RIVERSACADEMY
West London An Aspirations Academy

MATHS- Curriculum Plan

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 7 curriculum overview	Sequences Algebraic Notation and Substitution Expressions and Equations	Place Value Four Operations Averages and Range Rounding and Estimation	Graphing Data FDP Directed Number	Fractions and Percentages of amounts Perimeter and Area	Speed, distance and time Properties of Number	Add and subtract fractions Angles and Polygons
Key knowledge outcomes (students should know)	Students should know how to identify linear and non-linear sequences and understand the definition of a term-to-term rule. Students should know standard algebraic conventions and understand how to substitute numbers into expressions. Students should know the difference	Students should know the value of each digit in integers up to one billion and decimals down to thousandths. Students should know formal structures for addition, subtraction, multiplication, and division, as well as the priority rules of BIDMAS Students should know that the mean, median, and mode are measures of	Students should know the features of statistical diagrams, including bar charts, pictograms, and time-series graphs, and how they represent data. Students should know key equivalent fraction, decimal, and percentage values and understand how they represent parts of a whole.	Students should know that finding a fraction or percentage of an amount involves treating the fraction or percent as a multiplicative operator. Students should know that perimeter is the total distance around a 2D shape, while area is the space inside	Students should know the formula connecting speed, distance, and time, and understand how they relate as a compound measure. Students should know the mathematical definitions of factors, multiples, primes, square numbers, Highest Common Factor (HCF), and Lowest	Students should know that fractions must be converted to share a common denominator before they can be added or subtracted. Students should know that angles measure turn in degrees and recall basic geometric facts, such as angles on

	between an expression, an equation, and an identity, and understand that an equals sign represents balance.	central tendency, while the range measures the spread of data. Students should know the rules for rounding numbers to powers of ten, decimal places, or significant figures to approximate answers.	Students should know how to use a number line to represent positive and negative values and understand the sign rules for operating with directed numbers.	it measured in square units.	Common Multiple (LCM).	a straight line totaling 180° and around a point totaling 360°.
Key skills (students should be able to)	Generate sequence from term-to-term rule Make and test conjectures about the generalisations that underlie patterns and relationships Use algebra to generalise the structure of arithmetic. To solve linear equations	Order and compare integers up to one billion and decimals down to thousandths. Correctly position integers and decimals on a variety of scales. Multiply and divide numbers by 10, 100, and 1000, understanding place value shifts. Solve multi-step real-world problems and interpret	Construct, read, and interpret key statistical representations including pictograms, bar charts, and time-series graphs. Interpret and compare data sets from different graphs to draw conclusions and identify trends. Convert fluently between fractions, decimals, and	Calculate exact fractions of amounts with and without a calculator. Calculate percentages of quantities, including simple multipliers for percentage increases and decreases. Find the perimeter of composite 2D	Calculate speed, distance, and time using the standard formula and rearrange it as necessary. Convert between different units of speed and time, such as hours to minutes or miles per hour to kilometers per hour. Identify and list factors, multiples,	Add and subtract fractions with common and different denominators, including mixed numbers. Convert between improper fractions and mixed numbers to simplify calculations and express answers in their simplest

	Simplify and manipulate algebraic expressions to maintain equivalence See approximation through rounding to estimate answers	remainders appropriately. Apply BIDMAS accurately, including the use of brackets and fraction bars. Calculate the mean, median, and mode from ungrouped data. Calculate the range to analyze data consistency. Interpret and compare data sets in context using averages and range. Round to a specified power of 10, decimal place, or significant figure. Use rounding (to 1 significant figure) to approximate outcomes and check reasonableness. Identify the upper	percentages, including values greater than 100%. Order and compare a mixture of fractions, decimals, and percentages by converting them to a common format. Perform calculations involving addition and subtraction with directed numbers (positive and negative integers). Perform calculations involving multiplication and division with directed numbers, applying the correct rules for signs.	shapes, including rectangles, triangles, and parallelograms. Calculate the area of rectangles, triangles, and parallelograms using standard formulae.	and prime numbers for integers. Find the Highest Common Factor (HCF) and Lowest Common Multiple (LCM) of two or more numbers.	form. Use correct geometric notation to name, draw, and measure lines, segments, and angles. Apply angle facts, including angles on a straight line, vertically opposite angles, and angles around a point, to calculate missing values.

		and lower bounds of rounded numbers.				
Year 8 curriculum overview	Ratio and scale Multiplicative change Multiplying and dividing fractions	Working in the cartesian plane Representing data Representations tables & probability	Brackets, equations & inequalities Algebraic techniques Sequence Algebraic techniques Indices	Fractions & percentages Standard form Developing Number sense	Angels in parallel lines & polygons. Area of trapezium & circles Line symmetry & reflection.	The data handling cycle Measure of location.
Key knowledge outcomes (students should know)	Students should know that a ratio describes a multiplicative relationship between parts and understand how to use scale factors on maps and diagrams. Students should know that multiplicative change involves multiplying or dividing by a constant scale factor	Students should know how to locate and plot coordinates in all four quadrants of the Cartesian plane. Students should know that data can be visually represented using various charts and graphs to make patterns and distributions easier to analyze. Students should know how to construct and	Students should know that brackets are used to group terms and understand the rules for solving linear equations and representing inequalities. Students should know that algebraic sequences can be generated and analyzed using both term-to-term and	Students should know how to express parts of a whole interchangeably as fractions, decimals, or percentages and use them as operators. Students should know that standard form is a structure used to write very large or	Students should know that alternate and corresponding angles are equal when lines are parallel and recall the rules for interior angles of polygons. Students should know the formula for the area of a trapezium and understand that a circle's area is calculated using its	Students should know that the data handling cycle involves specifying a problem, planning, collecting data, processing and representing data, and discussing outcomes. Students should know that

	to maintain proportionality. Students should know that multiplying fractions involves multiplying the numerators and denominators together, while dividing fractions requires multiplying by the reciprocal of the divisor.	read sample space tables and understand that probability values range from 0 to 1.	position-to-term rules to find the nth term. Students should know the laws of indices for multiplying and dividing powers with the same base.	very small numbers as a power of 10. Students should know how to look for numerical connections and apply number sense to select efficient calculation strategies.	radius. Students should know that line symmetry divides a shape into identical halves and that a reflection creates a congruent flipped image.	averages measure the central tendency of data, while the range and outliers describe its spread.
Key skills (students should be able to)	Make connections between number relationships, and their algebraic and graphical representations. Use scale factor, scale diagrams and maps. Interpret when the structure of a numerical problem requires proportional reasoning. Use of Calculation strategies	Make connections between different numerical, algebraic , graphical and diagrammatic representations. Use language and properties precisely to analyse probability and statistics. Generate theoretical sample spaces for single and combined events. Using 0-1	Understand and use standard mathematical formulae. Identify variables and express relationships between variables algebraically. Understanding collecting like terms Multiplying a single term over a bracket. Taking out common factors. Generate	Interpret fractions and percentages as operators Work with terminating decimals and their corresponding fractions. Use integer powers and associate real roots (Square, cube and higher) Use standard units of mass length, time, money and	Understand the relationship between parallel lines, alternate and corresponding angles. Illustrate properties of triangles, quadrilaterals and circles. Solve problems involving perimeters of 2-D shapes , area of circles and	Describe, interpret and compare observed distributions of a single variable. Construct and interpret and compare tables,charts and diagrams. Understanding measures of central tendency

	to solve complex problems.	probability scale.	terms of a sequence from either a term-to-term rule or a position-to-term rule. Find the nth term of a sequence.	other measures.	composite shapes. Identify properties of reflection applied to given figures. Sketch and draw using conventional terms and notations with rotationally symmetric.	(mean, mode, median) and spread (range, outliers)
Year 9 curriculum overview	Forming and solving equations Straight line graphs Testing conjectures	3D shapes Constructions and congruence	Numbers Using percentages Maths and money	Deduction Rotation and translation Pythagoras' Theorem	Enlargement and Similarity Solving ratio and proportion problems Rates	Probability Algebraic representation
Key knowledge outcomes (students should know)	Students should know how to construct and rearrange mathematical formulae to change the subject and solve equations. Students should know that a straight-line graph can be represented by the equation y =	Students should know how to identify and describe the properties of 3D shapes, including vertices, edges, faces, and plans and elevations. Students should know the standard criteria for triangle congruence (SSS, SAS, ASA, RHS) and how to	Students should know the structure of the real number system, including the definitions and differences between integers, rational numbers, and irrational numbers. Students should know that percentages can express fractional	Students should know that geometric deduction requires applying established angle and shape facts to logically prove missing measurements. Students should know that a translation moves	Students should know that enlargement changes the size of a shape by a scale factor from a center point, creating a mathematically similar shape. Students should know how to set up and solve direct and inverse proportion	Students should know how to systematically list outcomes and calculate probabilities using tables, grids, and Venn diagrams. Students should know that algebraic representation

	mx + c, where m is the gradient and c is the y-intercept. Students should know that testing conjectures involves using algebraic or numerical arguments to prove or disprove a mathematical statement.	use compasses and rulers for geometric constructions.	changes and be used as multipliers for complex calculations. Students should know financial terms such as interest, tax, profit, and loss, and understand how to calculate value over time.	a shape using a vector, while a rotation turns a shape around a fixed center by a specific angle. Students should know that Pythagoras' Theorem states that the square of the hypotenuse is equal to the sum of the squares of the other two sides in a right-angled triangle.	problems using both algebraic and graphical methods. Students should know that rates express a relationship between two different quantities, such as speed, density, or unit pricing.	involves using letters to model real-life situations and plotting non-linear graphs like quadratics to find hidden values.
Key skills (students should be able to)	Understand and use standard mathematical formulae, rearrange formulas to change subject. Interpret mathematical	Use language and properties precisely to analyse algebraic expressions 2-D and 3-D shapes Draw and measure line segments angles in geometric figures, including interpreting scale drawings.	Appreciate the infinite nature of the set of integers, real and rational numbers. Interpret fractions and percentages as operators Select and use appropriate	Apply properties of angles at a point, angles at a point on a straight line, vertically opposite angles. Identify properties of, and describe result of, translations,	Use scale factors, scale diagrams and maps. Solve problems involving direct and inverse proportion, including graphical and algebraic representations.	Enumerate sets and unions/intersections of sets systematically, using tables, grids and venn diagrams. Use quadratic

	relationships both algebraically and graphically. To reason deductively geometry, number and algebra.	Use the standard conventions for labelling sides and angles of triangle ABC, and know and use the criteria for congruence triangles	calculations strategies to solve increasingly complex problems.	rotations and reflections applied to given figures. Use Pythagoras' Theorem to solve problems involving right-angled triangles.	Use compound units such as speed, unit pricing and density to solve problems.	graphs to estimate values of y for given values of x and vice versa.
Year 10 curriculum Foundation overview	Non-Calculator Methods Trigonometry	Equations and Inequalities Simultaneous Equations Congruence, similarity & enlargement	Angles and Bearings Working with Circles Vectors	Ratios and Fractions Percentages and Interest	Probability Collecting, Representing and Interpreting Data	Types of Number and Sequences Indices and Roots Manipulating Expressions
Key knowledge outcomes (students should know)	Students should know how to apply mental and written strategies for arithmetic operations, estimations, and fractions without relying on a calculator. Students should know the definitions	Students should know how to solve linear equations and represent inequalities on a number line using correct algebraic notation. Students should know that simultaneous equations represent a pair of equations with shared variables that	Students should know that bearings are geometric angles measured clockwise from North, expressed as three-digit figures. Students should know the definitions and formulas for a circle's circumference and area, as well as	Students should know how to divide a quantity into a given ratio and understand the link between ratios and fractions as parts of a whole. Students should know how to calculate	Students should know that the probability of independent and dependent events can be calculated and represented systematically using tree diagrams or tables. Students should know how to	Students should know the definitions of prime factors, HCF, and LCM, and understand how to find the nth term of a linear sequence. Students should know the laws of indices for

	of the sine, cosine, and tangent ratios and understand how to apply them to find missing sides and angles in right-angled triangles.	can be solved by finding their single common intersection point. Students should know that congruent shapes are identical in size and shape, while similar shapes are enlargements of each other with identical angles and proportional sides.	how to calculate arc lengths and sector areas. Students should know that a vector represents a quantity with both magnitude and direction, and understand how to express them as column vectors.	percentage change and solve problems involving compound interest, growth, and decay over time.	construct and interpret tables, charts, and diagrams for both grouped and ungrouped data sets to analyze distributions.	simplifying expressions and understand how to calculate with roots and numbers in standard form. Students should know standard algebraic methods to simplify expressions, including expanding brackets and factorising quadratic expressions.
Key skills (students should be able to)	Use fractional scale factors for enlargements Apply relationships of similarity for lengths of shapes Apply Pythagoras' Theorem and	Expand and consolidate on algebraic capability from KS3 Select appropriate techniques to problem solve with algebraic methods	Interpret and use bearings, making connections with other parts of Mathematics Calculate arc lengths and areas of sectors Calculate the volume and surface area of	Divide a given quantity into two parts. Compare area, length and volume using ratio Solve a variety of problems involving	Construct and interpret tables, charts and diagrams for grouped and ungrouped data Describe and interpret distributions of a single variable and	Consolidate knowledge of factors, primes, HCF and LCM. Calculate the nth term of a linear sequence Calculate with

	trigonometry in 2D Develop problem solving skills from different parts of Mathematics	Form and solve linear simultaneous equations algebraically and graphically	spheres, cylinders and cones. Apply operations involving vectors through diagrammatic and column representations	percentage change. Form and solve growth and decay problems, including compound interest Calculate the probability of independent and dependent events, using representations.	the relationships between two variables Calculate exactly with fractions Apply and interpret limits of accuracy when rounding	and simplify roots and integer indices Calculate with numbers in the standard form Simplify algebraic expressions,, including factorising quadratic expressions
Year 10 Higher curriculum overview	Non-Calculator Methods Trigonometry	Equations and Inequalities Simultaneous Equations	Angles and Bearings Working with Circles Vectors	Ratios and Fractions Percentages and Interest	Probability Collecting, Representing and Interpreting Data	Types of Number and Sequences Indices and Roots Manipulating Expressions
Key knowledge outcomes (students should know)	Students should know how to perform complex arithmetic operations, estimate answers to multi-step problems, and manipulate fractions fluently without a	Students should know how to solve linear and quadratic equations, and represent solutions to inequalities using algebraic notation, set	Students should know how to apply angle facts to multi-step geometric problems and express directions as three-digit bearings measured clockwise	Students should know how to solve complex sharing problems using ratios, and understand the links between ratio, scale factor,	Students should know how to compute and interpret conditional probabilities using systematic representations such as Venn diagrams,	Students should know the definitions of prime factors, arithmetic progress, and geometric progress, and

	calculator. Students should know the sine, cosine, and tangent ratios for right-angled triangles, as well as the sine rule, cosine rule, and triangle area formula for non-right-angled triangles.	notation, and graphs. Students should know how to solve simultaneous equations algebraically and graphically, including pairs where one equation is linear and the other is quadratic.	from North. Students should know all standard circle theorems regarding angles, tangents, and chords, and understand how to calculate arc lengths and sector areas. Students should know how to add, subtract, and scale column vectors, and use them to construct formal geometric arguments and mathematical proofs.	and changes in length, area, or volume for similar shapes. Students should know how to calculate percentage increases, decreases, and repeated changes over time to solve complex compound interest, growth, and decay problems.	sample spaces, and tree diagrams. Students should know how to construct, interpret, and compare advanced statistical diagrams, including histograms with unequal class widths, cumulative frequency graphs, and box plots.	know how to find the nth term for both linear and quadratic sequences. Students should know the laws of indices for negative and fractional exponents, and understand how to simplify and calculate exactly with surds and standard form. Students should know standard algebraic methods to simplify complex expressions and fractions, deduce turning points by completing the square, and expand multiple brackets.

Key skills (students should be able to)	Use fractional and negative scale factors for enlargements Apply relationships of similarity for lengths, area and volume of shapes Apply Pythagoras' Theorem and trigonometry in 2D and 3D Apply the sine and cosine rule to calculate the area, sides and angles of any triangle.	Expand and consolidate on algebraic capability from KS3 Solve quadratic equations and inequalities through factorising and graphical methods Represent inequality solutions using set notation and graphs Solve linear/quadratic equations for two variables algebraically	Interpret and use bearings, making connections with other parts of Higher Mathematics Apply knowledge of scale factor to the surface area and volume of cylinders, cones and spheres. Apply and prove the standard circle theorems Use vectors to construct geometric arguments and proofs	Link ratio and fractions to the relationships between lengths area and volume in similar figures. Work with the general iterative processes Calculate and interpret conditional probabilities through appropriate representations	Construct and interpret histograms, cumulative frequency graphs and box plots Apply knowledge of quartiles and the inter quartile range Simplify expressions involving squares and surds Change recurring decimals into their corresponding fractions and vice versa Apply and interpret limits of accuracy, including upper and lower bounds	Calculate the nth term of a linear and quadratic sequence Interpret sequences involving surds Estimate powers and roots of any positive number Calculate with fractional indices Simplify and manipulate algebraic expressions and fractions Use algebraic expressions to construct proofs
Year 11 Foundation curriculum overview	Expanding and factorising Algebraic reasoning Changing the subject	Functions Geometric reasoning Multiplicative reasoning	Gradients & lines Non-linear graphs Using graphs	Listing & Describing Transforming & Constructing Show that..	Revision & Exam preparation	Summer exams

Key knowledge outcomes (students should know)	Students should know how to apply algebraic expanding and factorising methods to simplify expressions and solve quadratic equations. Students should know that an equation states that two expressions are equal for specific values, whereas an identity is true for all values of the variables. Students should know that changing the subject of a formula means rearranging it to isolate a specific variable on one side of the equals sign.	Students should know that a function is a mathematical relationship that maps an input value to a unique output value. Students should know how to use multi-step geometric deduction, bearings, and vectors to logically calculate missing values and prove properties of shapes. Students should know that multiplicative reasoning involves using proportional links, ratios, scale factors, and rates of change to solve complex real-world problems.	Students should know that the linear equation $y = mx + c$ defines a straight line where m represents the gradient and c represents the y-intercept. Students should know that non-linear graphs, such as quadratics and cubics, are curves that represent variables changing at a non-constant rate. Students should know how to interpret information and find approximate solutions from real-world graphs, including speed-distance-time and conversion charts.	Students should know systematic strategies, such as tree diagrams, tables, and lists, to enumerate outcomes and calculate the probability of combined independent or dependent events. Students should know that transforming a shape involves changing its position, orientation, or size through translation, rotation, reflection, or enlargement, while constructing involves drawing accurate geometric diagrams using tools.	Students should know how to structure an effective revision routine, identify personal areas for development, and apply mathematical strategies to solve multi-topic exam problems.	

				Students should know that a mathematical proof or "show that" question requires a logical sequence of algebraic or geometric steps to confirm a statement is true.		
Key skills (students should be able to)	Simplify and manipulate algebraic expressions Know the difference between an equation and an identity Solve quadratic and simultaneous equations algebraically and graphically Form and solve an equation and interpret the solution Solve linear	Deduce roots algebraically Apply Pythagoras' Theorem and trigonometry to find angles and lengths in right angle triangles Reason deductively in geometry and with bearings and vectors Interpret inverse and direct proportion equations. Link ratio to similarity and scale factors	Plot and interpret graphs. Use the form y=mx+c to find the equation of a line and identity parallel lines Find approximate solutions using a graph Identify roots and intercepts of quadratic functions graphically Plot and interpret graphs of real contexts, such as speed, distance, time	Calculate probability of independent and dependent combined events Construct and interpret plans and elevations of 3D shapes Use integer and fractional scale factor for enlargements Describe translations of 2D vectors Apply the	Model real-life situations mathematically and express the results using a range of formal representations Interpret mathematical relationships both algebraically and geometrically Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine	Identify the areas in which to revise and relearn Revise problems which cover multiple aspects of the curriculum

	equations and inequalities Calculate the nth term of a linear sequence Test conjectures through the use of algebra			concepts of congruence and similarity Apply addition and subtraction of vectors and multiplication of vectors by a scalar	problems, interpret their solution in the context of the problem given	
Year 11 Higher curriculum overview	Expanding and factorising Algebraic reasoning Changing the subject	Functions Geometric reasoning Multiplicative reasoning	Gradients & lines Non-linear graphs Using graphs	Listing & Describing Transforming & Constructing Show that..	Revision & Exam preparation	Summer exams
Key knowledge outcomes (students should know)	Students should know how to use algebra to support and construct rigorous mathematical arguments and formal proofs. Students should know how to translate real-life contexts, compound	Students should know how to interpret expressions as functions and apply operations to solve problems involving composite and inverse functions. Students should know how to apply and algebraically prove all standard circle	Students should know that the gradient of a linear graph represents a constant rate of change, while the gradient of a curve represents an instantaneous rate. Students should know how to freely convert and	Students should know that a negative scale factor inverts a shape through a center of enlargement in addition to scaling its dimensions. Students should know how to describe the net	Students should know how to structure an effective revision routine, identify personal areas for development, and apply mathematical strategies to solve multi-topic exam problems.	

	situations, or procedures directly into clear algebraic expressions. Students should know how to change the subject of a formula in complex scenarios where the target variable appears multiple times or inside a root.	theorems regarding angles, tangents, chords, and cyclic quadrilaterals. Students should know how to construct equations that describe direct and inverse proportion relationships, using a constant of proportionality.	transition between different numerical, algebraic, graphical, and diagrammatic representations of functions. Students should know how to use the standard form y = mx + c to identify parallel lines with equal gradients and perpendicular lines with negative reciprocal gradients. Students should know how to solve simultaneous equations graphically by finding the exact points of intersection between linear and non-linear paths. Students should know the behavior and key features of the exponential function graph, including its y-intercept and	change achieved by multi-step geometric transformations, such as combined reflections and rotations. Students should know the key characteristics and cyclical wave shapes of the sine, cosine, and tangent trigonometric functions. Students should know how to sketch transformations of a given function graph, specifically applying vertical or horizontal translations and reflections. Students should know how to apply the product rule for counting		

			asymptotic nature. Students should know that the equation of a circle with a center at the origin is represented by x squared plus y squared equals r squared. Students should know how to approximate the area under a curve by splitting it into a series of trapezia and calculating their combined areas.	to determine the total number of possible outcomes for a series of combined choices.		
Key skills (students should be able to)	Use algebra to support and construct arguments (proofs) Translate simple situations or procedures into algebraic expressions	Interpret simple expressions as functions Recognise, sketch and interpret graph of quadratic functions Solve problems with	Interpret gradient of graphs as a rate of change Freely move between different numerical, algebraic, graphical and diagrammatic representations	Use negative scale factors for enlargement Describe changes achieved by multi-step transformations	Model real-life situations mathematically and express the results using a range of formal representations Interpret	Identify the areas in which to revise and relearn Revise problems which cover multiple aspects of the curriculum

	Solve quadratic equations algebraically by factorising, by completing the square and by using the quadratic formula Interpret solutions to equations numerically using iteration	composite and inverse functions Deduce turning points by completing the square Apply and prove the standard circle theorems Use vectors to construct geometric arguments and proofs Construct equations that describe direct and inverse proportion	Use the form y=mx+c to identify perpendicular and parallel lines Find solutions to linear/quadratic simultaneous equations using a graph Recognise the exponential function Recognise and use the equation of a circle Interpret the gradient at a point on a curve as the instantaneous rate of change Calculate the gradients of graphs and areas under graphs	Recognise graphs of the trigonometric functions Sketch translations and reflections of the graph of a given function Use the product rule for counting Interpret conditional probabilities through representations Work with recurring decimals and their corresponding fractions Show that using proofs, shapes, vectors and data.	mathematical relationships both algebraically and geometrically Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems, interpret their solution in the context of the problem given	

Year 12 curriculum overview	Unit 1: Algebra and Functions	Unit 3a: Algebraic Methods	Unit 4: Trigonometric Ratio and Equations	Unit 7: Integration	Unit 8: Exponentials and	Unit 2: Algebraic and Partial

	Unit 2: Coordinate Geometry in the (x, y) Plane **Applied** Unit 1: Statistical Sampling Unit 2: Data Presentation and Interpretation	Unit 3b: Algebraic Methods **Applied** Unit 3: Probability Unit 4: Statistical Distributions	Unit 6: Differentiation **Applied** Unit 5: Statistical Hypothesis Testing Unit 6: Quantities and Units in Mechanics	Unit 5: Vector **Applied** Unit 7: Constant Acceleration (Kinematics 1) Unit 8: Forces & Newton's Laws	Logarithms **Applied** Unit 9: Variable Acceleration (Kinematics 2)	Fractions (Y13) Unit 3: Functions and Modelling (Y13) **Applied** Unit 2: Probability (Y13
Key knowledge outcomes (students should know)	Students should know how to manipulate quadratic expressions, sketch cubic and quartic graphs, solve simultaneous equations, and use the laws of indices and surds to solve algebraic problems. Students should know the coordinate geometry formulas for the midpoint, gradient, and length of a line segment,	Students should know how to construct and interpret statistical measures of location and spread, such as the mean, standard deviation, and quartiles, and use diagrams like box plots and histograms to compare data sets. Students should know how to use the factor theorem to factorise polynomials,	Students should know how to apply the laws of probability, calculate conditional probabilities using Venn diagrams or tree diagrams, and understand the concept of mutually exclusive and independent events. Students should know the properties and conditions required to model a real-world situation	Students should know that the derivative represents the instantaneous rate of change or gradient of a curve, and know how to differentiate expressions from first principles or using the power rule to locate stationary points. Students should know how to formulate a	Students should know that integration is the fundamental inverse process of differentiation, and know how to find the constant of integration and calculate definite integrals to determine the area under a curve. Students should know how to represent vectors	Students should know Newton's three laws of motion, understand how to construct free-body diagrams, and apply the formula force equals mass times acceleration to resolve horizontal or vertical forces on a particle. Students should know the

	and understand that the equation of a circle is defined by its center point and radius. Students should know the differences between a population and a sample, understand the advantages and disadvantages of various sampling methods, and identify potential sources of bias in data collection.	complete proofs by deduction or exhaustion, and simplify complex algebraic fractions.	using a binomial distribution, and know how to calculate probabilities using its cumulative distribution function. Students should know the exact values of trigonometric functions for key angles, understand the behavior and periodicity of sine, cosine, and tangent graphs, and use standard trigonometric identities to solve equations.	hypothesis test for a binomial proportion, understand the definition of a critical region and critical values, and interpret the significance level to accept or reject a null hypothesis. Students should know the standard International System of Units (SI units) for mass, length, time, and force, and understand how to distinguish between scalar and vector quantities in physical contexts.	in two dimensions using magnitude and direction or column vectors, and understand how to calculate the resultant vector and find the displacement between two points. Students should know the standard constant acceleration formulae (suvat equations) and understand how to apply them to model linear motion, including objects falling freely under gravity.	mathematical relationship between exponentials and logarithms, understand the behavior of the natural exponential function, and know how to use logarithms to solve equations where the unknown is an index. Students should know that variable acceleration requires using calculus to transition between displacement, velocity, and acceleration by differentiating or integrating with respect to time.
Key skills (students should be able to)	Non-routine problem solving - expert thinking, metacognition, creativity Systems thinking- – decision making and reasoning.					

	Critical thinking - – definitions of critical thinking are broad and usually involve general cognitive skills such as analysing, synthesising and reasoning skills. ICT literacy- – access, manage, integrate, evaluate, construct and communicate.

Year 13 curriculum overview	Unit 4: Series and Sequences Unit 5: Algebraic and Partial Fractions **Applied** Unit 1: Regression and Correlation	Unit 6: Trigonometry **Applied** Unit 3 The Normal Distribution	Unit 7: Parametric Equations Unit 8: Differentiation **Applied** Unit 4: Moments Unit 5: Forces at any Angle	Unit 10: Integration (part 1) **Applied** Unit 6: Projectiles	Unit 11: Integration (part 2) Unit 12: Vectors (3D) **Applied** Unit 7: Applications of Forces	Unit 9: Numerical Methods Unit 1: Proof **Applied** Unit 8: Further Kinematics
Key knowledge outcomes (students should know)	Students should know how to decompose algebraic expressions into partial fractions with	Students should know how to expand expressions of the form (1+x)n using the binomial	Students should know how to apply advanced differentiation techniques, including	Students should know how to use advanced integration techniques,	Students should know how to use vectors in three dimensions to calculate the	Students should know how to model the two-dimensional motion of a

	linear or repeated denominators to simplify complex rational functions for further manipulation. Students should know the formal definitions of a function, including domain and range, and understand how to find composite and inverse functions and sketch transformations of graphs. Students should know how to apply conditional probability formulas to multi-stage problems and model real-world scenarios using independent or dependent probability structures.	theorem for negative or fractional indices and determine the validity of the expansion. Students should know the definitions and graph shapes of the reciprocal trigonometric functions secant, cosecant, and cotangent, and understand how to apply their corresponding identities to solve equations. Students should know how to identify arithmetic and geometric progressions, use standard formulas to calculate the nth term and the sum of a series, and understand the notation and properties of sigma	the product rule, quotient rule, and chain rule, to find gradients of complex functions and solve related rates of change problems. Students should know how to use radians to measure angles, calculate arc lengths and sector areas, and apply small angle approximations to trigonometric functions. Students should know that a normal distribution is a continuous probability distribution symmetric about its mean, and understand how to calculate probabilities and conduct hypothesis tests for the mean of	including integration by substitution, integration by parts, and using partial fractions, to find areas under curves and evaluate definite integrals. Students should know how to set up, solve, and interpret first-order differential equations to model real-world situations involving rates of change. Students should know how to use numerical methods, such as the Newton-Raphson method and the trapezium rule, to find approximate roots of equations and estimate areas when analytical methods are not	distance between two points, find the equation of a straight line, and determine points of intersection or skewness. Students should know how to apply Newton's laws of motion to complex systems, including connected particles on inclined planes, pulley systems, and objects experiencing friction. Students should know how to resolve forces and calculate moments about a pivot point to analyze the static equilibrium of rigid bodies, such as ladders and	projectile moving freely under gravity by treating horizontal and vertical components independently. Students should know how to interpret and analyze the correlation between two variables using scatter diagrams, calculate the product moment correlation coefficient, and conduct hypothesis tests for zero correlation. Students should know how to synthesize algebraic, geometric, statistical, and mechanical concepts to

		networks.	a normal population.	possible.	uniform beams.	independently select and apply appropriate mathematical strategies when tackling unfamiliar, multi-topic synoptic exam questions.
Key skills (students should be able to)	Non-routine problem solving - expert thinking, metacognition, creativity Systems thinking- – decision making and reasoning. Critical thinking - – definitions of critical thinking are broad and usually involve general cognitive skills such as analysing, synthesising and reasoning skills. ICT literacy- – access, manage, integrate, evaluate, construct and communicate.					