Space Studio West London
an Aspirations Academy

Mathematics - Curriculum Plan

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
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 of the sine, cosine, and tangent ratios and understand how to apply them to find missing sides and angles in right-angled triangles.	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 can be solved by finding their single common intersection point. Students should know	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 how to calculate arc lengths and sector areas. Students should know that a vector	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 percentage change and solve problems involving compound interest, growth, and decay over time.	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 construct and interpret tables, charts, and diagrams for both grouped and ungrouped data	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 simplifying expressions and understand how to calculate with roots and numbers

		that congruent shapes are identical in size and shape, while similar shapes are enlargements of each other with identical angles and proportional sides.	represents a quantity with both magnitude and direction, and understand how to express them as column vectors.		sets to analyze distributions.	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 trigonometry in 2D Develop problem solving skills from different parts of Mathematics	Expand and consolidate on algebraic capability from KS3 Select appropriate techniques to problem solve with algebraic methods Form and solve linear simultaneous equations algebraically and graphically	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 spheres, cylinders and cones. Apply operations involving vectors through diagrammatic and column representations	Divide a given quantity into two parts. Compare area, length and volume using ratio Solve a variety of problems involving percentage change. Form and solve growth and decay problems, including compound interest Calculate the probability of independent and	Construct and interpret tables, charts and diagrams for grouped and ungrouped data Describe and interpret distributions of a single variable and the relationships between two variables Calculate exactly with fractions Apply and interpret	Consolidate knowledge of factors, primes, HCF and LCM. Calculate the nth term of a linear sequence Calculate with and simplify roots and integer indices Calculate with numbers in the standard form Simplify algebraic expressions,, including factorising

				dependent events, using representations.	limits of accuracy when rounding	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 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.	Students should know how to solve linear and quadratic equations, and represent solutions to inequalities using algebraic notation, set 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.	Students should know how to apply angle facts to multi-step geometric problems and express directions as three-digit bearings measured clockwise 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 solve complex sharing problems using ratios, and understand the links between ratio, scale factor, 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,	Students should know how to compute and interpret conditional probabilities using systematic representations such as Venn diagrams, sample spaces, and tree diagrams. Students should know how to construct, interpret, and compare advanced statistical diagrams, including	Students should know the definitions of prime factors, arithmetic progress, and geometric progress, and 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

			Students should know how to add, subtract, and scale column vectors, and use them to construct formal geometric arguments and mathematical proofs.	growth, and decay problems.	histograms with unequal class widths, cumulative frequency graphs, and box plots.	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	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	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	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	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	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

	cosine rule to calculate the area, sides and angles of any triangle.	Solve linear/quadratic equations for two variables algebraically	Use vectors to construct geometric arguments and proofs	representations	Change recurring decimals into their corresponding fractions and vice versa Apply and interpret limits of accuracy, including upper and lower bounds	Simplify and manipulate algebraic expressions and fractions Use algebraic expressions to construct proofs
Year 11 curriculum overview	Transformations Constructions, Loci & Bearings Probability Congruence & Similarity	**Mock 1** Inequalities Curved graphs Exponential functions Vectors and geometric proof Compound Measures	Circle Geometry Circle Theorems Trigonometry (recap) Further trigonometry Trigonometric graphs Transformation of Graphs **Mock 2**	Further Algebra: - Rearranging Equations (recap) - Iteration - Algebraic Fractions (recap) - Surds (recap)	Further Statistics: - Collecting Data (Stratified Sample, Capture-Recapture) - Cumulative Frequency, Box Plots & Histograms (recap)	Revision **GCSEs**
Key knowledge outcomes (students should know)	Types of transformations and key vocabulary to describe them. Invariant points (H). Compass skills to perform constructions and angle facts to work with bearings.	Inequality symbols and notation on a numberline. Set notation (H). Solutions of inequalities are regions (sets of	Parts of a circle. Angle facts in isosceles triangles. Wording for key circle theorems.	Algebraic notation and manipulation. Iterative methods and graphical representation of solutions (H). Rules of operations with Fractions (F) and	Key statistical vocabulary. Methods of data collection. Capture-Recapture process. Types of statistical	

	—---------- Product rule of combinations. Theoretical probability and relative frequency. AND & OR rules. Conditional probability (H). —---------- Rules of congruence (SSS, SAS, ASA, RHS) Linear, area and volume scale factors	values). Sketching quadratic functions (H). —---------- Shapes of linear and curved graphs. —---------- Column vector notation and graphical representations. Collinear points and parallel vector proof (H). —---------- Name compound measures and use their units to help with calculations.	—---------- Trigonometric ratios. Sine, Cosine Rules & Area of Triangle formula (H) Shapes of trigonometric graphs. Range and domain of trigonometric graphs (H). Rules of transformation of graphs (H)	Algebraic Fractions (H). Rules of Indices (F) and Surds (H)	diagrams and their use. Calculations to process and analyse data. Key parameters to compare the distribution.	
Key skills (students should be able to)	Name, describe and draw the four transformations (reflection, rotation, translation & enlargement).	Present inequalities on a numberline and using graphs. Solve linear inequalities.	Name and draw parts of a circle. Identify isosceles triangles in circles and use angle facts to solve problems.	Simplify algebra. Form expressions and equations. Rearrange formulae.	Describe a random sampling process. Calculate a stratified sample. Estimate	

	Accurately construct perpendicular bisectors, angle bisectors and loci. Calculate bearings and solve problems involving bearings. —---------- Calculate probabilities for single and multiple events. Use frequency trees, probability trees and Venn Diagrams. Solve probability problems by forming equations (H). —---------- Recognise congruent shapes (F) and construct proof of congruence (H). Use similarity in 1D, 2D and 3D problems.	Solve quadratic inequalities (H). Solve problems with speed, pressure and density. —---------- Sketch reciprocal and exponential graphs (H). Match graphs to their equations. —---------- Draw vectors. Calculate with vectors. Solve geometric problems and write proofs using vectors (H). —---------- Convert compound units accurately.	Recognise, apply and prove circle theorems (H). —---------- Use correct trigonometric ratios to find a missing side or angle. Use Sine, Cosine Rule and Area of Triangle in non-right-angle triangles (H). Draw trigonometric graphs and use them to solve problems (H). Transform graphs and describe transformations (H).	Use iteration to estimate solutions. Use the rule of sign change to confirm that a function has a root in a given interval (H). Manipulate fractions and complete four operations with them. Manipulate algebraic fractions and surds (H). Solve problems involving algebraic fractions and surds (H).	population by Capture-Recapture method. Accurately draw statistical diagrams. Estimate the median and quartiles from cumulative frequency, box plot and histogram. Compare two or more data sets.	
Year 12 curriculum overview	Unit 1: Algebra and Functions Unit 2: Coordinate Geometry in the (x, y) Plane **Applied**	Unit 3a: Algebraic Methods Unit 3b: Algebraic Methods **Applied** Unit 3: Probability	Unit 4: Trigonometric Ratio and Equations Unit 6: Differentiation **Applied** Unit 5: Statistical	Unit 7: Integration Unit 5: Vector **Applied** Unit 7: Constant	Unit 8: Exponentials and Logarithms **Applied** Unit 9: Variable	Unit 2: Algebraic and Partial Fractions (Y13) Unit 3: Functions and Modelling (Y13) **Applied** Unit 2: Probability

	Unit 1: Statistical Sampling Unit 2: Data Presentation and Interpretation	Unit 4: Statistical Distributions	Hypothesis Testing Unit 6: Quantities and Units in Mechanics	Acceleration (Kinematics 1) Unit 8: Forces & Newton's Laws	Acceleration (Kinematics 2)	(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, and understand that the equation of a circle is defined by its center point and radius. Students should know the differences between a population	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, complete proofs by deduction or exhaustion, and simplify complex algebraic fractions.	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 using a binomial distribution, and know how to calculate probabilities using its cumulative	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 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	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 in two dimensions using magnitude and direction or column vectors, and understand how to calculate the resultant vector and find the	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 mathematical relationship between exponentials and logarithms, understand the behavior of the

	and a sample, understand the advantages and disadvantages of various sampling methods, and identify potential sources of bias in data collection.		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.	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.	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.	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 6: Trigonometry	Unit 7: Parametric Equations	Unit 10: Integration (part 1)	Unit 11: Integration (part 2)	Unit 9: Numerical Methods

	Unit 5: Algebraic and Partial Fractions **Applied** Unit 1: Regression and Correlation	**Applied** Unit 3 The Normal Distribution	Unit 8: Differentiation **Applied** Unit 4: Moments Unit 5: Forces at any Angle	**Applied** Unit 6: Projectiles	Unit 12: Vectors (3D) **Applied** Unit 7: Applications of Forces	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 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	Students should know how to expand expressions of the form (1+x)n using the binomial 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	Students should know how to apply advanced differentiation techniques, including 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	Students should know how to use advanced integration techniques, 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	Students should know how to use vectors in three dimensions to calculate the 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	Students should know how to model the two-dimensional motion of a 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

	formulas to multi-stage problems and model real-world scenarios using independent or dependent probability structures.	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 networks.	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 a normal population.	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 possible.	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 uniform beams.	correlation coefficient, and conduct hypothesis tests for zero correlation. Students should know how to synthesize algebraic, geometric, statistical, and mechanical concepts to 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.					