



Mathematics is a highly interwoven subject. This curriculum map outlines just some of the next links stemming from each topic.

Topic name	Term	Skills developed	Next link in curriculum
Regression and Correlation	Autumn	<ul style="list-style-type: none"> <li>Understand exponential models in bivariate data</li> <li>Use a change of variable to estimate coefficients in an exponential model</li> <li>Understand and calculate the product moment correlation coefficient</li> <li>Carry out a hypothesis test for zero correlation</li> </ul>	<ul style="list-style-type: none"> <li>Normal Distribution (continuation of exploring various Hypothesis Tests) Y13</li> </ul>
Functions and Graphs	Autumn	<ul style="list-style-type: none"> <li>Understand and use the modulus function</li> <li>Understand mappings and functions, and use domain and range</li> <li>Combine two or more functions to make a composite function</li> <li>Know how to find the inverse of a function graphically and algebraically</li> <li>Sketch the graphs of the modulus functions <math>y =  f(x) </math> and <math>y = f( x )</math></li> <li>Apply a combination of two (or more) transformations to the same curve</li> <li>Transform the modulus function</li> </ul>	<ul style="list-style-type: none"> <li>Parametric Equations Y13</li> </ul>
Algebraic Methods	Autumn	<ul style="list-style-type: none"> <li>Use proof by contradiction to prove true statements</li> <li>Multiply and divide two or more algebraic fractions</li> <li>Add or subtract two or more algebraic fractions</li> <li>Convert an expression with linear factors in the denominator into partial fractions</li> <li>Divide algebraic expressions</li> <li>Convert an improper fraction into partial fraction form</li> </ul>	<ul style="list-style-type: none"> <li>Sequences and Series Y13</li> </ul>
Moments	Autumn	<ul style="list-style-type: none"> <li>Calculate the turning effect of a force applied to a rigid body</li> <li>Calculate the resultant moment of a set of forces acting on a rigid body</li> <li>Solve problems involving uniform rods in equilibrium</li> <li>Solve problems involving non-uniform rods</li> <li>Solve problems involving rods on the point of tilting</li> </ul>	<ul style="list-style-type: none"> <li>Forces and Friction Y13</li> </ul>



Binomial Expansion	Autumn	<ul style="list-style-type: none"> <li>Expand <math>(1 + x)^n</math> for any rational constant <math>n</math> and determine the range of values of <math>x</math> for which the expansion is valid</li> <li>Expand <math>(a + bx)^n</math> for any rational constant <math>n</math> and determine the range of values of <math>x</math> for which the expansion is valid</li> <li>Use partial fractions to expand fractional expressions</li> </ul>	<ul style="list-style-type: none"> <li>Integration Y13</li> </ul>
Sequences and Series	Autumn	<ul style="list-style-type: none"> <li>Find the <math>n</math>th term of an arithmetic sequence</li> <li>Prove and use the formula for the sum of the first <math>n</math> terms of an arithmetic series</li> <li>Find the <math>n</math>th term of a geometric sequence</li> <li>Prove and use the formula for the sum to infinity of a convergent geometric sequence</li> <li>Use sigma notation to describe series</li> <li>Generate sequences from recurrence relations</li> <li>Model real-life situations with sequences and series</li> </ul>	<ul style="list-style-type: none"> <li>Numerical Methods in Further Education</li> </ul>
Forces and Friction	Autumn	<ul style="list-style-type: none"> <li>Resolve forces into components</li> <li>Use the triangle law to find a resultant force</li> <li>Solve problems involving smooth or rough inclined planes</li> <li>Understand friction and the coefficient of friction</li> <li>Use <math>F \leq \mu R</math></li> </ul>	<ul style="list-style-type: none"> <li>Applications of Forces Y13</li> </ul>
Radians	Autumn	<ul style="list-style-type: none"> <li>Convert between degrees and radians and apply this to trigonometric graphs and their transformations</li> <li>Know exact values of angles measured in radians</li> <li>Find an arc length using radians</li> <li>Find areas of sectors and segments using radians</li> <li>Solve trigonometric equations in radians</li> <li>Use approximate trigonometric values when <math>\theta</math> is small</li> </ul>	<ul style="list-style-type: none"> <li>Trigonometry and Modelling Y13</li> </ul>
Trigonometric Functions	Autumn	<ul style="list-style-type: none"> <li>Understand the definitions of secant, cosecant and cotangent and their relationship to cosine, sine and tangent</li> <li>Understand the graphs of secant, cosecant and cotangent and their domain and range</li> <li>Simplify expressions, prove simple identities and solve equations involving secant, cosecant and cotangent</li> <li>Prove and use <math>\sec^2 x \equiv 1 + \tan^2 x</math> and <math>\operatorname{cosec}^2 x \equiv 1 + \cot^2 x</math></li> </ul>	<ul style="list-style-type: none"> <li>Trigonometry and Modelling Y13</li> </ul>



		<ul style="list-style-type: none"><li>Understand and use inverse trigonometric functions and their domain and ranges</li></ul>	
Trigonometry and Modelling	Autumn	<ul style="list-style-type: none"><li>Prove and use the addition formulae</li><li>Understand and use the double-angle formulae</li><li>Solve trigonometric equations using the double-angle and addition formulae</li><li>Write expressions of the form <math>a \cos \theta \pm b \sin \theta</math> in the forms <math>R \cos(\theta \pm \alpha)</math> or <math>R \sin(\theta \pm \alpha)</math></li><li>Prove trigonometric identities using a variety of identities</li><li>Use trigonometric functions to model real-life situations</li></ul>	<ul style="list-style-type: none"><li>Differentiation Y13</li><li>Integration Y13</li></ul>
Parametric Equations	Autumn	<ul style="list-style-type: none"><li>Convert parametric equations into Cartesian form by substitution</li><li>Convert parametric equations into Cartesian form using trigonometric identities</li><li>Understand and use parametric equations of curves and sketch parametric curves</li><li>Solve coordinate geometry problems involving parametric equations</li><li>Use parametric equations in modelling in a variety of contexts</li></ul>	<ul style="list-style-type: none"><li>Differentiation (Part 2) Y13</li></ul>
Differentiation (Part 1)	Autumn	<ul style="list-style-type: none"><li>Differentiate trigonometric functions</li><li>Differentiate exponentials and logarithms</li><li>Differentiate functions using the chain, product and quotient rules</li></ul>	<ul style="list-style-type: none"><li>Integration Y13</li><li>Differentiation (Part 2) Y13</li></ul>
Conditional Probability	Autumn	<ul style="list-style-type: none"><li>Understand set notation in probability</li><li>Understand conditional probability</li><li>Solve conditional probability problems using two-way tables and Venn diagrams</li><li>Use probability formulae to solve problems</li><li>Solve conditional probability using tree diagrams</li></ul>	<ul style="list-style-type: none"><li>Normal Distribution Y13</li></ul>



Normal Distribution	Spring	<ul style="list-style-type: none"><li>• Understand the normal distribution and the characteristics of a normal distribution curve</li><li>• Find percentage points on a standard normal curve</li><li>• Calculate values on a standard normal curve</li><li>• Find unknown means and/or standard deviations for a normal distribution</li><li>• Approximate a binomial distribution using a normal distribution</li><li>• Select appropriate distributions and solve real-life problems in context</li><li>• Carry out a hypothesis test for the mean of a normal distribution</li></ul>	<ul style="list-style-type: none"><li>• Statistics in Further Education or Further Maths A-level Statistics (Discrete random variables and other distributions)</li></ul>
Integration	Spring	<ul style="list-style-type: none"><li>• Integrate standard mathematical functions including trigonometric and exponential functions and use the reverse of the chain rule to integrate functions of the form <math>f(ax + b)</math></li><li>• Use trigonometric identities in integration</li><li>• Use the reverse of the chain rule to integrate more complex functions</li><li>• Integrate functions by making a substitution, using integration by parts and using partial fractions</li><li>• Use integration to find the area under a curve</li><li>• Use the trapezium rule to approximate the area under a curve</li><li>• Solve simple differential equations and model real-life situations with differential equations</li></ul>	<ul style="list-style-type: none"><li>• Calculus in Further Education (Physics and Mathematics) and in Further Mathematics A-level</li></ul>
Differentiation (Part 2)	Spring	<ul style="list-style-type: none"><li>• Differentiate parametric equations</li><li>• Differentiate functions which are defined implicitly</li><li>• Use the second derivative to describe the behaviour of a function</li><li>• Solve problems involving connected rates of change and construct simple differential equations</li></ul>	<ul style="list-style-type: none"><li>• Calculus in Further Education (Physics and Mathematics) and in Further Mathematics A-level</li></ul>
Projectiles	Spring	<ul style="list-style-type: none"><li>• Model motion under gravity for an object projected horizontally</li><li>• Resolve velocity into components</li><li>• Solve problems involving particles projected at an angle</li><li>• Derive the formulae for time of flight, range and greatest height, and the equation of the path of a projectile</li></ul>	<ul style="list-style-type: none"><li>• Further Kinematics Y13</li></ul>



Vectors	Spring	<ul style="list-style-type: none"><li>• Understand 3D Cartesian coordinates</li><li>• Use vectors in three dimensions</li><li>• Use vectors to solve geometric problems</li><li>• Model 3D motion in mechanics with vectors</li></ul>	<ul style="list-style-type: none"><li>• Vectors in Further Mathematics or Mechanics in Further Education (Engineering, Physics and Mathematics)</li></ul>
Numerical Methods	Spring	<ul style="list-style-type: none"><li>• Locate roots of <math>f(x) = 0</math> by considering changes of sign</li><li>• Use iteration to find an approximation to the root of the equation <math>f(x) = 0</math></li><li>• Use the Newton-Raphson procedure to find approximations to the solutions of equations of the form <math>f(x) = 0</math></li><li>• Use numerical methods to solve problems in context</li></ul>	<ul style="list-style-type: none"><li>• Further Education (Computing, Engineering, Physics and Mathematics)</li></ul>
Applications of Forces	Spring/Summer	<ul style="list-style-type: none"><li>• Find an unknown force when a system is in equilibrium</li><li>• Solve statics problems involving weight, tension and pulleys</li><li>• Understand and solve problems involving limiting equilibrium</li><li>• Solve problems involving connected particles that require the resolution of forces</li></ul>	<ul style="list-style-type: none"><li>• Mechanics in Further Education (Engineering, Physics and Mathematics)</li></ul>
Further Kinematics	Summer	<ul style="list-style-type: none"><li>• Work with vectors for displacement, velocity and acceleration when using the vector equations of motion</li><li>• Use calculus with harder functions of time involving variable acceleration</li><li>• Differentiate and integrate vectors with respect to time</li></ul>	<ul style="list-style-type: none"><li>• Mechanics in Further Education (Engineering, Physics and Mathematics)</li></ul>