

# YEAR 12 Core 1 & 2 Maths Curriculum (A Level Year 1)



**Holly Lodge High School**  
College of Science

Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<b>Focus</b>	Algebra and Functions Quadratic Functions Equations & Inequalities Binomial Expansion	Sketching Curves Coordinate Geometry Radian Measures Sine and Cosine Rule	Differentiation Sequences and Series Exponentials and Logs	Integration Graphs of Trig Functions Trig Identities and Equations	Revision for Core 1 and 2 exams	Introduce topics for Core 3 Functions Transformations Algebraic Fractions
<b>Key Tasks</b>	<p>Simplify, expand, factorise algebraic expressions; Apply laws of indices, Simplify surds. Use algebraic long division.</p> <p>Plot and solve quadratic functions by factorising, completing the square and the quadratic formula; sketch quadratic graphs using the discriminant.</p> <p>Solve a range of simultaneous equations and inequalities using elimination and substitution for</p>	<p>Sketch graphs for cubic and reciprocal functions. Transform functions.</p> <p>Find equation of a straight line including for parallel and perpendicular lines. Express the equation of a circle in the form <math>(x-a)^2 + (y-b)^2 = r^2</math></p> <p>Identify the intersection of a straight line and circle.</p> <p>Calculate the length of an arc and area of a sector using radians</p>	<p>Differentiate functions involving negative and fractional powers; find the second differential of a function</p> <p>Differentiate functions in real-life contexts; find the gradient of a tangent and a normal to a curve at a given point.</p> <p>Solve problems involving arithmetic and geometric sequences and the sum of a series</p> <p>Sketch graphs for functions <math>y=a^x</math></p> <p>Calculate logs to base 10; use the basic laws</p>	<p>Integrate basic functions including negative and fractional powers; integrate simple functions with defined limits. Use definite integration to find areas under curves; work out the area between a curve and a line; use the trapezium rule.</p> <p>Use basic trigonometric functions for any angle size; Know signs for basic trig functions (four quadrants);</p>		<p>Identify the range and domain for functions and represent them graphically; Express composite functions and inverse functions using algebra.</p> <p>Sketch the graph of modulus functions and solve equations; Sketch graphs of functions involving combinations of transformations.</p> <p>Simplify algebraic fractions. Express algebraic improper fractions as mixed</p>

	quadratic and linear functions  Expand binomial expressions in the form $(1+x)^n$ ; understand and use Pascal's Triangle	Use the sine and cosine rule to find missing angles and lengths in a triangle; use sin rule to find the area of a triangle.	of logs ( $x$ , $\div$ , powers) and solve equations in the form $a^x=b$ using logs	Find exact values of some trigonometric ratios. Recognise and transform trig graphs (sin, cos, tan)  Know how to apply basic trig identities; solve trig equations for sin, cos, tan Including quadratic equations.		numbers using long division & remainder theorem
<b>Assessment</b>	<b>Half-Term Assessment 1</b>	<b>MOCK EXAM</b>	<b>Half-Term Assessment 3</b>	<b>Half-Term Assessment 4</b>		

## YEAR 12 Decision Maths Curriculum (A Level Year 1)

 <span style="float: right;"><b>Holly Lodge High School</b> College of Science</span>						
Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<b>Focus</b>	Algorithms Graphs and Networks Algorithms on Networks 1	Algorithms on Networks 2 Chinese Postman Critical Path Analysis 1	Critical Path Analysis 2 Matchings	Linear Programming	Revision for Decision 1	Introduce topics for Statistics 1

<p><b>Key Tasks</b></p>	<p>Use a trace table and a flow chart; carry out a bubble sort; carry out a quick sort Implement a binary search; implement the three bin packing algorithm.</p> <p>Represent graphs and networks using matrices.</p> <p>Use Krushal's algorithm to find a min spanning tree; use Prim's algorithm to find a min spanning tree and apply to a distant matrix.</p>	<p>Use Dijkstra's algorithm to find the shortest path between two vertices.</p> <p>Determine whether a graph is traversable Use Chinese postman algorithm to find shortest route.</p> <p>Model a project by an activity network from a precedence table; understand the use of dummies; carry out a forward pass and a backward pass using early and late event times.</p>	<p>Identify critical activities; determine the total float of activities; construct and use cascade (Gantt) charts; construct a scheduling diagram.</p> <p>Model matching problems using a bipartite graph; use the maximum matching algorithm, starting from an initial matching.</p>	<p>Formulate a problem as a linear programming problem; illustrate a two-variable linear programming problem graphically; locate the optimal point in a feasible region using the objective line (ruler) method; use the vertex testing method to locate optimal point; determine solutions that need integer values</p>		
<p><b>Assessment</b></p>	<p><b>Half-Term Assessment 1</b></p>	<p><b>MOCK EXAM</b></p>	<p><b>Half-Term Assessment 3</b></p>	<p><b>Half-Term Assessment 4</b></p>		

# YEAR 13 Core 3 & 4 Maths Curriculum (A Level Year 2)

 <span style="float: right;"> <b>Holly Lodge High School</b>                      College of Science                 </span>						
Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<b>Focus</b>	Functions Transformations Exponentials and Logs Numerical Methods Algebraic Fractions	Partial Fractions Binomial Expansion Coordinate Geometry Trigonometry	Further Trigonometry Differentiation	Integration Vectors	Revision for Core 3 and 4 exams	
<b>Key Tasks</b>	Identify the range and domain for functions and represent them graphically; Express composite functions using algebra; find the inverse of a function.  Sketch the graph of modulus functions and solve equations involving modulus Sketch graphs of functions involving combinations of transformations.	Add/subtract algebraic fractions expressing answer as a single fraction; split a fraction into two partial fractions.  Use the binomial expansion for $(1+x)^n$ and $(a+bx)^n$  Define the coordinates of a point on a curve using parametric equations; find the area under a curve	Use double angle formulae for $\sin 2X$ , $\cos 2X$ , $\tan 2X$ Prove trig identities using the double angle formula; express sums and differences as products using the factor formula.  Use the chain rule, product rule and quotient rule to differentiate functions. Differentiate exponential functions	Integrate a whole range of functions including trig identities and partial fractions. Use standard patterns to integrate expressions; integrate expressions using integration by substitution and by parts; use the trapezium rule; use integration to find areas and volumes; use integration to solve differential equations in real-life contexts.  Know how to define vectors and use vector		

	<p>Use the iteration formula to find an approximation for the root of the equation <math>f(x) = 0</math></p> <p>Simplify algebraic fractions by (+, -, x, ÷). Express algebraic improper fractions as mixed numbers using long division &amp; remainder theorem.</p>	<p>given by parametric equations.</p> <p>Use the functions for secant, cosecant and cotangent and know their graphical properties; Simplify expressions, prove identities and solve equations.</p>	<p>and log functions; differentiate trig functions.</p> <p>Find the gradient of a curve given in parametric coordinates; differentiate implicit functions and power functions <math>y = a^x</math>; relate one rate of change to another.</p>	<p>notation; use vectors to describe a point in 2D and 3D; use the Cartesian components of a vector in 2D and 3D; find the angle between two vectors; write the equation of a straight line in vector form; calculate the angle between two straight lines</p>		
<b>Assessment</b>	<b>Half-Term Assessment 1</b>	<b>MOCK EXAM</b>	<b>Half-Term Assessment 3</b>	<b>Half-Term Assessment 4</b>		

# YEAR 13 Statistics Maths Curriculum (A Level Year 2)

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Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<b>Focus</b>	Data Location Data Dispersion	Representation of Data Correlation Regression	Normal Distribution Mathematical Models	Probability Discrete Random Variables	Revision for Statistics 1	
<b>Key Tasks</b>	Classify variables; understand terms relating to the grouping of discrete data; find the mode, median, mean for discrete data; Find the mode, median, mean for discrete data (frequency table); Find the mean and modal class for grouped data; Use linear interpolation to find the median for grouped data; use coding to find the mean	Draw and interpret stem and leaf diagrams; calculate outliers and represent them on box plots; plot and interpret histograms; Identify the skew of data and compare distributions.  Plot a scatter graph and identify the correlation; use a calculator to calculate and interpret the PMCC ; use the formula to calculate and interpret the PMCC; use coding to calculate the PMCC.	Use tables to find probabilities of the normal distribution, Z; use tables to find the value of z, given a probability; standardise a normal distribution into Z and use tables; use the normal tables to find $\mu$ and sigma; use the normal distribution to answer questions in context.  Understand and design a mathematical model	Solve probability problems by drawing a Venn diagram; apply the addition rule and multiplication rule to solve problems; represent conditional probabilities on a tree diagram; prove that events are mutually exclusive or independent.  Represent a probability distribution using a table; Find the probability of X for between a set of values; find the cumulative distribution		

	Find the range and quartiles using linear interpolation for discrete and continuous data; use linear interpolation to find the percentiles for discrete and continuous data; find the variance and standard deviation for discrete and continuous data; use coding to find the standard deviation.	Define independent and dependent variables; calculate the regression equation using a calculator; calculate the regression equation; use coding to calculate the regression equation; apply and interpret the regression equation.		function; find the expected value for a discrete random variable Find an expected value and the variance for a function; find the mean and standard deviation of the original data using coding.		
<b>Assessment</b>	<b>Half-Term Assessment 1</b>	<b>MOCK EXAM</b>	<b>Half-Term Assessment 3</b>	<b>Half-Term Assessment 4</b>		