Year 11H Scheme of Work

Unit	Key Objectives
Probability	Use the product rule for counting; Estimate the number of times an event will occur, given the probability and the number of trials; Compare experimental data and theoretical probabilities; Compare relative frequencies from samples of different sizes. Find the probability of successive events, such as several throws of a single dice; Draw a probability tree diagram based on given information, and use this to find probability and expected number of outcome; Understand selection with or without replacement; Calculate the probability of independent and dependent combined events; Understand conditional probabilities and decide if two events are independent; Use a two-way table to calculate conditional probability; Use a tree diagram to calculate conditional probability; Use a Venn diagram to calculate conditional probability;
Further Trigonometry	Know and apply Area = ½ ab sin C to calculate the area, sides or angles of any triangle Find the arc length and area of a sector Find the area of a segment Know the sine and cosine rules, and use to solve 2D problems, including involving bearings Use the sine and cosine rules to solve 3D problems
Ratio	Combine ratios Write ratio as a linear function Express a multiplicative relationship between two quantities as a ratio or a fraction, e.g. when A:B are in the ratio 3:5, A is $\frac{3}{5}$B. When 4a = 7b, then a = $\frac{7b}{4}$ or a:b is 7:4 Solve ratio problems when ratios are changed by adding or removing items Solve two stage ratio problems (e.g. parts of parts)

Histograms	Know the appropriate uses of histograms Construct and interpret histograms from class intervals with unequal width Use and understand frequency density From histograms complete a grouped frequency table understand and define frequency density Estimate the mean from a histogram Estimate the median from a histogram with unequal class widths or any other information from a histogram, such as the number of people in a given interval
Cumulative Frequency and Box Plots	Know the appropriate uses of cumulative frequency diagrams; Construct and interpret cumulative frequency tables; Construct and interpret cumulative frequency graphs/diagrams and from the graph: estimate frequency greater/less than a given value; find the median and quartile values and interquartile range; Compare the mean and range of two distributions, or median and interquartile range, as appropriate; Interpret box plots to find median, quartiles, range and interquartile range and draw conclusions; Produce box plots from raw data and when given quartiles, median and identify any outliers;
Circle Theorems 2	Use the facts that the fact that the angle between a tangent and radius is 90° the tangent at any point on a circle is perpendicular to the radius at that point alternate segment theorem the perpendicular from the centre of a circle to a chord bisects the chord Prove the circle theorems (not the tangent properties)

Exploring Graphs	Recognise a linear, quadratic, cubic, reciprocal and exponential graph from its shape Draw graphs of simple cubic functions using tables of values Interpret graphs of simple cubic functions, including finding solutions to cubic equations Draw graphs of the reciprocal function with $x \neq 0$ using tables of values State the value of x for which the equation is not defined Recognise, sketch and interpret graphs of exponential functions y = kx where k>0 and integer values of x Recognise, sketch and interpret graphs of the trigonometric functions (in degrees) y = sin x, y = cos x and y = tan x for angles of any size Know the exact values of sin θ and cos θ for θ = 0°, 30°, 45° , 60° and 90° and exact value of tan θ for θ = 0°, 30°, 45° and 60° and find them from graphs Use trigonometric graphs to find solutions to simple equations Interpret and analyse transformations of graphs of functions and write the functions algebraically, e.g. write the equation of f(x) + a, or f(x – a) apply the transformations y = –f(x), y = f(–x) for linear, quadratic, cubic and trigonometric functions apply the transformations y = f(x) + a, y = f(x + a) for linear, quadratic, cubic and trigonometric functions
Circle Geometry	Recognise and construct the graph of a circle using $x^2 + y^2 = r^2$ for radius r centred at the origin of coordinates Draw circles, centre the origin, equation $x^2 + y^2 = r^2$ Find the equation of a tangent to a circle at a given point, by finding the gradient of the radius that meets the circle at that point (circles all centre the origin) finding the gradient of the tangent perpendicular to it using the given point Find the point of intersection of a line and a circle Select and apply construction techniques and understanding of loci to draw graphs based on circles and perpendiculars of lines
Vectors and Geometric Proof	Understand that 2**a** is parallel to a and twice its length, and that **a** is parallel to **–a** in the opposite direction Represent vectors, combinations of vectors and scalar multiples in the plane pictorially Find the length of a vector using Pythagoras' Theorem Calculate the resultant of two vectors Solve geometric problems in 2D where vectors are divided in a given ratio Produce geometrical proofs to prove points are collinear and vectors/lines are parallel

Iteration	Use iteration to find approximate solutions to equations, for simple equations in the first instance, then quadratic and cubic equations Know and use the fact that a sign change shows a solution Use an iterative process to solve problem in context Use iteration with simple converging sequences
Real Life Graphs	Use graphs to calculate various measures (of individual sections), including unit price (gradient), average speed, distance, time, acceleration Estimate area under a quadratic or other graph by dividing it into trapezia, rectangles or triangles Interpret the gradient of linear or non-linear graphs, and estimate the gradient of a quadratic or non-linear graph at a given point by sketching the tangent and finding its gradient Interpret the gradient of non-linear graph in curved distance–time and velocity–time graphs For a non-linear distance–time graph, estimate the speed at one point in time, from the tangent, and the average speed over several seconds by finding the gradient of the chord For a non-linear velocity–time graph, estimate the acceleration at one point in time, from the tangent, and the average acceleration over several seconds by finding the gradient of the chord Interpret the gradient of a linear or non-linear graph in financial contexts Interpret the area under a linear or non-linear graph in real-life contexts Interpret the rate of change of graphs of containers filling and emptying Interpret the rate of change of unit price in price graphs
Quadratic Inequalities	Solve quadratic inequalities in one variable, by factorising and sketching the graph to find critical values Represent the solution set for inequalities using set notation, i.e. curly brackets and 'is an element of' notation For problems identifying the solutions to two different inequalities, show this as the intersection of the two solution sets, i.e. solution of $x^2 - 3x - 10 < 0$ as $\{x: -3 < x < 5\}$ Solve a pair of quadratic inequalities or a quadratic and a linear inequality and identify the set of solutions that satisfy both Solve quadratic inequalities in context
Algebraic Fractions	Simplify algebraic fractions Add and subtract algebraic fractions Multiply and divide algebraic fractions Solve quadratic equations arising from algebraic fraction equations

Algebraic Proof	Use general forms for consecutive integers (n, n+1) Use general forms for even (2n) and odd (2n + 1) numbers Use general forms for multiple of a number (3n, 4n, 5n etc) Solve 'Show that' and proof questions using consecutive integers, squares, even numbers and odd numbers Use different general forms, where needed, to represent different numbers (2m and 2n)
Congruence	Understand and use SSS, SAS, ASA and RHS conditions to prove the congruence of triangles using formal arguments, and to verify standard ruler and pair of compasses constructions Solve angle problems by first proving congruence
Constructions and Loci	Use the standard ruler and compass constructions understand, from the experience of constructing them, that triangles satisfying SSS, SAS, ASA and RHS are unique, but SSA triangles are not construct the perpendicular bisector of a given line construct the perpendicular from a point to a line construct the bisector of a given angle construct angles of 90°, 45° Construct a region bounded by a circle and an intersecting line a given distance from a point and a given distance from a line equal distances from two points or two line segments regions which may be defined by 'nearer to' or 'greater than' Find and describe regions satisfying a combination of loci, including in 3D Use constructions to solve loci problems including with bearings Know that the perpendicular distance from a point to a line is the shortest distance to the line