

Curriculum Long Term Planning Overview

Key Stage 5

Subject Area: Maths

Academic Year: 2018-19

Key: M9 for example means 'Mechanics Chapter 9'
 P means 'Pure'
 S means 'Statistics'

Year	Study Modules	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Year 12	Study Modules	<p>M9: Constant Acceleration</p> <p>Understand and interpret displacement-time graphs</p> <p>Understand and interpret velocity-time graphs</p> <p>Derive the constant acceleration formulae and use them to solve problems</p> <p>Use the constant acceleration formulae to solve problems involving vertical motion under gravity</p>	<p>P6: Circles</p> <p>Find the mid-point of a line segment</p> <p>Find the equation of the perpendicular bisector to a line segment</p> <p>Know how to find the equation of a circle</p> <p>Solve geometric problems involving straight lines and circles</p> <p>Use circle properties to solve problems on coordinate grids</p> <p>Find the angle in a semi-circle and solve other problems involving circles and triangles</p>	<p>P13: Integration</p> <p>Find y given dy/dx</p> <p>Integrate polynomials</p> <p>Find $f(x)$, given $f'(x)$ and a point on the curve</p> <p>Evaluate a definite integral</p> <p>Find the area bounded by a curve and the x axis</p> <p>Find the area bounded by a curve and straight lines</p>	<p>P9: Trigonometric Ratios</p> <p>Use the sine and cosine rule to find a missing side or angle</p> <p>Use both the sine and cosine rule</p> <p>Find the area of a triangle using an appropriate formula</p> <p>Solve problems involving triangles</p> <p>Sketch graphs of the sine, cosine and tangent functions</p> <p>Sketch simple transformations of these graphs</p>	<p>P11: Vectors</p> <p>Use vectors in 2D</p> <p>Use column vectors and carry out arithmetic operations</p> <p>Calculate the magnitude and direction of a vector</p> <p>Understand and use position vectors</p> <p>Use vectors to solve geometric problems</p> <p>Understand vector magnitude and use vectors in speed/distance calculations</p> <p>Use vectors to solve problems in context</p>	<p>(Introduction to units studied in Year 13)</p> <p>P1: Algebraic Methods</p> <p>Use proof by contradiction to prove true statements</p> <p>Multiply and divide two or more algebraic fractions</p> <p>Add or subtract two or more algebraic fractions</p> <p>Convert an expression with linear factors in the denominator into partial fractions</p> <p>Convert an expression with repeated linear factors in the denominator into partial fractions</p> <p>Divide algebraic expressions</p> <p>Convert an improper fraction into partial fraction form</p>
		<p>P5: Straight Line Graphs</p> <p>Calculate the gradient of a line joining a pair of points</p> <p>Understand the link between the equation of a line, its gradient and intercept</p> <p>Find the equation of a line given (i) the gradient and one point on the line or (ii) two points on the line</p>	<p>P12: Differentiation</p> <p>Find the derivative, $f'(x)$ or dy/dx of a simple function</p> <p>Use the derivative to solve problems involving gradients, tangents and normals</p> <p>Identify increasing and decreasing functions</p> <p>Find the second order</p>	<p>M10: Forces and Motion</p> <p>Draw force diagrams and calculate resultant forces</p> <p>Understand and use Newton's first law</p> <p>Calculate resultant forces by adding vectors</p> <p>Understand and use Newton's Second Law $F=ma$</p> <p>Apply Newton's Second Law to vector forces and acceleration</p>	<p>P10: Trigonometric Identities and Ratios</p> <p>Calculate the sine, cosine and tangent of any angle</p> <p>Know the exact trigonometric ratios for 30, 45 and 60 degrees</p> <p>Know and use the relationships of the trigonometric ratios</p>	<p>M11: Variable Acceleration</p> <p>Understand that displacement, velocity and acceleration may be given as functions of time</p> <p>Use differentiation to solve kinematics problems</p> <p>Use calculus to solve</p>	<p>P2: Functions and Graphs</p> <p>Understand and use the modulus function</p>

	<p>Find the point of intersection for a pair of straight lines</p> <p>Know and use the rules for parallel and perpendicular lines</p> <p>Solve length and area problems on coordinate grids</p> <p>Use straight line graphs to construct mathematical models</p> <p>P6: Circles</p> <p>Find the mid-point of a line segment</p> <p>Find the equation of the perpendicular bisector to a line segment</p> <p>Know how to find the equation of a circle</p> <p>Solve geometric problems involving straight lines and circles</p> <p>Use circle properties to solve problems on coordinate grids</p> <p>Find the angle in a semi-circle and solve other problems involving circles and triangles</p> <p>P1: Algebraic Expressions</p> <p>Expand a single term over brackets and collect like terms</p> <p>Expand the product of two or three expressions</p> <p>Factorise linear, quadratic and simple</p>	<p>derivative of a simple function</p> <p>Find stationary points of functions and determine their nature</p> <p>Sketch the gradient function of a given function</p> <p>Model real-life situations with differentiation</p> <p>P13: Integration</p> <p>Find y given dy/dx</p> <p>Integrate polynomials</p> <p>Find $f(x)$, given $f'(x)$ and a point on the curve</p> <p>Evaluate a definite integral</p> <p>Find the area bounded by a curve and the x axis</p> <p>Find the area bounded by a curve and straight lines</p> <p>P7: Algebraic Methods</p> <p>Cancel factors in algebraic fractions</p> <p>Divide a polynomial by a linear expression</p> <p>Use the factor theorem to factorise a cubic expression</p> <p>Construct mathematical proofs using algebra</p> <p>Use proof by exhaustion and disprove by counter-example</p>	<p>Understand and use Newton's third law</p> <p>Solve problems involving connected particles</p> <p>S5: Probability</p> <p>Calculate probabilities for single events</p> <p>Draw and interpret venn diagrams</p> <p>Understand mutually exclusive and independent events and determine whether two events are independent</p> <p>Understand tree diagrams</p> <p>P8: Binomial Expansion</p> <p>Use Pascals' triangle to identify binomial coefficients and use them to expand simple binomial expressions</p> <p>Use combinations and factorial notation</p> <p>Use the binomial expansion to expand brackets</p> <p>Find individual coefficients in a binomial expansion</p> <p>Make approximations using the binomial expansion</p> <p>S6: Distributions</p> <p>Understand and use discrete probability distributions includinf</p>	<p>Solve trigonometric equations of the forms $\sin x = k$, $\cos x = k$ and $\tan x = k$</p> <p>Solve more complicated trigonometric equations of the forms $\sin x = k$, $\sin(x+a) = k$ and equivalent equations involving \cos and \tan</p> <p>Solve trigonometric equations that produce quadratics</p> <p>P11: Vectors</p> <p>Use vectors in 2D</p> <p>Use column vectors and carry out arithmetic operations</p> <p>Calculate the magnitude and direction of a vector</p> <p>Understand and use position vectors</p> <p>Use vectors to solve geometric problems</p> <p>Understand vector magnitude and use vectors in speed/distance calculations</p> <p>Use vectors to solve problems in context</p> <p>S6: Distributions</p> <p>Understand and use discrete probability distributions includinf the discrete uniform distribution</p> <p>Understand the binomial distribution as a model and comment on</p>	<p>problems involving maxima and minima</p> <p>Use integration to solve kinematics problems</p> <p>Use calculus to derive constant acceleration formulae</p> <p>P14: Exponentials and Logarithms</p> <p>Sketch graphs of the form $y = a^x$, $y = e^x$ and transformations of these graphs</p> <p>Differentiate e^x and understand why this result is important</p> <p>Use and interpret models that use exponential functions</p> <p>Recognise the relationship between exponents and logarithms</p> <p>Recall and apply laws of logarithms</p> <p>Solve equations of the form $a^x = b$</p> <p>Describe and use the natural logarithm function</p> <p>Use logarithms to estimate the values of constants in non-linear models</p>	<p>Understand mappings and functions and use domain and range</p> <p>Combine two or more functions to make a composite functions</p> <p>Know how to find the inverse of a function graphically and algebraically</p> <p>Sketch the graphs of the modulus functions $y = f(x)$ and $y = f(x)$</p> <p>Apply a combination of two (or more) transformations to the same curve</p> <p>Transform the modulus function</p> <p>P1: Proof</p> <p>Use proof by contradiction to prove true statements</p> <p>Multiply and divide two or more algebraic fractions</p> <p>Add or subtract two or more algebraic fractions</p> <p>Convert an expression with linear factors in the denominator into partial fractions</p> <p>Convert an expression with repeated linear factors in the denominator into partial fractions</p> <p>Divide algebraic expressions</p>
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	<p>cubic expressions</p> <p>Know and use the law of indices</p> <p>Simplify and use the rules of surds</p> <p>Rationalise denominators</p> <p>P2: Quadratics</p> <p>Solve quadratic equations using factorisation and the quadratic formula</p> <p>Solve quadratic equations by completing the square</p> <p>Read and use $f(x)$ notation when working with functions</p> <p>Sketch the graphs and find the turning point of a quadratic function</p> <p>Find and interpret the discriminant of a quadratic expression</p> <p>Use and apply models that involve quadratic functions</p> <p>P3: Equations and Inequalities</p> <p>Solve linear simultaneous equations using elimination or substitution</p> <p>Solve simultaneous equations, one linear and one quadratic</p> <p>Interpret algebraic solutions of equations graphically</p>	<p>S2: Measures of Location and Spread</p> <p>Calculate measures of central tendency such as the mean, median and mode</p> <p>Calculate measures of location such as percentiles and deciles</p> <p>Calculate measures of spread such as range, interquartile range and interpercentile range</p> <p>S3: Representations of Data</p> <p>Calculate variance and standard deviation</p> <p>Understand and use coding</p> <p>Identify outliers in data sets</p> <p>Draw and interpret box plots</p> <p>Draw and interpret cumulative frequency diagrams</p> <p>Draw and interpret histograms</p> <p>S4: Data Processing and Interpretation</p> <p>Compare two data sets</p> <p>Draw and interpret scatter diagrams for bivariate data</p> <p>Interpret correlation and understand that it does not imply causation</p>	<p>the discrete uniform distribution</p> <p>Understand the binomial distribution as a model and comment on appropriateness</p> <p>Calculate individual probabilities for the binomial distribution</p> <p>Calculate cumulative probabilities for the binomial distribution</p>	<p>appropriateness</p> <p>Calculate individual probabilities for the binomial distribution</p> <p>Calculate cumulative probabilities for the binomial distribution</p> <p>S7: Hypothesis Testing</p> <p>Understand the language and concept of hypothesis testing</p> <p>Understand that a sample is used to make an inference about a population</p> <p>Draw and interpret venn diagrams</p> <p>Carry out a one-tailed test for the proportion of the binomial distribution and interpret the results</p> <p>Carry out a two-tailed test for the proportion of the binomial distribution and interpret the results</p> <p>S1: Data Collection</p> <p>Understand 'population', 'sample' and 'census' and comment on the advantages and disadvantages of each</p> <p>Understand the advantages and disadvantages of simple random sampling, systematic sampling, stratified sampling, quota sampling and opportunity sampling</p> <p>Define qualitative,</p>	<p>Convert an improper fraction into partial fraction form</p> <p>M5: Forces and Friction</p> <p>Resolve forces into components</p> <p>Use the triangle law to find a resultant force</p> <p>Solve problems involving smooth or rough inclined planes</p> <p>Understand friction and the coefficient of friction</p> <p>Use $F = \mu R$</p> <p>P5: Radians</p> <p>Convert between degrees and radians and apply this to trigonometric graphs and their transformations</p> <p>Know exact values of angles measured in radians</p> <p>Find an arc length using radians</p> <p>Find the areas of sectors and segments using radians</p> <p>Solve trigonometric equations in radians</p> <p>Use approximation trigonometric values when θ is small</p>
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	<p>Solve linear inequalities</p> <p>Interpret inequalities graphically</p> <p>Represent linear and quadratic inequalities graphically</p> <p>P4: Graphs and Transformations</p> <p>Sketch cubic graphs</p> <p>Sketch quadratic graphs</p> <p>Sketch reciprocal graphs of the form $y = a/x$ and $y = a/x^2$</p> <p>Use intersection points of graphs to solve equations</p> <p>Translate and sketch graphs</p> <p>Transform graphs of unfamiliar functions</p>	<p>Interpret the coefficients of a regression line equation for bivariate data</p> <p>Understand when you can use a regression line to make predictions</p> <p>S5: Probability</p> <p>Calculate probabilities for single events</p> <p>Draw and interpret venn diagrams</p> <p>Understand mutually exclusive and independent events and determine whether two events are independent</p> <p>Understand tree diagrams</p>		<p>quantitative, discrete and continuous data and understand grouped data</p> <p>Understand the large data set and how to collect data from it, identify types of data and calculate simple statistics</p> <p>P14: Exponentials and Logarithms</p> <p>Sketch graphs of the form $y = a^x$, $y = e^x$ and transformations of these graphs</p> <p>Differentiate e^x and understand why this result is important</p> <p>Use and interpret models that use exponential functions</p> <p>Recognise the relationship between exponents and logarithms</p> <p>Recall and apply laws of logarithms</p> <p>Solve equations of the form $a^x = b$</p> <p>Describe and use the natural logarithm function</p> <p>Use logarithms to estimate the values of constants in non-linear models</p>		
Assessment	Open book end of topic assessment	Closed book end of term test	Open book end of topic assessment	Open book end of topic assessment	Open book end of topic assessment	Closed book end of term test

Year	Study Modules	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Year 13	Study Modules	<p>P1: Algebraic Methods</p> <p>Use proof by contradiction to prove true statements</p> <p>Multiply and divide two or more algebraic fractions</p> <p>Add or subtract two or more algebraic fractions</p> <p>Convert an expression with linear factors in the denominator into partial fractions</p> <p>Convert an expression with repeated linear factors in the denominator into partial fractions</p> <p>Divide algebraic expressions</p> <p>Convert an improper fraction into partial fraction form</p> <p>P2: Functions and Graphs</p> <p>Understand and use the modulus function</p> <p>Understand mappings and functions and use domain and range</p> <p>Combine two or more functions to make a composite functions</p> <p>Know how to find the inverse of a function graphically and algebraically</p>	<p>P3: Sequences and Series</p> <p>Find the n^{th} term of an arithmetic sequence</p> <p>Prove and use the formula for the sum of the first n terms of an arithmetic series</p> <p>Find the n^{th} term of a geometric series</p> <p>Prove and use the formula for the sum of a finite geometric series</p> <p>Prove and use the formula for the sum to infinity of a convergent geometric series</p> <p>Use sigma notation to describe series</p> <p>Generate sequences using recurrence relations</p> <p>Model real-life situations with sequences and series</p> <p>P4: Binomial Expansion</p> <p>Expand $(1 + x)^n$ for any rational constant n and determine the range of values of x for which the expansion is valid</p> <p>Expand $(a + bx)^n$ for any rational constant n and determine the range of values of x for which the expansion is valid</p> <p>Use partial fractions to</p>	<p>S3: Normal Distribution</p> <p>Understand the normal distribution and the characteristic of a normal distribution curve</p> <p>Find percentages points on a standard normal curve</p> <p>Calculate values on a standard normal curve</p> <p>Find unknown means and/or standard deviations for a normal distribution</p> <p>Approximating a binomial distribution using a normal distribution</p> <p>Select appropriate distributions and solve real-life problems in context</p> <p>Carry out a hypothesis test for the mean of a normal distribution</p> <p>P11: Integration</p> <p>Use knowledge of derivatives to integrate familiar functions</p> <p>Integrate a function of form $f(ax+b)$ using the reverse of the chain rule for differentiation</p> <p>Use trigonometric identities in integration</p> <p>Use the reverse of the chain rule to integrate</p>	<p>P11: Integration</p> <p>Use knowledge of derivatives to integrate familiar functions</p> <p>Integrate a function of form $f(ax+b)$ using the reverse of the chain rule for differentiation</p> <p>Use trigonometric identities in integration</p> <p>Integrate functions by making a substitution</p> <p>Integrate functions by using integration by parts</p> <p>Integrate functions by using partial fractions</p> <p>Use integration to find the area under a curve</p> <p>Use the trapezium rule to approximate the area under a curve</p> <p>Use integration to solve differential equations</p> <p>Use differential to model real-life situations</p> <p>S3: Normal Distribution</p> <p>Understand the normal distribution and the characteristic of a normal distribution curve</p> <p>Find percentages points</p>	<p>Revision</p> <p>M6: Projectiles</p> <p>Model motion under gravity for an object projected horizontally</p> <p>Resolve velocity into components</p> <p>Solve problems involving particles projected at an angle</p> <p>Derive the formulae for time of flight, range and greatest height, and the equation of the path of a projectile</p> <p>M8: Further Kinematics</p> <p>Work with vectors for displacement, velocity and acceleration when using the vector equations of motion</p> <p>Work with vectors for displacement, velocity and acceleration when using the vector equations of motion</p> <p>Use calculus with harder functions of time involving variable acceleration</p> <p>Differentiate and integrate vectors with respect to time</p> <p>Differentiate and integrate vectors with respect to time</p>	

		<p>Sketch the graphs of the modulus functions $y = f(x)$ and $y = f(x)$</p> <p>Apply a combination of two (or more) transformations to the same curve</p> <p>Transform the modulus function</p> <p>P1: Proof</p> <p>Use proof by contradiction to prove true statements</p> <p>Multiply and divide two or more algebraic fractions</p> <p>Add or subtract two or more algebraic fractions</p> <p>Convert an expression with linear factors in the denominator into partial fractions</p> <p>Convert an expression with repeated linear factors in the denominator into partial fractions</p> <p>Divide algebraic expressions</p> <p>Convert an improper fraction into partial fraction form</p> <p>M5: Forces and Friction</p> <p>Resolve forces into components</p> <p>Use the triangle law to find a resultant force</p>	<p>expand fractional expressions</p> <p>S1: Regression, Correlation and Hypothesis Testing</p> <p>Understand exponential models in bivariate data and use a change of variable to estimate coefficients in an exponential model</p> <p>Understand and calculate the product moment correlation coefficient</p> <p>Carry out a hypothesis test for zero correlation</p> <p>S2: Conditional Probability</p> <p>Understand set notation in probability</p> <p>Understand conditional probability</p> <p>Solve conditional probability problems using two-way tables and venn diagrams</p> <p>Use probability formulae to solve problems</p> <p>Solve conditional probability using tree diagrams</p> <p>P6: Trigonometric Functions</p> <p>Understand the definitions of secant, cosecant and cotangent and their relationship to sine, cosine and tangent</p> <p>Understand the graphs</p>	<p>more complex functions</p> <p>Integrate functions by making a substitution</p> <p>Integrate functions by using integration by parts</p> <p>Integrate functions by using partial fractions</p> <p>Use integration to find the area under a curve</p> <p>Use the trapezium rule to approximate the area under a curve</p> <p>Use integration to solve differential equations</p> <p>Use differential to model real-life situations</p> <p>P12: Vectors</p> <p>Understand 3D Cartesian coordinates</p> <p>Use vectors in three dimensions</p> <p>Use vectors to solve geometric problems</p> <p>Model 3D motion in mechanics with vectors</p> <p>M4: Moments</p> <p>Calculate the turning effect of a force applied to a rigid body</p> <p>Calculate the resultant moment of a set of forces acting on a rigid body</p> <p>Solve problems involving uniform rods in equilibrium</p>	<p>on a standard normal curve</p> <p>Calculate values on a standard normal curve</p> <p>Find unknown means and/or standard deviations for a normal distribution</p> <p>Approximating a binomial distribution using a normal distribution</p> <p>Select appropriate distributions and solve real-life problems in context</p> <p>Carry out a hypothesis test for the mean of a normal distribution</p> <p>P8: Parametric Equations</p> <p>Convert parametric equations into Cartesian form by substitution</p> <p>Convert parametric equations into Cartesian form using trigonometric identities</p> <p>Understand and use parametric equations of curves and sketch parametric curves</p> <p>Solve coordinate geometry problems involving parametric equations</p> <p>Use parametric equations in modelling in a variety of contexts</p> <p>P10: Numerical Methods</p>		
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		<p>Solve problems involving smooth or rough inclined planes</p> <p>Understand friction and the coefficient of friction</p> <p>Use $F = \mu R$</p> <p>P5: Radians</p> <p>Convert between degrees and radians and apply this to trigonometric graphs and their transformations</p> <p>Know exact values of angles measured in radians</p> <p>Find an arc length using radians</p> <p>Find the areas of sectors and segments using radians</p> <p>Solve trigonometric equations in radians</p> <p>Use approximation trigonometric values when θ is small</p> <p>P6: Trigonometric Functions</p> <p>Understand the definitions of secant, cosecant and cotangent and their relationship to sine, cosine and tangent</p> <p>Understand the graphs of secant, cosecant and cotangent and their domain and range</p> <p>Simplify expressions, prove simple identities</p>	<p>of secant, cosecant and cotangent and their domain and range</p> <p>Simplify expressions, prove simple identities and solve equations involving secant, cosecant and cotangent</p> <p>Prove and use $\sec^2 x = 1 + \tan^2 x$ and $\operatorname{cosec}^2 x = 1 + \cot^2 x$</p> <p>Understand and use inverse trigonometric functions and their domain and ranges</p> <p>P7: Trigonometry and Modelling</p> <p>Prove and use the additional formulae</p> <p>Use the angles additional formulae</p> <p>Understand and use the double-angle formulae</p> <p>Solve trigonometric equations using the double-angle and addition formulae</p> <p>Write and simplify expressions of the form $a \cos \theta + b \sin \theta$ in forms $R \cos(\theta + \alpha)$ or $R \sin(\theta + \alpha)$</p> <p>Prove trigonometric identities using a variety of identities</p> <p>Use trigonometric functions to model real-life situations</p> <p>P9: Differentiation</p> <p>Differentiate functions</p>	<p>Solve problems involving non-uniform rods</p> <p>Solve problems involving rods on the point of tilting</p>	<p>Locate roots of $f(x)=0$ by considering changes of sign</p> <p>Use iteration to find an approximation to the root of the equation $f(x)=0$</p> <p>Use the Newton-Raphson procedure to find approximations to the solutions of equations of the form $f(x)=0$</p> <p>Use numerical methods to solve problems in context</p> <p>M7: Application of Forces</p> <p>Find an unknown force when a system is in equilibrium</p> <p>Solve statics problems involving weight, tension and pulleys</p> <p>Understand and solve problems involving limiting equilibrium</p> <p>Solve problems involving motion on rough or smooth inclined planes</p> <p>Solve problems involving connected particles that require the resolution of forces</p> <p>M6: Projectiles</p> <p>Model motion under gravity for an object projected horizontally</p> <p>Resolve velocity into components</p>	
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		<p>and solve equations involving secant, cosecant and cotangent</p> <p>Prove and use $\sec^2 x = 1 + \tan^2 x$ and $\operatorname{cosec}^2 x = 1 + \cot^2 x$</p> <p>Understand and use inverse trigonometric functions and their domain and ranges</p>	<p>sinx and cosx</p> <p>Differentiate exponential and logarithmic functions</p> <p>Use the chain rule to differentiate composite functions, or functions of another function</p> <p>Differentiate the product of two functions</p> <p>Differentiate the quotient rule of two functions</p> <p>Differentiate trigonometric functions</p> <p>Differentiate parametric equations</p> <p>Differentiate functions which are defined implicitly</p> <p>Use the second derivative to describe the behaviour of a function</p> <p>Solve problems involving connected rates of change and construct simple differential equations</p>		<p>Solve problems involving particles projected at an angle</p> <p>Derive the formulae for time of flight, range and greatest height, and the equation of the path of a projectile</p>		
	Assessment	Open book end of topic assessment	Closed book end of term test	Open book end of topic assessment	Open book end of topic assessment	Open book end of topic assessment	

