

## Year 12 Route 1

Timing	Unit Title	Key Question	Knowledge	Assessing Understanding
Autumn 1	<p><b>Pure</b></p> <p><b>Algebra and functions</b></p> <p><b>Straight line graphs</b></p> <p><b>Algebraic methods</b></p>	<p>Can you solve, linear, quadratic and simultaneous equations and inequalities?</p> <p>Can you simplify surds and indices?</p> <p>What does the discriminant tell us?</p> <p>Can you represent inequalities on a graph?</p> <p>Can you confidently sketch straight line graphs?</p> <p>How do you find the equation of a straight line?</p> <p>Can you simplify algebraic fractions?</p> <p>Can you use long division in algebra?</p> <p>How do we use the factor theorem?</p> <p>Can you construct a well-reasoned proof?</p>	<ul style="list-style-type: none"> <li>Extending the algebra covered at GCSE with particular reference to indices, factorising and surds.</li> <li>Solving of quadratic equations – from a variety of starting points.</li> </ul> <ul style="list-style-type: none"> <li>Straight line graph problem solving</li> <li>Be able to find the length of a line segment, midpoint of a line, area of a triangle</li> </ul> <ul style="list-style-type: none"> <li>Add, subtract, multiply, divide and simplify algebraic fractions</li> <li>Factorise cubics using the factor theorem and algebraic long division.</li> <li>Carry out simple algebraic proofs – deduction, exhaustion and counter example.</li> </ul>	<p><b>How understanding is assessed</b></p> <p>Students will be assessed on their ability to:</p> <ul style="list-style-type: none"> <li>Carry out mathematical techniques.</li> <li>Problem solving using the knowledge and techniques they have gained.</li> </ul> <p><b>Skills</b></p> <ul style="list-style-type: none"> <li>Numerical</li> <li>Algebraic, particularly solving equations and carrying out simple proofs.</li> <li>Sketching graphs</li> </ul> <p><b>Assessment point information</b></p> <p>The pure, mechanics and statistics lessons run side by side and all assessment is by using Exam standard questions on the topics studied either as homework or tests.</p>

	<b>Graph transformations</b>	<p>Can you confidently sketch quadratic, cubic, quartic and reciprocal graphs?</p> <p>How are curve transformations applied to a range of functions?</p>	<ul style="list-style-type: none"> <li>Sketching quadratic, cubic, quartic and reciprocal graphs</li> <li>Understanding the effects of graph transformations</li> </ul>	
Autumn 2	<p><b>Statistics</b></p> <p><b>Measures of locations and spread</b></p> <p><b>Representations of data</b></p> <p><b>Correlation</b></p>	<p>Can you make interpretations about data based on measures of location and spread?</p> <p>Can you apply coding techniques?</p> <p>Can you compare sets of data using a variety of statistical techniques?</p> <p>What is meant by an outlier?</p> <p>Can you interpret scatter diagrams and regression lines?</p>	<ul style="list-style-type: none"> <li>Build on GCSE knowledge of measures of locations and spread</li> <li>Calculate variance and standard deviation</li> <li>Understand and use coding techniques</li> <li>Identify outliers</li> <li>Be able to draw and interpret box plots, cumulative frequency diagrams and histograms</li> <li>Recognise explanatory and response variables.</li> <li>Interpretation of correlation and regression.</li> <li>Be able to clean data – deal with missing data, errors and outliers.</li> </ul>	<p><b>How understanding is assessed</b></p> <p>Students will be assessed on their ability to:</p> <ul style="list-style-type: none"> <li>Carry out mathematical techniques.</li> <li>Problem solving using the knowledge and techniques they have gained.</li> </ul> <p><b>Skills</b></p> <ul style="list-style-type: none"> <li>Numerical</li> <li>Algebraic particularly solving equations and carrying out simple proofs.</li> <li>Sketching graphs</li> </ul> <p><b>Assessment point information</b></p> <p>The pure, mechanics and statistics lessons run side by side and all assessment is by using Exam standard questions on the topics studied either as homework or tests.</p>

	<b>Mechanics</b> <b>Modelling in mechanics</b>  <b>Constant acceleration</b>	<b>Can you interpret a model?</b>  <b>Can you apply SUVAT equations?</b>	<ul style="list-style-type: none"> <li>Correct mechanics terminology.</li> <li>Modelling of simple real-life situations.</li> <li>Learn and apply the SUVAT equations.</li> <li>Draw and/or interpret speed/time graphs.</li> <li>Solve problems involving vertical motion under gravity</li> </ul>	
Spring 1	<b>Pure</b> <b>Differentiation</b>  <b>The binomial expansion</b>  <b>Vectors</b>	<b>What is differentiation used for?</b>  <b>Can you apply the rules of differentiation?</b>  <b>Can you carry out a binomial expansion?</b>  <b>Do you know the definition of a vector?</b>  <b>Can you +,- and carry out scalar multiplications.</b>  <b>Can you solve geometric problems using vectors?</b>	<ul style="list-style-type: none"> <li>The basic differentiation rules</li> <li>Use differentiation to find the equation of tangents, normals and locate stationary points.</li> <li>Find and use the second derivative.</li> <li>Binomial expansion for positive integer powers.</li> <li>Familiarisation with Pascal's Triangle and <math>nCr</math> notation is needed.</li> <li>Position vectors, calculate a vector that runs between two given points. Find the distance between two points.</li> <li>Use ratio theorem to find the position vector of a point which divides a line in a given ratio.</li> <li>Apply theory to a variety of geometric problems.</li> </ul>	<b>How understanding is assessed</b> Students will be assessed on their ability to: <ul style="list-style-type: none"> <li>Carry out mathematical techniques.</li> <li>Problem solving using the knowledge and techniques they have gained.</li> </ul> <b>Skills</b> <ul style="list-style-type: none"> <li>Numerical</li> <li>Algebraic particularly solving equations and carrying out simple proofs.</li> <li>Sketching graphs</li> </ul> <b>Assessment point information</b> The pure, mechanics and statistics lessons run side by side and all assessment is by using Exam standard questions on the topics studied either as homework or tests.

	<b>Mechanics</b> <b>Forces &amp; motion 1</b>	<p>Can you draw a force diagram?</p> <p>Do you understand Newton's 3 laws and how they can be applied to a simple set of forces acting on a particle?</p>	<ul style="list-style-type: none"> <li>Force diagrams, equilibrium, including vector notation.</li> <li>Find a resultant force</li> <li><math>F=ma</math></li> </ul>	
	<b>Statistics</b> <b>Probability</b>	<p>Can you use a Venn Diagram or a Tree Diagram to solve a probability problem?</p>	<ul style="list-style-type: none"> <li>Know how Venn diagrams and Tree diagrams are used and which is the best method to use for different types of questions.</li> <li>Understand the terms mutually exclusive and independent</li> </ul>	
Spring 2	<b>Pure</b> <b>Integration</b>	<p>Do you understand how differentiation and integration are linked?</p> <p>Can you apply the rule of integration to find an area?</p> <p>What is the difference between a definite and indefinite integral?</p>	<ul style="list-style-type: none"> <li>Using the fundamental rules for integrating functions such as <math>x^n</math>.</li> <li>Using <math>dy/dx</math> and <math>f'(x)</math> notation.</li> <li>Integrating a gradient function to find the original function.</li> <li>Using integration to find the area under a curve.</li> </ul>	<p><b>How understanding is assessed</b>  Students will be assessed on their ability to:</p> <ul style="list-style-type: none"> <li>Carry out mathematical techniques.</li> <li>Problem solving using the knowledge and techniques they have gained.</li> </ul>
	<b>Exponentials and logarithms</b>	<p>Can you sketch the <math>a^x</math>, <math>e^x</math> and log functions?</p> <p>Do you know how to apply the rules of logs?</p>	<ul style="list-style-type: none"> <li>Know the graphs of a variety of exponential and log/ln functions.</li> <li>Be able to solve equations which contain these type of functions.</li> <li>Use exponentials to model real life situations such as compound interest and radioactive decay.</li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>Numerical</li> <li>Algebraic particularly solving equations and carrying out simple proofs.</li> <li>Sketching graphs</li> </ul> <p><b>Assessment point information</b>  The pure, mechanics and statistics lessons run side by side and all assessment is by</p>

	<b>Trigonometric equations and identities</b>	<b>Can you find all of the solutions to a trig equation?</b>	<ul style="list-style-type: none"> <li>Solve trig equations using the quadrant diagram</li> <li>Exact trig ratios</li> <li><math>\sin^2 \theta + \cos^2 \theta = 1</math></li> <li><math>\tan \theta = \frac{\sin \theta}{\cos \theta}</math></li> <li>Solve trig equations involving identities</li> </ul>	using: Exam standard questions on the topics studied either as homework or test
	<b>Mechanics</b> <b>Forces &amp; motion 2</b>	<b>Can you apply Newton's Laws to increasingly complex problems?</b>	<ul style="list-style-type: none"> <li>Solve problems involving connected particles, pulley systems.</li> </ul>	
	<b>Statistics</b> <b>Statistical distributions</b>	<b>Can you calculate probabilities from a discrete uniform distribution and from a binomial distribution?</b>	<ul style="list-style-type: none"> <li>Deal with discrete distributions finding probabilities, mean and variance. With particular reference to the binomial distribution.</li> </ul>	
	<b>Hypothesis testing</b>	<b>Do you know the terminology used in hypothesis testing?</b> <b>How do we carry out one and two tailed tests?</b>	<ul style="list-style-type: none"> <li>Be able to carry out a statistical hypothesis test for the proportion in a binomial distribution.</li> <li>Understand that a sample is being used to make an inference about a population.</li> <li>Appreciate what is meant by significance level.</li> </ul>	
	<b>Data Collection</b>	<b>Why is sampling used and what are the different methods?</b>	<ul style="list-style-type: none"> <li>Understand how each sampling method works and be able to compare them.</li> <li>Be able to sample from the large exam data set.</li> </ul>	

## Curriculum Outline 2025-26

## Department: Mathematics

Summer	<p><b>Pure</b></p> <p><b>Circles</b></p> <p>Can you find the equation of a circle?</p> <p>Can you use tangent and chord properties to solve geometrical problems?</p> <p><b>Trigonometry</b></p> <p>What is the 'special case' of the sine rule?</p> <p>Can you sketch all trig functions and apply transformations to them?</p> <p><b>Mechanics</b></p> <p><b>Variable acceleration</b></p> <p>How is calculus used to deal with variable acceleration?</p>	<ul style="list-style-type: none"> <li>Equation of a circle</li> <li>Find midpoints, perpendicular bisectors, points of intersection</li> <li>Solve triangle problems using the sine and cosine rules</li> <li>Graphs and transformations of trig functions</li> <li>Solve kinematics problems using differentiation and integration.</li> </ul>	<p><b>How understanding is assessed</b></p> <p>Students will be assessed on their ability to:</p> <ul style="list-style-type: none"> <li>Carry out mathematical techniques.</li> <li>Problem solving using the knowledge and techniques they have gained.</li> </ul> <p><b>Skills</b></p> <ul style="list-style-type: none"> <li>Numerical</li> <li>Algebraic particularly solving equations and carrying out simple proofs.</li> <li>Sketching graphs</li> </ul> <p><b>Assessment point information</b></p> <p>The pure, mechanics and statistics lessons run side by side and all assessment is by using Exam standard questions on the topics studied either as homework or tests.</p>
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We often start to teach Year 2 pure topics after the end of year exams (e.g. Algebraic methods, Radians, Sequences and series)