

Year 12 A LEVEL MATHS Curriculum Map

Term	Topic/Unit title	Essential knowledge and skills (what students should know, understand and be able to do by the end of the unit/topic)
Autumn 1	Proof and mathematical communication	<ul style="list-style-type: none"> ● Know about mathematical structures and arguments ● Learn to use inequality, interval and set notation ● Understand disproof by counter-example ● See some proofs using deduction ● Understand proof by exhaustion
	Indices and Surds	<ul style="list-style-type: none"> ● Using the laws of indices to simplify expressions. ● Simplify expressions containing surds, including rationalising the denominator.
	Quadratic Functions.	<ul style="list-style-type: none"> ● Review the GCSE methods with quadratic equations but extending to manipulating an equation to make it into the standard format. ● Recognise and sketch the graphs of quadratic functions - sketching a curve from an equation, and finding an equation from a curve. ● Complete the square, but with the focus on more challenging expressions than GCSE presents. ● Solve quadratic inequalities ● Know what the discriminant is, and understand its role in determining the nature of the solution set. ● Learn to solve disguised quadratics
	Co-ordinate Geometry,	<ul style="list-style-type: none"> ● Find the distance between two points, and the mid-point of two points ● Find the equation of a straight line in the form $y - y_1 = m(x - x_1)$ and $ax + by + c = 0$
	Logs	<ul style="list-style-type: none"> ● Determine whether two lines are parallel or perpendicular ● Find the equation of a circle with a given centre and radius ● Solve problems involving intersections of lines and circles

	Exponential Modelling.	<ul style="list-style-type: none"> ● Undo exponential functions using logarithms ● Use the laws of logarithms ● Use logarithms to find exact solutions to exponential equations ● Use a special number called e. ● Learn about the graphs of exponential functions ● Understand why exponential graphs are used in modelling ● Learn how to use logarithms to transform non linear graphs into linear graphs
Autumn 2	<p>Polynomials,</p> <p>Using Graphs</p> <p>Derivatives & Differentiation</p> <p>Binomial Expansion</p>	<ul style="list-style-type: none"> ● Learn how to define a polynomial ● Find the product of two polynomials ● Find the quotient of two polynomials ● Find the factors of a polynomial ● Sketch polynomials ● Use the link between solving simultaneous equations and intersecting lines and curves. ● Determine the number of intersections between a line and a curve ● Use transformations of graphs ● Use graphs and applications of direct and inverse proportion ● Illustrate two variable inequalities on a graph ● Be able to sketch the gradient function for a curve ● Find the derivative of a function from first principles ● Differentiate simple polynomials ● Determine whether a function is increasing or decreasing ● Learn how to expand $(a + b)^n$ for integer values of n. ● Know how to find individual terms rather than the whole expression ● Use expansions to find approximations ● Use the $n!$ and nC_r notations

	<p>Trigonometry</p> <p>Triangle Geometry</p>	<ul style="list-style-type: none"> ● Understand the trig functions, their properties and graphs ● Learn how to solve equations involving trig functions ● Learn the trig identities ● Use identities to solve harder equations ● Use the sine rule to find the angles of any triangle ● Use the cosine rule to find the angles of any triangle ● Use $A = \frac{1}{2} ab \sin C$
<p>Spring 1</p>	<p>Applications of Differentiation</p> <p>Integration</p> <p>Vectors</p> <p>Introduction to Kinematics</p>	<ul style="list-style-type: none"> ● Use differentiation to solve problems of finding tangents and normals to curves at given points. ● Learn to find maxima and minima on curves ● Be able to maximise or minimise quantities ● Learn how to carry out the inverse of differentiation ● Find the equation of a curve given a derivative and a point on the curve ● Find the area between a curve and the x axis using integration ● Use i and j vectors to represent problems ● Learn how to find the magnitude of a vector ● Work with combinations of vectors ● Recognise when vectors are parallel ● Find unit vectors ● Use positions and displacements ● Solve geometrical problems with vectors ● Begin to work with displacement, velocity and acceleration and understand the links and differences to scalar quantities ● Use calculus to link the three vector quantities ● Represent motion on a travel graph ● Solve multi stage problems

Spring 2	<p>Constant Acceleration Formulae</p> <p>Working with Data</p>	<ul style="list-style-type: none"> ● Derive the equations for motion with constant acceleration ● Use the constant acceleration formulae ● Solve problems involving motion under gravity ● Solve multi stage problems ● Learn to interpret statistical diagrams including stem and leaf, histograms, scatter graphs, cumulative frequency curves and box and whisker plots. ● Learn to calculate standard deviation ● Understand correlation
Summer 1	<p>Probability</p> <p>Hypothesis Testing</p> <p>Forces and Motion</p> <p>Objects in Contact</p>	<ul style="list-style-type: none"> ● Learn what causes motion, and understand the concept of a force ● Learn how force is related to acceleration ● Understand what happens when several forces act on an object ● Learn about different forces including gravity ● Know how to determine if a particle is in equilibrium ● Recognise the difference between a sample and a population ● Use different sampling methods ● Use the correct vocabulary relating to hypothesis testing ● Carry out a hypothesis test involving a binomial distribution ● Learn what causes motion, and understand the concept of a force ● Learn how force is related to acceleration ● Understand what happens when several forces act on an object ● Learn about different forces including gravity ● Know how to determine if a particle is in equilibrium ● Learn to apply Newton's Third Law - objects exert equal and opposite forces on each other. ● Learn how to calculate the contact forces between objects ● Learn how to find tensions where objects are connected ● Learn how to solve connected particle pulley problems

Summer 2	Functions	<ul style="list-style-type: none"> • Learn about mappings and functions • Learn about one to one and many to one functions • Learn about domains and ranges • Find composite functions • Find the inverse of a function
	Proof	<ul style="list-style-type: none"> • Review proof by deduction, proof by exhaustion and by counter example. • Learn proof by contradiction • Learn to criticise proofs.
	Sequences & Series	<ul style="list-style-type: none"> • Determine the behaviour of some sequences • Use sigma notation • Learn about constant differences and constant ratios • Learn about infinite sequences • Apply sequence methods to real life problems

Year 13 A LEVEL MATHS Curriculum Map

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Autumn 1	Radian Measure	<ul style="list-style-type: none"> • Learn what radians are • Calculate special values of trig functions in radians
	Further Trigonometry	<ul style="list-style-type: none"> • Use trigonometric modelling in real life situations • Solve geometric problems involving circles • Approximate trig functions by polynomials • Use the sum and difference formulae • Simplify sums of trig functions • Learn the reciprocal trig functions
	Calculus of Exponential and Trig Functions	<ul style="list-style-type: none"> • Differentiate e^x, $\ln x$, $\sin x$, $\cos x$ and $\tan x$ • Integrate e^x, $1/x$, $\sin x$, $\cos x$ • Use calculus to solve geometrical problems

	<p>Further Graph Transformations</p> <p>Rational Functions and Partial Fractions</p> <p>Binomial Expansion</p> <p>Conditional Probability</p> <p>Normal Distribution</p>	<ul style="list-style-type: none"> ● Draw a graph following two or more transformations ● Find the equation of a graph after a combination of transformations ● Sketch graphs involving the modulus function ● Use modulus graphs to solve equations and inequalities ● Manipulate rational functions using operations including division ● Split rational functions into partial fractions ● Expand $(a + bx)^n$ where n is any rational power ● Use binomial expansions to make approximations ● Use set notation to describe probabilities ● Work with conditional probabilities using Venn Diagrams, Two Way Tables and Tree Diagrams ● Calculate probabilities for a normally distributed random variable ● Relate distributions to the standard one ● Calculate cumulative probabilities ● Find means and standard deviations ● Use the normal distribution as a model ● Use the normal distribution to approximate the binomial
Autumn 2	<p>Further Differentiation</p> <p>Further Integration</p> <p>Hypothesis Testing</p>	<ul style="list-style-type: none"> ● Differentiate using the chain rule ● Differentiate products and quotients ● Find the derivatives of functions expressed implicitly ● Differentiate inverse functions ● Integrate using known derivatives ● Use the chain rule in reverse ● Use integration by substitution (change of variable) ● Use integration by parts ● Integrate using trig identities ● Integrate quotients by separating into partial fractions ● Learn that the sample mean is a random variable

		<ul style="list-style-type: none"> ● Know how the sample mean is distributed ● Test whether the mean of a distribution is different from a predicted value ● Test sets of bi variate for significant correlation
Spring 1	<p>Calculus Applications</p> <p>Differential Equations</p> <p>Numerical Integration</p> <p>Vector Applications</p> <p>Projectiles</p> <p>Forces in Context</p> <p>Moments</p>	<ul style="list-style-type: none"> ● Use second derivatives to determine the shape of a curve ● Describe curves using parameters ● Calculate connected rates of change ● Find the area between two curves ● Solve differential equations by separation of variable ● Write differential equations from given contexts ● Interpret the solution of a differential equation and decide if it's realistic in a given context. ● Find the roots of an equation using change of sign methods ● Learn to use the Newton Raphson method ● Used fixed point iteration ● Identify occasions when iterative methods may fail ● Describe motion using velocity, displacement and acceleration vectors ● Use constant acceleration formulae with vectors ● Use calculus with vectors ● Learn to use the standard base vectors ● Solve geometrical problems in 3d ● Model projectile motion in 2d ● Find maximum heights and ranges of projectiles ● Find the Cartesian equation of the trajectory of a projectile ● Resolve forces in order to calculate resultants ● Use a model for friction ● Determine the acceleration of a particle on an inclined plane ● Know how to find the turning effect of a force ● Solve problems involving rods and laminas

		<ul style="list-style-type: none">● Find the centre of mass of a non uniform rod● Use the idea of rotational equilibrium
Spring 2	Revision	
Summer 1	Revision	