Year 11 Maths Curriculum Plan

Higher Curriculum Plan is listed first. Foundation Curriculum Plan is also listed, underneath.

Key concept/ Key question	Overview of the unit	Assessment	Cross Curricular Skills	Suggested reading material and websites:

Sets & Venn Diagrams	Apply the product rule for counting
	    Use a Venn diagram to sort information in a probability problem
	    Use a two-way table to sort information in a probability problem
	    Use a Venn diagram to calculate theoretical probabilities
	    Use a two-way table to calculate theoretical probabilities
	    Calculate conditional probabilities using different representations
	Use set notation confidently
		Diagnostic Minitest
		End of Unit Minitest
			Interpreting the question: literacy	Hegarty Maths

Vectors	Understand the concept of a vector & use to describe enlargements
	    Use diagrammatic representation of vectors
	    Know and use different notations for vectors
	    Add and vectors
	    Multiply a vector by a scalar, including expanding brackets eg ⅔ (3**a** + 12**b)**
	· Solve simple geometrical problems involving vectors
		Diagnostic Minitest
		End of Unit Minitest
			Interpreting the question: literacy	Hegarty Maths

Algebraic Fractions	Expand the product of two binomials involving surds Expand trinomials fluently (must be confident on the Just Maths 9-1 Sample Questions on Expanding/Factorising/Solving Polynomials) Factorise an expression involving the difference of two squares, even if algebraic Factorise a quadratic expression of the form $ax^2 + bx + c$ Simplify an algebraic fraction that involves factorisation, in both numerator and denominator, or either Add, subtract, multiply, divide algebraic fractions that involve quadratics with fluency and confidence, so that students can confidently solve all the Just Mths 9-1 Sample Exam Questions on Algebraic Fractions Write proofs involving algebraic fractions, and rearrange algebraic fractions into specific forms given in exam question style Solve linear equations involving algebraic fractions Solve quadratic equations involving algebraic fractions	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths
Sequences	Recap the nth term of a linear sequence if necessary Find the nth term of a sequence of the form $ax^2 + bx + c$ Understand the difference between an arithmetic progression, a quadratic sequence and a geometric progression Recognise, find the next terms in, or find a given term in a geometric progression (of the form ar^n), and describe a geometric progression ar^n, when r is a fraction > 0 or a surd Work confidently with formal notation for the term to term rule Solve problems involving variations on the Fibonacci sequence	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths
Tangents	Recognise, plot and interpret exponential graphs Plot graphs of non-standard functions	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths

		Use graphs of non-standard functions to solve simple kinematic problems Recognise that the gradient of a curve is not constant Know that the gradient of a curve is the gradient of the tangent at that point Calculate (estimate) the gradient at a point on a curve Interpret the gradient at a point on a curve as the instantaneous rate of change Solve problems involving the gradients of graphs in context Know that the area under a speed-time graph gives the distance Calculate (estimate) the area under a graph: THIS INCLUDES USING THE FORMAL TRAPEZIUM RULE which used to be A level Solve problems involving the area under graphs in context · Identify (interpret) roots, intercepts and turning points of quadratic functions graphically (this is recap from earlier)			
	Proportion	·Recap forming and solving more complex equations for direct and inverse proportion, including directly/inversely proportional to the square, cube, square root, cube root etc Recap identification of when a table of values shows quantities in direct or inverse proportion Recap correct identification of graphs representing direct or inverse proportion Recognise when word problems are in fact proportion problems, and use appropriate techniques	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths

	Functions	Understand the meaning of a function
		    Know the notation for composite functions
		    Find the inverse of a given function
		    Solve problems involving inverse functions
		· Solve problems involving composite functions
			Diagnostic Minitest
			End of Unit Minitest
				Interpreting the question: literacy	Hegarty Maths

3D Pythagoras	Visualise the diagonals of a cuboid, and the triangle that can be created by joining any three vertices of a three dimensional shape Use Pythagoras' theorem to find the length a given diagonal in a cuboid Use Pythagoras' theorem to find lengths in three dimensional figures Use trigonometry to find the angle between a line and a plane Solve practical problems involving lengths and angles in three dimensional figures Know the labelling conventions for non-right angled triangles Derive the sine rule (proof not examined) Know the cosine rule Identify when the sine (cosine) rule is needed to solve a problem Set up and use the sine (cosine) rule to find a missing side in a non-right angled triangle Recognise the ambiguous case when using the sine rule - now examinable · Solve problems involving bearings	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths
Graphs	Plot the graph of an exponential function, $y = k^x$, for positive values of k Understand that trigonometric values can be found for angles of any size Plot the graphs of the trigonometric functions, $y = \sin x$, $y = \cos x$ and $y = \tan x$ Use the trig graphs to find multiple solutions, eg if sin x = 30, find alternative values of x. Know the key features of exponential and trigonometric graphs	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths

	Identify linear, quadratic, cubic, exponential, trigonometric, and reciprocal graph sketches Know the effects of transforming the graph $y = f(x)$: $f(x)$, $f(ax)$, $af(x)$, $f(x) + a$, $f(x + a)$, $y = f(-x)$ and $y = -f(x)$ · Solve problems involving the transformation of graphs			
Vectors II	· Understand how to create and present a proof involving vectors · Make deductions about situations involving vectors that are multiples of other vectors · Make deductions about situations involving vectors expressed using ratios ● · Make deductions about situations involving vectors and parallel lines	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths
Proof	· Recap the criteria for triangles to be congruent (SSS, SAS, ASA, RHS) & Identify congruent triangles · Use known facts to form conjectures about lines and angles in geometrical situations · Use known facts to derive further information in geometrical situations · Test conjectures using known facts · Know the structure of a simple mathematical proof · Use known facts to create proofs · Explain why the base angles in an isosceles triangle must be equal ● · Explain the connections between Pythagorean triples	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths
Histograms	· Understand the definition of a histogram · Construct and use the horizontal axis of a histogram correctly · Know that frequency density = frequency ¸ class width · Identify when it is necessary to calculate the frequency density	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths

	· Construct histograms for grouped data with equal class intervals · Construct histograms for grouped data with unequal class intervals · Use a histogram to find missing values in a frequency table · Use a partially completed histogram and frequency table to complete both • Construct and interpret time series, including commenting on trends and seasonal variation.			
Quadratics	• Choose a quadratic function related to a quadratic inequality · Sketch the graph of the related quadratic function · Identify the roots of the related quadratic function · Use the graph the find, and state, the solution to a quadratic inequality · Make an appropriate substitution when solving simultaneous equations in two variables where one is quadratic · Manipulate and solve the resulting quadratic equation to find the values for one variable · Find the values of the second variable by substitution • · Make connections between simultaneous equations and graphs	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths

Foundation Curriculum Plan

Key concept/ Key question	Overview of the unit	Assessment	Cross Curricular Skills	Suggested reading material and websites:
Proportion Graphs	• Know the difference between direct and inverse proportion • Recognise direct (inverse) proportion in a situation NB solving proportion equations is y11 for Foundation. • Know the features of a graph that represents a direct (inverse) proportion situation • Know the features of an expression (or formula) that represents a direct (inverse) proportion situation • Understand the connection between the multiplier, the expression and the graph • Know the meaning of congruent (similar) shapes • Identify congruence (similarity) of shapes in a range of situations • Identify the information required to solve a problem involving similar shapes • Finding missing lengths in similar shapes • Understand why speed, density and pressure are known as compound units • Know the definition of density (pressure, population density, speed) • Solve problems involving density (pressure, speed) • Convert between units of density	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths
Probability	• Know that probabilities add to 1 • List all elements in a combination of sets using a Venn diagram • List outcomes of an event systematically • Use a table to list all outcomes of an event • List outcomes of an event using a grid (two-way table) • Use frequency trees to record outcomes of probability experiments	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths

	• Make conclusions about probabilities based on frequency trees • Construct theoretical possibility spaces for combined experiments with equally likely outcomes • Calculate probabilities using a possibility space • Use theoretical probability to calculate expected outcomes • Use experimental probability to calculate expected outcomes			
Congruency, Similarity and Proof	• Identify congruent triangles • Know and use the criteria for triangles to be congruent (SSS, SAS, ASA, RHS) • Solve problems, including geometrical proof, involving congruence • Solve simple problems involving similarity • Solve problems involving similarity • Test conjectures using known facts in geometrical situations, including why the base angles in an isosceles triangle must be equal **this includes proofs using angle facts: spend time on this.** • · Explain the connections between Pythagorean triples	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths
Vectors	• Understand the concept of a vector & use to describe enlargements • Use diagrammatic representation of vectors • Know and use different notations for vectors • Add and vectors • Multiply a vector by a scalar, including expanding brackets eg ⅔ (3**a** + 12**b)** • · Solve simple geometrical problems involving vectors	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths
Fibonacci and Geometric Sequences	• Recognise and use the Fibonacci sequence • Generate Fibonacci type sequences • Find the next terms of a Fibonacci sequence • Explore growing patterns and other problems involving quadratic sequences • Generate terms of a quadratic sequence from a written rule • Find the next terms of a quadratic sequence using first and second differences • Generate terms of a quadratic sequence from its nth term	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths

Volume and Surface Area	• **F**ind the surface area of spheres • Find the volume of spheres • Use Pythagoras' theorem to find lengths in a pyramid or cone • Find the surface area of cones and pyramids • Find the volume of cones and pyramids • Identify how to find the volume of a composite solid • Identify how to find the surface area of a composite solid • Solve practical problems involving the surface area of solids • · Solve practical problems involving the volume of solids	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths
Proportion	• Recognise a graph that illustrates direct proportion • Recognise a graph that illustrates inverse proportion • Interpret a graph that illustrates direct proportion • Interpret a graph that illustrates inverse proportion • Understand that X is inversely proportional to Y is equivalent to X is proportional to 1/Y • Interpret equations that describe direct proportion: directly examinable. Eg if y = kx, explain what k represents and describe the relationship as 'direct proportion' • Interpret equations that describe inverse proportion: directly examinable. Eg if y = k/x^2, be able to write that x squared is inversely proportional to y, and explain k as the constant of proportionality • Solve equations involving direct or inverse proportion (do not have to be able to set them up) • Solve problems which include finding the multiplier in a situation involving direct proportion • Solve problems which include finding the multiplier in a situation involving inverse proportion	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths

Solving Quadratics	- Factorise a quadratic equation (note a = 1 always for Foundation) - Factorise a quadratic equation using difference of two squares - Solve a quadratic equation in factorised form - Solve a quadratic equation of the form $x^2 + bx + c$ by factorising - Make connections between graphs and quadratic equations of the form $ax^2 + bx + c = 0$ - Make connections between graphs and quadratic equations of the form $ax^2 + bx + c = d$ - Find approximate solutions to quadratic equations using a graph - Deduce roots of quadratic functions algebraically · Solve problems that involve solving a quadratic equation in context	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths
percentages	- Recognise when a situation involves compound interest - Set up a compound interest problem - Calculate the result of a repeated percentage change, including compound interest - Set up and solve a growth or decay problem - Solve reverse percentage change problems	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths
Geometric Sequences	- Recognise and describe a simple geometric progression · Find the next three terms, or any given term, in a geometric progression	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths
Quadratic Turning Points	▪ Identify and interpret roots of quadratic functions graphically ○ Identify and interpret intercepts of quadratic functions graphically · Identify and interpret turning points of quadratic functions graphically	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths
Statistics	○ Understand the limitations of sampling ○ Use a sample to infer properties of a population - Identify misleading graphs and explain why they are misleading - Construct, interpret, and identify mistakes in composite and dual bar charts - Construct and interpret stem and leaf diagrams	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths

	• Construct and interpret line graphs • Construct and interpret pictograms • Construct and interpret pie charts			
Standard Form & Error Intervals	• Revise calculating with positive indices (roots) using written methods • Revise calculating with negative indices in the context of standard form • Use a calculator to evaluate numerical expressions involving powers (roots) • Interpret a number written in standard form • Add (subtract) numbers written in standard form • Multiply (divide) numbers written in standard form • Convert a 'near miss' into standard form; e.g. 23×10^7 • Enter a calculation written in standard form into a scientific calculator • Interpret the standard form display of a scientific calculator • Understand the difference between truncating and rounding • Round to a given number of decimal places and significant figures • Identify the minimum and maximum values of an amount that has been rounded and express as an error interval using inequality symbols (to nearest x, x d.p., x s.f.) • Use inequalities to describe the range of values for a rounded value • Solve problems involving the maximum and minimum values of an amount that has been rounded	Diagnostic Minitest End of Unit Minitest	Interpreting the question: literacy	Hegarty Maths

Time Series, Pie Charts and Scatter Diagrams	• Construct graphs of time series
	   ○ Interpret graphs of time series
	   ○ Construct and interpret pie charts
	   ○ Interpret a scatter diagram using understanding of correlation
	   ○ Construct a line of best fit on a scatter diagram and use the line of best fit to estimate values
	   ○ Know when it is appropriate to use a line of best fit to estimate values
	• Identify outliers and explain why they are outliers
	   ○ Understand that correlation does not indicate causation
		Diagnostic Minitest
		End of Unit Minitest
			Interpreting the question: literacy	Hegarty Maths

	• Understand, construct & interpret frequency polygons				

Probability	• Calculate the probabilities of independent combined events
	     ○ Calculate the probabilities of dependent combined events
	     ○ Construct and list outcomes of combined events using a tree diagram
	     ○ Use a tree diagram to solve simple and complex problems involving independent combined events
	     ○ Use a tree diagram to solve simple and complex problems involving dependent combined events
	     ○ Understand the difference between a frequency tree and a probability tree
	 • Complete a frequency tree, correctly interpreting worded information in the question
	 • · Understand that relative frequency tends towards theoretical probability as sample size increases
		Diagnostic Minitest
		End of Unit Minitest
			Interpreting the question: literacy	Hegarty Maths