2) EOU for 11.04 3) MOCK EXAMS
Spring 1	1) EOU for 9.05	1) EOU for 10.05	1) EOU for 11.05 2) EOU for 11.06 3) EOU for 11.07 4) EOU for 11.08
Spring 2	1) EOU for 9.06 2) End of Term	1) EOU for 10.06 2) EOU for 10.07 3) End of Term	1) EOU for 11.09 2) EOU for 11.10 3) EOU for 11.11 4) MARCH MOCKS
Summer 1	1) EOU for 9.08 2) EOU for 9.09 3) EOU for 9.10 4) EOU for 9.11	1) EOU for 10.09 2) EOU for 10.10	
Summer 2	1) EOU for 9.12 2) END OF YEAR 3) EOU for 9.13	1) EOU for 10.11 2) END OF YEAR 3) EOU for 10.12 4) EOU for 10.13	

Unit Details

Key Stage	4
Year Group	9
Unit Title	9.01: Straight Line Graphs

Completion Schedule

Content Delivered	
Prior Knowledge	• Identify and draw lines that are parallel to the axes. • Recognise, use and draw the lines $y = x$ and $y = -x$ • Substitute into equations. • Use a table of values to plot straight line graphs.
Core Concepts	• Identify and compare gradients using $y = mx + c$ • Identify and compare y-intercepts using $y = mx + c$ • Understand and use $y = mx + c$ • Identify parallel lines using $y = mx + c$ • Equation of parallel lines given $y = mx + c$ and y-intercept • Calculate the gradient given two points. • Calculate the gradient of a line from a graph. • Equation of a line from a graph. • Interpret gradient and intercepts of real-life graphs. • Find the equations of real-life straight-line graphs. • Construct real-life graphs.
Stretch and Challenge	• Rearrange equations to write them in the form $y = mx + c$ • Model real-life graphs for inverse proportion. • Identify perpendicular lines using $y = mx + c$ • Equation of a straight-line graph given one point and gradient • Equation of a straight-line graph given two points. • Find the equation of perpendicular lines from a graph. • Equation of a perpendicular line given $y = mx + c$ and y-intercept.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• develop algebraic and graphical fluency, including understanding linear and simple quadratic functions • recognise, sketch and produce graphs of linear and quadratic functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane • interpret mathematical relationships both algebraically and graphically • reduce a given linear equation in two variables to the standard form $y = mx + c$; calculate and interpret gradients and intercepts of graphs of such linear equations numerically, graphically and algebraically • use linear and quadratic graphs to estimate values of y for given values of x and vice versa and to find approximate solutions of simultaneous linear equations • solve problems involving direct	Horizontal Vertical Straight line Graph Parallel Slope Coordinate Product	Parallel Axis Equation Intercept Linear Table of values Gradient Direct proportion Inverse proportion Perpendicular Reciprocal

Unit Details

Key Stage	4
Year Group	9
Unit Title	9.02: Forming and Solving Equations

Completion Schedule

Content Delivered	
Prior Knowledge	• Solve equations with one-step. • Expand a single bracket. • Solve equations with two or more steps. • Substitution into expressions. • Area of shapes such as rectangles and triangles.
Core Concepts	• Form and solve equations. • Solve equations with unknowns on both sides. • Solve one-step inequalities. • Solve inequalities with two or more steps. • Solve inequalities with unknowns on both sides. • Form and solve inequalities. • Substituting into formulae and expressions. • Changing the subject of formula (one-step) • Changing the subject of a formula (two-step) • Expanding a pair of binomials.
Stretch and Challenge	• Changing the subject of more complex formula including brackets and powers. • Expand triple brackets

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• move freely between different numerical, algebraic, graphical and diagrammatic representations [for example…equations and graphs] • use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement) • understand and use standard mathematical formulae; rearrange formulae to change the subject • model situations or procedures by translating them into algebraic expressions or formulae, and by using graphs.	Solve Unknown Form Check	Equation Inequality Solution Inverse Expand Coefficient Substitute Variable Subject Formula Inverse Rearrange

Unit Details

Key Stage	4
Year Group	9
Unit Title	9.03: Three -dimensional Shapes

Completion Schedule

Content Delivered	
Prior Knowledge	• Know names of 2-D and 3-D shapes • Use key vocabulary of vertices, edges and faces to describe 3-D shapes. • Calculate the area of a square and rectangle. • Calculate the area of a parallelogram. • Calculate the area of a triangle. • Calculate the area of a trapezium. • Calculate the area of compound shapes. • Calculate the area of a circle. • Calculate the circumference of a circle. • Round to 1 decimal place • Round to 1,2 and 3 significant figures.
Core Concepts	• Accurate nets of cuboids and other 3-D shapes. • Construct and interpret plans and elevations. • Calculate the surface area of cubes and cuboids. • Calculate the surface area of triangular prisms. • Calculate the surface area of a cylinder. • Volume of a cube and cuboid. • Volume of a cylinder • Volume of other 3-D shapes. • Calculate the missing side given the volume of a cube, cuboid or cylinder.
Stretch and Challenge	• Volume of a pyramids (given perpendicular height) • Volume of a cone and sphere (given perpendicular height) • Calculate the missing side given the volume of a cone, sphere or pyramid. • Find the volume of compound 3-D shapes • Find the surface area of compound 3-D shapes.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Use language and properties precisely to analyse numbers, algebraic expressions and 2D and 3D shapes • Use the properties of faces, surfaces and vertices of 3D shapes. • Derive and apply formula to calculate and solve problems involving: perimeter and area of triangles, parallelograms, trapezia, volume of cuboid (including cubes) and other prisms (including cylinders)	Dimensions Face Edge Net Plan Compound Units Surface	Cube/cuboid Cone Cylinder Sphere Pyramid Vertex Polygon Prism Cross-section Area Front elevation Side elevation Isometric Perpendicular height Formulae Surface area Circumference Curved surface area

Unit Details

Key Stage	4
Year Group	9
Unit Title	9.04: Construction and Congruency

Completion Schedule

Content Delivered	
Prior Knowledge	• Measure Angles • Draw Angles • Use a pair of compasses. • Draw and interpret scale drawings. • Construct a triangle given SSS • Construct a triangle given SAS and ASA.
Core Concepts	• Locus of distance from a point. • Locus of distance from a straight line/shape. • Locus equidistant from two points. • Locus of distance from two lines. • Construct an angle bisector. • Construct a perpendicular bisector. • Construct a perpendicular from a point. • Construct a perpendicular to a point. • Identify congruent figures. • Know the criteria for congruence of triangles. • Identify congruent triangles.
Stretch and Challenge	• Prove a pair of triangles are congruent.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary

• To draw and measure line segments and angles, including interpreting scale drawings.
• Derive and use standard ruler and compass constructions, recognise and use the perpendicular distance from a point to a line as the shortest distance to the line.
  • To describe , sketch and draw using conventional terms and notations
  • To use the standard conventions for labelling the sides and angles of a triangle and know and use the criteria for congruence
	Estimate
	Scale
	Equidistant
	Point
	Path
	Construction lines
	Net
	Reflection
	Identical
		Acute
		Obtuse
		Reflex
		Right-angle
		Protractor
		Ratio
		Multiplier
		Locus
		Bisector
		Arc
		Perpendicular
		Line segment
		SSS
		SAS
		ASA
		Prism
		Equilateral
		Scalene
		Isosceles
		Invariant

Unit Details

Key Stage	4
Year Group	9
Unit Title	9.05: Numbers

Completion Schedule

Content Delivered	
Prior Knowledge	• Four Operations with Directed Numbers • Add and subtract fractions from integers expressing the answer as a single fraction. • Add and Subtract fractions with different denominators • Multiply a fraction by an integer • Multiply fractions • Divide a fraction by an integer • Divide fractions • Calculate the highest common factor and lowest common multiple of 2 or more numbers. • Write numbers greater than one in standard form. • Convert numbers in standard form to an ordinary number (greater than one). • Write numbers between zero and one in standard form. • Convert numbers in standard form to an ordinary number (between zero and one). • Write a number as a product of prime factors.
Core Concepts	• Identify Integers, real and rational numbers • Add and subtract mixed numbers • Multiply and divide mixed numbers • Multiply and divide numbers written in standard form. • Add or subtract number written in standard form. • Find the LCM and HCF using product of prime factors • Standard form using a calculator
Stretch and Challenge	• Identify surds • Multiply and divide surds • Simplify surds • Adding and subtracting surds • Expand brackets with surds • Rationalise the denominator containing a single term

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• use the four operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative • use the concepts and vocabulary of prime numbers, factors (or divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation property • interpret and compare numbers in standard form $A \times 10n$, $1 \leq n < 10$ where n is a positive or negative integer or zero • appreciate the infinite nature of the sets of integers, real and rational numbers.	Real Root Positive Negative Directed Operation Product Remainder	Integer Rational Irrational Square root Cube root Surd Simplify Inverse Square number Cube number Quotient Factor Multiple Prime numbers HCF LCM Product of prime factors Numerator Denominator Mixed number Improper fraction Standard form Exponent Power Indices

Unit Details

Key Stage	4
Year Group	9
Unit Title	9.06: Percentages and Money

Completion Schedule

Content Delivered	
Prior Knowledge	• Convert fluently between any fraction, decimal and percentage. • Calculate fractions of an amount without a calculator. • Calculate fractions of amounts with a calculator. • Find a percentage of amounts without a calculator. • Find a percentage of amounts with a calculator. • Express one number as a fraction of another • Express one number as a percentage of another • Calculate percentage change.
Core Concepts	• Calculate original value given a percentage. • Calculate original value following a percentage increase. • Calculate original value following a percentage decrease. • Solve non-calculator percentage problems. • Solve calculator problems. • Solve financial maths problems. • Solve repeat percentage change problems. • Calculate simple interest • Calculate compound interest. • Solve exchange rate problems
Stretch and Challenge	• Solve multiple different percentage change problems. • Solve reverse percentage problems involving compound interest.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• define percentage as 'number of parts per hundred', interpret percentage changes as a fraction or a decimal, interpret these multiplicatively, express one quantity as a percentage of another, compare two quantities using percentages, and work with percentages greater than 100% • interpret fractions and percentages as operators • solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics • select and use appropriate calculation strategies to solve increasingly complex problems • interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning • develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics	Equivalent Increase Decrease Reduce Profit Loss Original Change Reverse Total Debit Credit Balance Expense Bill Annual Tax VAT	Fraction Decimal Percentage Multiplier Bar model Power Index Exponent Depreciate Appreciate Compound Interest Unitary Proportion

Unit Details

Key Stage	4
Year Group	9
Unit Title	9.07: Deductions

Completion Schedule

Content Delivered	
Prior Knowledge	• Use the sum of angles at a point. • Use the sum of angles on a straight line. • Use the equality of vertically opposite angles. • Apply the sum of angles in a triangle. • Apply the sum of angles in a quadrilateral. • Form and solve equations.
Core Concepts	• Identify and calculate co-interior angles. • Identify and calculate alternate angles. • Identify and calculate corresponding angles. • Solve angle problems involving parallel lines. • Form and solve angle problems with algebra.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Derive and use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/ at a given point, bisecting a given angle); recognise and use the perpendicular distance from a point to a line as the shortest distance to the line. • Describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that and reflectively and rotationally symmetric. • Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles. • Understand and use the relationship between parallel lines and alternate and corresponding angles.	Parallel Interior Exterior Regular Sum Total	Alternate Corresponding Transversal Co-interior Isosceles Equation Polygon

Unit Details

Key Stage	4
Year Group	9
Unit Title	9.08: Rotations and Translations

Completion Schedule

Content Delivered	
Prior Knowledge	• Identify the order of rotational symmetry of a shape.
Core Concepts	• Rotate a shape. • Rotate a shape given a centre on a coordinate grid. • Describe rotations. • Interpret a vector. • Translate a shape by a given vector. • Describe translations of shapes.
Stetch and Challenge	• Combine transformations.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Identify properties of, and describe the results of translations, rotations and reflections applied to figures. • Describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric. • Develop their mathematical knowledge, in part part through solving problems and evaluating the outcomes, including multi-step problems.	Order Regular Irregular Rotation Clockwise Anti-clockwise Translate Horizontal Vertical Centre	Rotational symmetry Invariant Vector

Unit Details

Key Stage	4
Year Group	9
Unit Title	9.09: Pythagoras Theorem

Completion Schedule

Content Delivered	
Prior Knowledge	• Calculate squares and square roots
Core Concepts	• Identify the hypotenuse of a right-angled triangle. • Calculate the hypotenuse of a right-angled triangle. • Calculate the shorter side of a right-angled triangle. • Determine whether a triangle is right angled. • Use Pythagoras theorem on a coordinate grid.
Stetch and Challenge	• Explore proofs of Pythagoras theorem. • Use Pythagoras in 3-D shapes.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Use Pythagoras' Theorem to solve problems involving right-angled triangles. • Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides, including Pythagoras' Theorem, and use know results to obtain simple proofs. • Interpret mathematical relationships both algebraically and geometrically. • Begin to reason deductively in geometry, number and algebra, including using geometrical constructions. • Begin to model situations mathematically and express the result using a range of formal mathematical representations.	Origin Negative Positive	Square number Square root Significant figure Decimal point Hypotenuse Adjacent side Opposite side Right-angled triangle Quadrant Gradient Line segment Cube/ cuboid

Unit Details

Key Stage	4
Year Group	9
Unit Title	9.10: Enlargement and Similarity

Completion Schedule

Content Delivered	
Prior Knowledge	• Enlarge a shape by a positive scale factor. • Enlarge a shape by a positive fractional scale factor. • Calculation fractions of a number.
Core Concepts	• Enlarge a shape by a positive scale factor from a point. • Enlarge a shape by a positive fractional scale factor from a point. • Identify similar shapes. • Calculate scale factors in similar shapes. • Work out missing sides and angles in a pair of similar shapes.
Stetch and Challenge	• Enlarge a shape by a negative scale factor. • Enlarge a shape by a negative fractional scale factor. • Explain and show why two triangles are similar. • Calculate missing sides and angles in similar triangles.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• construct similar shapes by enlargement, with and without coordinate grids • use scale factors, scale diagrams and maps • apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides • understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction • use Pythagoras' Theorem and trigonometric ratios in similar triangles to solve problems involving right-angled triangles	Similar Enlargement Object Image Centre Inverted Orientation Angle	Ratio Scale factor Corresponding sides Opposite side Adjacent side Hypotenuse Right-angle

Unit Details

Key Stage	4
Year Group	9
Unit Title	9.11: Ratio and Proportion

Completion Schedule

Content Delivered	
Prior Knowledge	• Write ratios in the form 1:n. • Share a value into a given ratio. • Solve ratio problems given one amount. • Solve problems with direct proportion.
Core Concepts	• Solve problems with inverse proportion. • Model real-life graphs involving inverse proportion.
Stetch and Challenge	• Explore inverse proportion graphs. • Solve problems with ratio and algebra.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• divide a given quantity into two parts in a given part : part or part : whole ratio; express the division of a quantity into two parts as a ratio • understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction • solve problems involving direct and inverse proportion, including graphical and algebraic representations • use compound units such as speed, unit pricing and density to solve problems	Graph Relationship Divide Share Equal parts Equivalent Unit cost Multiple	Ratio Multiplier Scale factor Linear Non-linear Gradient Variable Inverse Proportional Factor Equation Fraction

Unit Details

Key Stage	4
Year Group	9
Unit Title	9.12: Rates

Completion Schedule

Content Delivered	
Prior Knowledge	• Converting units of length, mass and capacity.
Core Concepts	• Convert units of area • Convert units of volume • Solve speed, distance and time problems • Interpret distance-time graphs • Calculate speed from a distance time graph • Plot distance time graphs • Solve problems with density, mass and volume. • Solve problems with pressure, force and area • Calculate with rates • Sketch graphs of water flows •
Stetch and Challenge	• Convert compound units.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• use compound units such as speed, unit pricing and density to solve problems • understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction • change freely between related standard units [for example time, length, area, volume/capacity, mass]	Speed Distance Time Minutes Hours Convert Accuracy Average Origin Mass Substitute Rearrange Curve	Rounding Gradient Axes Density Volume Prism Imperial Metric

Unit Details

Key Stage	4
Year Group	9
Unit Title	9.13: Probability

Completion Schedule

Content Delivered	
Prior Knowledge	• Understand and use the probability scale • Use the property that probabilities sum to 1 • Calculate the probability of a single event • Draw sample space diagrams • Calculate probabilities from sample space diagram • Draw Venn diagrams • Calculate probabilities from a Venn diagram
Core Concepts	• Calculate relative frequency • Calculate expected outcomes • Calculate the probability of independent events • Construct frequency trees • Calculate probabilities from frequency trees
Stetch and Challenge	• Draw and complete a tree diagram for independent events. • Calculate probabilities from tree diagrams. • Draw and complete a tree diagram for dependent events

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0-1 probability scale. • Understand that the probabilities of all possible outcomes sum to 1. • Enumerate set and unions/ intersections of sets systematically, using tables, grid and Venn diagrams. • Generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities.	Event Outcome Equally likely Trial Frequency Expected outcomes Intersection Union	Biased Unbiased Probability Relative frequency Independent events Tree diagram Venn diagram Sample space diagram Two-way table

Unit Details

Key Stage	4
Year Group	9
Unit Title	9.14: Algebraic Representations

Completion Schedule

Content Delivered	
Prior Knowledge	• Identify and draw lines that are parallel to the axes. • Use a table of values to plot graphs of the form y=mx+c • Substitute into equations.
Core Concepts	• Draw quadratic graphs • Estimate solutions using quadratic graphs • Identify the turning point using quadratic graphs • Interpret cubic graphs • Interpret reciprocal graphs • Interpret exponential graphs • Interpret piece-wise graphs
Stetch and Challenge	• Identify solutions to simultaneous equations using a graph • Solve a pair of linear simultaneous equations using graphs

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Recognise, sketch and produce graphs of quadratic function of one variable with appropriate scaling, using equations in x and y and the Cartesian plane. • Use quadratic graphs to estimate values of y for given values of x and vice versa. • Find approximate solutions to contextual problems from given graphs of a variety of functions, including piece-wise linear, exponential, and reciprocal graphs. • Use linear graphs to estimate values of y for given values of x and vice versa and to find approximate solutions of simultaneous linear equations. • Understand and use the concept and vocabulary of expressions, equations, inequalities, terms and factors.	Curve Symmetry Solution Intersection Satisfy	Quadratic Parabola Vertex Turning point Reciprocal Exponential Discontinuous Simultaneous Inequality Solution set

Unit Details

Key Stage	4
Year Group	10
Unit Title	10.01: Congruence, Similarity and Enlargement

Completion Schedule

Content Delivered	
Prior Knowledge	• Enlarge a shape by a positive integer scale factor. • Enlarge a shape by a fractional scale factor. • Calculate angles in parallel lines. • Use the language of SSS, SAS and ASA
Core Concepts	• Enlarge a shape by a positive or fractional scale factor from a point. • Describe enlargements. • Identify similar shapes. • Work out missing sides and angles in a pair of similar shapes. • Explain and show why two triangles are similar. • Distinguish between similarity and congruence. • Explain why two triangles are congruent.
Stretch and Challenge	• Enlarge a shape by a negative scale factor. • Explore the link between linear scale factor and area scale factor. • Calculate the areas of similar shapes. • Calculate missing lengths using the area scale factor. • Explore the link between linear scale factor and volume scale factor. • Calculate volumes of similar shapes. • Calculate missing lengths using the volume scale factor. • Prove triangles are congruent using the conditions of congruence.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• extend and formalise their knowledge of ratio and proportion in working with measures and geometry • compare lengths, areas and volumes using ratio notation and/or scale factors; make links to similarity • interpret and use fractional {and negative} scale factors for enlargements • apply the concepts of congruence and similarity, including the relationships between lengths, {areas and volumes} in similar figures • use mathematical language and properties precisely • make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples. • develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems	Enlarge Reflection Similar Parallel	Scale factor Ratio Origin Centre of enlargement Negative scale factor Proportion Corresponding angles Alternate angles Co-interior angles Area scale factor Hypotenuse Congruence

Unit Details

Key Stage	4
Year Group	10
Unit Title	10.02: Trigonometry

Completion Schedule

Content Delivered	
Prior Knowledge	• Recall the formula for Pythagoras Theorem. • Use Pythagoras Theorem to calculate the hypotenuse. • Use Pythagoras Theorem to calculate the shorter side.
Core Concepts	• Correctly label the hypotenuse, adjacent and opposite side of right-angled triangles. • Use the tangent ratio to calculate missing sides. • Use the sine and cosine ratio to calculate missing sides. • Use the tangent, sine, or cosine ratio to calculate missing lengths. • Use the tangent, sine, and cosine ratio to calculate missing angles. • Use problems in right-angled triangles using Pythagoras Theorem or Trigonometry. • Know, recall, and use exact trig values.
Stretch and Challenge	• Use trigonometry in 3-D shapes. • Calculate the area of a triangle using 1/2absinC • Use Sine rule to calculate missing lengths. • Use Sine rule to calculate missing angles. • Use Cosine rule to calculate missing lengths. • Use Cosine rule to calculate missing angles. • Choose Sine or Cosine rule to solve problems.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• extend and formalise their knowledge of ratio and proportion, including trigonometric ratios • apply Pythagoras' Theorem and trigonometric ratios to find angles and lengths in right-angled triangles {and, where possible, general triangles} in two {and three} dimensional figures • know the exact values of sin θ, cos θ, tan θ for required angles • {know and apply the sine rule and cosine rule to find unknown lengths and angles} • {know and apply to calculate the area, sides or angles of any triangle} • develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems • make and use connections between different parts of mathematics to solve problems • model situations mathematically and express the results using a range of formal mathematical representations, reflecting on how their solutions may have been affected by any modelling assumptions • select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem	Enlarge Angle Similar	Scale factor Ratio Adjacent side Opposite side Hypotenuse Right-angle Tangent Sine Cosine Subject of a formula Inverse $\sin^{-1} x$ $\cos^{-1} x$ $\tan^{-1} x$ Square root Pythagoras Theorem Surds

Unit Details

Key Stage	4
Year Group	10
Unit Title	10.03: Representing solutions of equations and inequalities

Completion Schedule

Content Delivered	
Prior Knowledge	• Solve equations with one-step • Solve equations with two or more steps. • Form and solve equations. • Solve one-step inequalities. • Solve inequalities with two or more steps • Form and solve inequalities. • Use a table of value to draw a straight line graph. • Solving equations with unknowns on both sides.
Core Concepts	• Show solutions to inequalities on a number line. • Interpret representations on a number line as inequalities. • Solve inequalities with unknowns on both sides. • Form and solve inequalities with unknowns on both sides. • Factorise quadratics • Solve quadratics by factorising
Stretch and Challenge	• Solutions using set notation. • Represent solutions to single inequalities on a graph using lines parallel to the axes. • Represent solutions to single inequalities using a straight line. • Represent solutions to multiple inequalities on a graph. • Rearrange and solve quadratics by factorising. • Sketch quadratics • Solve quadratics using a graph.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• consolidate their algebraic capability from key stage 3 and extend their understanding of algebraic simplification and manipulation to include quadratic expressions • translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve the equation and interpret the solution • select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem. • recognise, sketch and interpret graphs of linear functions, • factorising quadratic expressions of the form x 2 + bx + c (Higher only at this stage) • solve quadratic equations algebraically by factorising (Higher only at this stage) • solve linear inequalities in one {or two} variable{s}, {and quadratic inequalities in one variable}; represent the solution set on a number line, {using set notation and on a graph}	Solve Solution Union Intersect Unknown Roots	Variable Equation Expression Inverse operation Inequality Solution set Coordinate Gradient Linear Dashed line Solid line Quadratic Factorise

Unit Details

Key Stage	4
Year Group	10
Unit Title	10.04: Simultaneous Equations

Completion Schedule

Content Delivered	
Prior Knowledge	• Substitute numbers into expressions. • Rearrange equations to change the subject. • Simplify expressions by collecting like terms.
Core Concepts	• Understand that equations can have more than one solution. • Determine whether a given (x, y) is a solution to a pair of linear simultaneous equations. • Solve a pair of linear simultaneous equations by substitution a known value. • Solve a pair of linear simultaneous equations by substitution an expression. • Solve a pair of linear simultaneous equations using graphs. • Solve a pair of linear simultaneous equations by subtracting equations. • Solve by adjusting one equation. • Solve by adjusting both equations.
Stretch and Challenge	• Determine whether a given (x, y) is a solution to both a linear and quadratic equation. • Solve a pair of simultaneous equations (one linear, one quadratic) using graphs. • Solve a pair of simultaneous equations (one linear, one quadratic) using algebraically. • Solve a pair of simultaneous equations involving a third unknown.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
consolidate their algebraic capability from key stage 3 and extend their understanding of algebraic simplification and manipulation to include quadratic expressions • model situations mathematically and express the results using a range of formal mathematical representations, reflecting on how their solutions may have been affected by any modelling assumptions • translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution • select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem. • solve two simultaneous equations in two variables (linear/linear {or linear/quadratic}) algebraically; • recognise, sketch, and interpret graphs of linear functions and quadratic functions.	Substitute Rearrange Intersect Eliminate	Simultaneous Equation Expression Variable Coefficient Infinite solutions Finite solutions Inverse operation Subject of a formulae Coordinate LCM Quadratic Linear Non-linear Factorise

Unit Details

Key Stage	4
Year Group	10
Unit Title	10.05: Angles and Bearing

Completion Schedule

Content Delivered	
Prior Knowledge	• Use the standard conventions for labelling sides and angles of triangles ABC. • Measure angles. • Draw angles. • Use the sum of angles at a point. • Use the sum of angles on a straight line. • Use the equality of vertically opposite angles. • Use properties of corresponding and alternate angles. • Use the properties of co-interior angles. • Use Pythagoras Theorem to calculate missing sides. • Use the tangent, sine or cosine ratio to calculate missing sides. • Use the tangent, sine or cosine ratio to calculate missing angles. • Draw scale drawings • Interpret scale drawings
Core Concepts	• Understand and measure bearings. • Measure and read bearings • Make scale drawings using bearings. • Calculate bearings using angle rules. • Solve bearings problems using Pythagoras. • Solve bearings problems using Trigonometry.
Stretch and Challenge	• Solve bearings problems using the sine rule. • Solve bearings problems using the cosine rule.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• interpret and use bearings • compare lengths…using scale factors • apply Pythagoras' Theorem and trigonometric ratios to find angles and lengths in right-angled triangles {and, where possible, general triangles} in two dimensional figures • {know and apply the sine rule and cosine rule to find unknown lengths and angles} • use mathematical language and properties precisely • reason deductively in geometry, number and algebra, including using geometrical constructions • make and use connections between different parts of mathematics to solve problems	Compass Point Angle Enlarge North line Clockwise Parallel	Three letter notation Protractor Scale factor Bearing Bearing of … from … Ratio Co-interior Alternate angles Corresponding angles Sine ratio Cosine ratio Tangent ratio Perpendicular

Unit Details

Key Stage	4
Year Group	10
Unit Title	10.06: Working with Circles

Completion Schedule

Content Delivered	
Prior Knowledge	• Recognise and label parts of a circle. • Calculate the area of a circle. • Calculate the circumference of a circle. • Substitute into expressions.
Core Concepts	• Calculate the area of fractional parts of a circle. • Calculate the area of a sector. • Calculate the length of an arc. • Calculate the volume of a cylinder • Calculate the perimeter of fractional parts of a circle. • Solve problems involving the volume of a cylinder. • Calculate the volume of a cone. • Calculate the volume of a sphere. • Solve problems involving the volume of a cone and sphere. • Calculate the surface area of a sphere • Calculate the surface area of a cylinder • Calculate the surface area of a cone.
Stretch and Challenge	• Circle theorem: Angles at the centre and circumference. • Circle theorem: Angles in a semicircle. • Circle theorem: Angles in the same segment. • Circle theorem: Angles in a cyclic quadrilateral. • Solve area problems using similar shapes. • Solve volume problems using similar shapes.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment • calculate arc lengths, angles and areas of sectors of circles • calculate surface areas and volumes of spheres, pyramids, cones and composite solids • apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results	Centre Area Base	Circle Radius Diameter Tangent Arc Sector Segment Circumference Isosceles triangle Pythagoras Semicircle Subtend Vertices Cyclic quadrilateral Cylinder Cone In terms of π Perpendicular height Surface area Curved surface Sphere Scale factor

Unit Details

Key Stage	4
Year Group	10
Unit Title	10.07: Vectors

Completion Schedule

Content Delivered	
Prior Knowledge	• Translate shapes by a given vector. • Describe translations of shapes.
Core Concepts	• Understand and represent vectors. • Use and read vector notation. • Draw and understand vector multiplied by a scalar. • Draw and understand addition of vectors. • Draw and understand addition and subtraction of vectors.
Stretch and Challenge	• Explore vector journeys in shapes. • Explore vector journeys in quadrilaterals. • Understand parallel vectors. • Explore collinear point using vectors. • Use vectors to construct geometric arguments and proofs.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• describe translations as 2D vectors • apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; {use vectors to construct geometric arguments and proofs}.	Direction Parallel	Column vectors Scalar Magnitude Multiplier Resultant Vector journey Collinear

Unit Details

Key Stage	4
Year Group	10
Unit Title	10.08: Ratios and fractions

Completion Schedule

Content Delivered	
Prior Knowledge	• Compare quantities using a ratio • Convert between ratios and fractions • Divide a value into a given ratio. • Solve ratio problems given one amount. • Link ratios and graphs • Link ratios and scales
Core Concepts	• Use ratios and fractions to make comparisons • Solve problems with currency conversions. • Write ratios in the form 1:n • Write ratios in the form n:1 • Solve 'best buy' problems • Combine a set of ratios • Link ratio and algebra • Solve ratio problems
Stretch and Challenge	• Use ratio in area problems. • Use ratio in volume problems.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Consolidating subject content from key stage 3: ➢ Use ratio notation, including reduction to simplest form. ➢ Divide a given quantity into two parts in a given $part : part$ or $part : whole$ ratio; express the division of a quantity into two parts as a ratio. ➢ Relate the language of ratios and the associated calculations to the arithmetic of fractions and to linear functions. ➢ Use compound units such as speed, unit pricing and density to solve problems. • Compare lengths, areas and volumes using ratio notation and/or scale factors; make links to similarity. • Apply the concepts of congruence and similarity, including the relationships between lengths, {areas and volumes} in similar figures	Equivalent Share Part Whole Origin Unknown Enlarge Similar	Ratio Simplest form Direct Proportion Gradient Equation $y = mx + c$ Unit cost LCM Variable Equation Scale factor

Unit Details

Key Stage	4
Year Group	10
Unit Title	10.09: Percentages and Interest

Completion Schedule

Content Delivered	
Prior Knowledge	• Convert fluently between simple fractions, decimals and percentages • Convert fluently between any fractions, decimals and percentages. • Find a percentage of amounts without a calculator. • Find a percentage of amounts with a calculator. • Calculate percentage increase and decrease without a calculator. • Percentage decrease with a multiplier. • Percentage increase with a multiplier. • Calculate original value following a percentage increase. • Calculate original value following a percentage decrease.
Core Concepts	• Calculate simple interest • Calculate compound interest • Repeated percentages change • Solve problems involving growth and decay • Solve problems involving percentages, ratios and fractions
Stretch and Challenge	• Understand iterative process.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Consolidating subject content from key stage 3: ➢ Interpret these multiplicatively, express one quantity as a percentage of another, compare two quantities using percentages, and work with percentages greater than 100%. ➢ Solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics. • Set up, solve and interpret the answers in growth and decay problems, including compound interest {and work with general iterative processes}.	Increase Decrease Reduce Interest Reverse Original Growth Decay Repeat	Fraction Decimal Percentage Multiplier Numerator Denominator Simple interest Compound interest Powers/indices/exponent Appreciate Depreciate Subscript Iterative process

Unit Details

Key Stage	4
Year Group	10
Unit Title	10.10: Probability

Completion Schedule

Content Delivered	
Prior Knowledge	• Add fractions • Subtract fractions • Multiply fractions • Calculate the probability of a single event • Know and use the sum of probabilities of all possible outcomes is 1. • Draw sample space diagrams • Calculate probabilities from sample space diagram • Draw Venn diagrams • Construct frequency trees • Use set notation. • Understand and use the intersection of sets. • Understand and use the union of sets.
Core Concepts	• Use experimental data to estimate probabilities. • Calculate the probability of independent events. • Calculate probabilities from Venn diagrams. • Calculate probabilities from frequency trees • Calculate probabilities from two-way tables. • Draw and complete a tree diagram for independent events. • Calculate probabilities for independent events from a tree diagram. • Draw and complete a tree diagram for dependent events • Calculate probabilities for dependent events from a tree diagram.
Stretch and Challenge	• Construct and interpret conditional probabilities using tree diagrams. • Construct and interpret conditional probabilities using Venn diagrams • Construct and interpret conditional probabilities using two-way tables.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one. • Use a probability model to predict the outcomes of future experiments; understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size. • Calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions. • {Calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams}.	Outcome Equally likely Event Complement Intersect Union Estimate Systematic Product	Numerator Denominator LCM Simplest form Venn diagram Relative frequency Expected value Two-way table Frequency trees Universal set Sample space Independent event Tree diagrams Dependent events Conditional probability

Unit Details

Key Stage	4
Year Group	10
Unit Title	10.11: Collecting, representing, and Interpreting data

Completion Schedule

Content Delivered

Prior Knowledge	• Construct two-way tables • Interpret two-way tables • Construct a pie chart • Interpret a pie chart • Find and interpret averages from a list • Find and interpret averages from ungrouped frequency table. • Find and interpret averages from a grouped frequency table. • Construct line and bar charts • Construct scatter graphs • Interpret scatter graphs • Draw and use a line of best fit.
Core Concepts	• Understand populations and samples • Identify primary and secondary data • Construct a frequency polygon • Interpret a frequency polygon • Construct a dual bar chart • Interpret a dual bar chart • Criticise charts and graphs • Construct a time series graph • Interpret a time series graph • Construct a stem-and-leaf diagram • Interpret a stem-and-leaf diagram • Understand extrapolation
Stretch and Challenge	• Construct a stratified sample • Construct histograms • Interpret histograms • Construct a box plot • Interpret a box plot • Construct a cumulative frequency diagram • Use a cumulative frequency diagram to calculate the median. • Use a cumulative frequency diagram to calculate the upper and lower quartiles • Use a cumulative frequency diagram to draw a box plot.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• consolidating subject content from key stage 3: ➢ use describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data ➢ construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data ➢ describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers) • infer properties of populations or distributions from a	Population Sample Biased Random Frequency Midpoint Endpoint Angle Bias Misleading data Area Mean Average Range Spread	Primary data Secondary data Frequency polygon Class interval Line/bar chart Composite bar chart Dual/ multiple bar chart Pie chart Sector Histogram Frequency density Class width Median Mode Outlier

sample, whilst knowing the limitations of sampling • interpret and construct tables and line graphs for time series data. {construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use} • interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate graphical representation involving discrete, continuous and grouped data, {including box plots} • apply statistics to describe a population • interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (including modal class) and spread {including quartiles and inter-quartile range}	Consistent Origin	Modal class Estimated mean Time series Stem and leaf Cumulative frequency Upper quartile Lower quartile Interquartile range Box plot Scatter graoh Positive correlation Negative correlation Line of best fit Interpolate Extrapolate

Unit Details

Key Stage	4
Year Group	10
Unit Title	10.12: Non – Calculator Methods

Completion Schedule

Content Delivered

Prior Knowledge	• Mental and written methods for addition and subtraction (integers and decimals) • Mental and written methods for multiplication (integers and decimals) • Mental and written methods for division (integers and decimals) • Add fractions • Subtract fractions • Multiply fractions • Divide fractions • Round to 1,2 and 3 decimal places • Round to 1, 2 and 3 significant figures • Estimate answers to calculations
Core Concepts	• Exact answers • Error intervals for rounded numbers • Error intervals for truncated numbers • Use number sense • Solve financial maths problems • Solve multi-step problems
Stretch and Challenge	• Identify rational and irrational numbers • Convert recurring decimals to fractions using algebraic proof • Identify surds • Multiply surds • Divide surds • Simplify surds • Add and subtract surds • Expand single brackets involving surds • Expand double brackets using surds • Upper and lower bound involving calculations using the four operations

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• consolidate their numerical and mathematical capability from key stage 3 • calculate exactly with fractions, {surds} and multiples of π; {simplify surd expressions involving squares and rationalise denominators} • {change recurring decimals into their corresponding fractions and vice versa} • apply and interpret limits of accuracy when rounding or truncating, {including upper and lower bounds} • develop their use of formal mathematical knowledge to interpret and solve problems, including in financial contexts • make and use connections between different parts of mathematics to solve problems	Area Profit Loss Credit Debit Standing charge VAT Tax Force	Perimeter Volume Numerator Denominator Reciprocal Mixed number Improper fraction In terms of π Sine ratio Cosine ratio Tangent ratio Recurring decimal Surd Square root Cube root Simplify Rationalise the denominator Decimal place Significant figure Round Error interval Truncate Upper bound Lower bound Density

Unit Details

Key Stage	4
Year Group	10
Unit Title	10.13: Types of number & Sequences

Completion Schedule

Content Delivered	
Prior Knowledge	• Identify the factors of a number • Identify the multiplies of a number • Find any multiple of a number • Find the lowest common multiple of two or more numbers. • Find the highest common factor of two or more numbers. • Identify prime numbers. • Write a number as a product of prime factors.
Core Concepts	• Describe and continue arithmetic sequences • Describe and continue geometric sequences • Explore other sequences. • Find the rule for the nth term of a linear sequence
Stretch and Challenge	• Describe and continue sequences involving surds • find the rule for the nth term of a quadratic sequence.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• consolidating subject content from key stage 3: ➢ factors, multiples, primes, HCF and LCM ➢ describe and continue sequences • recognise and use sequences of triangular, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions (r $n$where n is an integer, and r is a positive rational number {or a surd}) {and other sequences} • deduce expressions to calculate the nth term of linear {and quadratic} sequence	Multiple Area Difference	Factor Factorise Prime Prime factor HCF LCM Arithmetic Nth term Geometric Term-to-term Surd Simplest from Common ratio Linear Non-linear Coefficient Quadratic

Unit Details

Key Stage	4
Year Group	11
Unit Title	11.01: Trigonometry

Completion Schedule

Content Delivered	
Prior Knowledge	• Recall the formula for Pythagoras Theorem. • Use Pythagoras Theorem to calculate the hypotenuse. • Use Pythagoras Theorem to calculate the shorter side.
Core Concepts	• Correctly label the hypotenuse, adjacent and opposite side of right-angled triangles. • Use the tangent ratio to calculate missing sides. • Use the sine and cosine ratio to calculate missing sides. • Use the tangent, sine, or cosine ratio to calculate missing lengths. • Use the tangent, sine, and cosine ratio to calculate missing angles. • Use problems in right-angled triangles using Pythagoras Theorem or Trigonometry. • Know, recall, and use exact trig values.
Higher Only	• Use trigonometry in 3-D shapes. • Calculate the area of a triangle using 1/2absinC • Use Sine rule to calculate missing lengths. • Use Sine rule to calculate missing angles. • Use Cosine rule to calculate missing lengths. • Use Cosine rule to calculate missing angles. • Choose Sine or Cosine rule to solve problems.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• extend and formalise their knowledge of ratio and proportion, including trigonometric ratios • apply Pythagoras' Theorem and trigonometric ratios to find angles and lengths in right-angled triangles {and, where possible, general triangles} in two {and three} dimensional figures • know the exact values of sin θ, cos θ, tan θ for required angles • {know and apply the sine rule and cosine rule to find unknown lengths and angles} • {know and apply to calculate the area, sides or angles of any triangle} • develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems • make and use connections between different parts of mathematics to solve problems • model situations mathematically and express the results using a range of formal mathematical representations, reflecting on how their solutions may have been affected by any modelling assumptions • select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem	Enlarge Opposite Angle Similar	Scale factor Ratio Adjacent Hypotenuse Right-angle Tangent Formula Sine Cosine Subject of a formula Inverse $\sin^{-1} x$ $\cos^{-1} x$ $\tan^{-1} x$ Square root Pythagoras Theorem Surds Simplify Prism Isosceles

Unit Details

Key Stage	4
Year Group	11
Unit Title	11.02: Gradients and Lines

Completion Schedule

Content Delivered	
Prior Knowledge	• Equations of lines parallel to the axes. • Use a table of values to plot a straight-line graph. • Interpret $y = mx + c$ • Find the equation of a line from a graph.
Core Concepts	• Calculate the gradient of a line given two points. • Calculate the gradient of a line from a graph. • Equation of a straight line given one point and gradient. • Equation of a straight line given two points. • Determine whether a point is on a line. • Equation of parallel lines given $y = mx + c$ and y-intercept • Equation of parallel lines given $y = mx + c$ and a point • Solve a pair of linear simultaneous equations using graphs
Higher Only	• Recognise perpendicular lines. • Equation of perpendicular lines • Solve a pair of simultaneous equations (one linear, one quadratic) using graphs.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Move freely between different numerical, algebraic, graphical and diagrammatic representations. • Plot and interpret graphs. • Interpret the gradient of a straight-line graph as a rate of change. • Use the form $y = mx + c$ to identify parallel (and perpendicular) lines; find the equation of a line through two points, or through one point with a given gradient. • Find approximate solutions to two simultaneous equations in two variables (linear/linear or linear/quadratic) using a graph.	Parallel Horizontal Vertical Straight lines Intercept Substitute Coordinate Simultaneous	Axis Equation Table of values y-intercept Gradient Perpendicular Reciprocal Negative reciprocal

Unit Details

Key Stage	4
Year Group	11
Unit Title	11.03: Non-Linear Graphs

Completion Schedule

Content Delivered	
Prior Knowledge	• Plot and read coordinates. • Substitute values into expressions. • Use a table of values to plot straight line graphs.
Core Concepts	• Plot and read from quadratic graphs. • Plot and read from cubic graphs. • Plot and read from reciprocal graphs. • Recognise graph shapes. • Identify and interpret roots and intercepts of quadratics.
Higher Only	• Understand and use exponential graphs. • Find and use the equation of a circle with centre (0, 0) • Find the equation of the tangent to any curve.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Moe freely between different numerical, algebraic, graphical and diagrammatic representations. • Recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, the reciprocal function (the exponential function $y = k^x$ for positive values of k) • Plot and interpret graph (including reciprocal graphs and exponential graphs) • Find approximate solutions using a graph. • Identify and interpret roots, intercepts of quadratic functions graphically. • Recognize and use the equation of a circle with centre at the origin.	Curve Substitute Vertical Horizontal Estimate Coordinate Roots	Quadratic Parabola Equation Cubic Asymptote Infinity Reciprocal Gradient Roots y-intercept Radius Diameter Pythagoras Theorem Origin Tangent

Unit Details

Key Stage	4
Year Group	11
Unit Title	11.04: Using Graphs

Completion Schedule

Content Delivered	
Prior Knowledge	• Calculate the gradient of a line from a graphs.. • Area of a triangle. • Area of a trapezium.
Core Concepts	• Read and interpret distance/time graphs. • Construct distance/time graphs. • Read and interpret speed/time graphs • Calculate the change in speed using speed/time graphs. • Calculate approximate solutions.
Stretch and Challenge	• Calculate the distance travelled using a speed/time graphs. • Estimate the area under a curve.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Plot and interpret graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed, and acceleration. • **Interpret the gradient at a point on a curve as the instantaneous rate of change; apply the concepts of instantaneous and average rate of change (gradient of tangents and chords) in numerical, algebraic, and graphical contexts.** • **Calculate or estimate gradients of graphs and areas under graphs (including quadratic and other non-linear graphs_, and interpret results in cases such as distance-time graphs, velocity-time graphs and graphs in financial contexts)**	Distance Speed Time Scale Constant Acceleration Pressure Area	Gradient Direct proportion Inverse proportion Trapezium

Unit Details

Key Stage	4
Year Group	11
Unit Title	11.05: Expanding and Factorising

Completion Schedule

Content Delivered	
Prior Knowledge	• Expand singe brackets. • Factorise single brackets. • Expand and simplify binomials
Core Concepts	• Factorise quadratic expressions. • Solve equations equal to 0. • Solve quadratic equations by factorisation
Higher Only	• Factorise complex quadratic expressions. • Solve complex quadratic expressions by factorisation. • Complete the square. • Solve quadratic equations by completing the square. • Solve quadratic equations using the quadratic formula.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct argument (**and proofs**) • simplify and manipulate algebraic expressions by: factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares; (**factorising quadratic expressions of the form $ax^2 + bx + c$**) • know the difference between an equation and an identify; solve quadratic equations (**including those that require rearrangement**) algebraically by factorising (**by completing the square and by using the quadratic formula**) • identify and interpret roots; deduce roots algebraically (**and turning points by completing the square**) • solve two simultaneous equations in two variable (linear/linear (**or linear/quadratic**)) algebraically; find approximate solutions using a graph	Expand Bracket Solutions	Factorise Coefficient HCF Factorise fully Binomial Simplify Quadratic Difference of two squares Coefficient Expression Term Roots Quadratic equation Completing the square

Unit Details

Key Stage	4
Year Group	11
Unit Title	11.06: Changing the Subject

Completion Schedule

Content Delivered	
Prior Knowledge	• Solve linear equations. • Solve inequalities. • Form and solve equations in the context of shape. • Form and sole inequalities in the context of shape.
Core Concepts	• Change the subject of simple formula. • Change the subject of any formula. • Change the subject of more complex formula.
Higher only	• Change the subject of formula where there is repeated subject. • Solve equations by iteration

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Solve linear inequalities in one variable. • Know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct argument (**and proofs**) • Translate simple situations or procedures into algebraic expression or formulae; derive an equation (or simultaneous equations), solve the equation(s) and interpret the solution. • **(find approximate solutions to equations numerically using iteration)**	Expand Unknown Solution Form Area Subject	Equation Coefficient Inequality Solution set Perimeter Volume Inverse operation Rearrange Formula Square number Square root Iterate

Unit Details

Key Stage	4
Year Group	11
Unit Title	11.07: Vectors

Completion Schedule

Content Delivered	
Prior Knowledge	• Translate shapes by a given vector. • Describe translations of shapes.
Core Concepts	• Understand and represent vectors. • Use and read vector notation. • Draw and understand vector multiplied by a scalar. • Draw and understand addition of vectors. • Draw and understand addition and subtraction of vectors.
Higher only	• Explore vector journeys in shapes. • Explore vector journeys in quadrilaterals. • Understand parallel vectors. • Explore collinear point using vectors. • Use vectors to construct geometric arguments and proofs.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• describe translations as 2D vectors • apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; {use vectors to construct geometric arguments and proofs}.	Direction Parallel	Column vectors Scalar Magnitude Multiplier Resultant Vector journey Collinear

Unit Details

Key Stage	4
Year Group	11
Unit Title	11.08: Functions

Completion Schedule

Content Delivered	
Prior Knowledge	• Use function machines. • Substitute into expressions and formulae.
Core Concepts	• Use function notation. • Solve equations involving functions. • Identify turning points from quadratic graphs. • Estimate solutions using quadratic graphs.
Higher only	• Work with composite functions. • Work with inverse functions. • Solve quadratic inequalities.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• Where appropriate, interpret simple expressions as functions with inputs and output; (**interpret the inverse process as the 'inverse function'; interpret the succession of two functions as a 'composite function'**) • Solve two simultaneous equations in two variables (linear/linear (**or linear/quadratic**) algebraically; find approximate solutions using a graph. • Identify and interpret roots; deduce roots algebraically (**and turning points by completing the square**) • Solve linear inequalities in one (**or two**) variables, (**and quadratic inequalities in one variable**), represent the solution set on a number line, (**using set notation and on a graph**) • Recognise, sketch and interpret graphs of quadratic functions. • Apply Pythagoras' theorem and trigonometric ratios to find angle sand lengths in right-angled triangles (**and, where possible, general triangles**) in two (**and three**) dimensional figures.	Input Output Function Operation Substitute	Inverse operation Variable Expression Composite function Inverse function Quadratic Turning point Intercept Inequality Solution set

Unit Details

Key Stage	4
Year Group	11
Unit Title	11.09: Working with Circles

Completion Schedule

Content Delivered	
Prior Knowledge	• Recognise and label parts of a circle. • Calculate the area of a circle. • Calculate the circumference of a circle. • Substitute into expressions.
Core Concepts	• Calculate the area of fractional parts of a circle. • Calculate the area of a sector. • Calculate the length of an arc. • Calculate the volume of a cylinder • Calculate the perimeter of fractional parts of a circle. • Solve problems involving the volume of a cylinder. • Calculate the volume of a cone. • Calculate the volume of a sphere. • Solve problems involving the volume of a cone and sphere. • Calculate the surface area of a sphere • Calculate the surface area of a cylinder • Calculate the surface area of a cone.
Higher only	• Circle theorem: Angles at the centre and circumference. • Circle theorem: Angles in a semicircle. • Circle theorem: Angles in the same segment. • Circle theorem: Angles in a cyclic quadrilateral. • Solve area problems using similar shapes. • Solve volume problems using similar shapes.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
• identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment • calculate arc lengths, angles and areas of sectors of circles • calculate surface areas and volumes of spheres, pyramids, cones and composite solids • apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results	Centre Area Base	Circle Radius Diameter Tangent Arc Sector Segment Circumference Isosceles triangle Pythagoras Semicircle Subtend Vertices Cyclic quadrilateral Cylinder Cone In terms of π Perpendicular height Surface area Curved surface Sphere Scale factor

Unit Details

Key Stage	4
Year Group	11
Unit Title	11.09: Algebraic Fractions

Completion Schedule

Content Delivered	
Prior Knowledge	• Factorise expressions into single brackets. • factorise expressions into double brackets. • Add and subtract fractions. • Multiply and divide fractions. • Solve one and two-step equations.
Higher only	• Simplify algebraic fractions. • Add algebraic fractions. • Subtract algebraic fractions. • Multiply algebraic fractions • Divide algebraic fractions. • Solve equations involving algebraic fractions.

National Curriculum content covered:	Tier Two Vocabulary	Tier Three Vocabulary
	Solve	Expression Factorise HCF Numerator Denominator Reciprocal Simplest form Equation Algebraic fraction

Unit Details

Key Stage	4
Year Group	11
Unit Title	11.11: Graphs (higher only)

Completion Schedule

Content Delivered	
Higher only	• Translations on the y-axis: y=f(x)+a • Translations on the x-axis: y=f(x-a) • Reflections: y=-f(x) and y=f(-x) • Sine Graph • Cosine Graph • Tangent Graph

	Tier Two Vocabulary	Tier Three Vocabulary
	Reflection Translation	Sine Cosine Tangent x-axis y-axis