

KS5 Curriculum Overview **(Mathematics)**

Year 12

TERM 1 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<ul style="list-style-type: none"> • Algebra • Quadratics and Cubics • Inequalities and Simultaneous equations • Vectors 	<ul style="list-style-type: none"> • Understand and use the laws of indices for all rational exponents. • Use and manipulate surds, including rationalising the denominator. • Understand and use graphs of functions; sketch curves defined by simple equations including polynomials. • Solve simultaneous equations in two variables by elimination and by substitution, including one linear and one quadratic equation. (Economics links) • Add vectors diagrammatically and perform the algebraic operations of vector addition and multiplication by scalars and understand their geometrical interpretations. • Use vectors to solve problems in pure mathematics and in context (including forces) 	<p>Vector links to sailing and navigation, air traffic controllers etc.</p> <p>Equation links to business and economics.</p>
TERM 2 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<p style="text-align: center;"><u>Pure</u></p> <ul style="list-style-type: none"> • Coordinate Geometry, Graphs and Circles • Proofs • Binomial Expansion <p style="text-align: center;"><u>Applied</u></p> <ul style="list-style-type: none"> • Constant Acceleration • Quantities in mechanics • Statistical Sampling • Data Presentation and Interpretation 	<p><u>Pure</u></p> <ul style="list-style-type: none"> • Understand and use the equation of a straight line, including the forms. • Be able to use straight line models in a variety of contexts. (Geography) • Understand and use the structure of mathematical proof, proceeding from given assumptions through a series of logical steps to a conclusion. (Law and data analyst links) <p><u>Applied</u></p> <ul style="list-style-type: none"> • Understand and use the language of kinematics: position; displacement; distance travelled; velocity; speed; acceleration. (Physics links) • Understand and use the terms 'population' and 'sample'. Use samples to make informal inferences about the 	<p>Coordinate geometry link to forecasting,</p> <p>Proof links to Law, data analyst, security, and programming.</p> <p>Engineering links to constant acceleration, quantities in Mechanics</p> <p>Data presentation and interpretation is links to research careers</p>

	<p>population. (Biology and Geography links)</p> <ul style="list-style-type: none"> • Interpret diagrams for single-variable data, including understanding that area in a histogram represents frequency. • Interpret measures of central tendency and variation, extending to standard deviation (Biology Links) • Be able to calculate standard deviation, including from summary statistics. 	
TERM 3 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<p><u>Pure</u></p> <ul style="list-style-type: none"> • Trigonometry Ratios • Trigonometric Identities <p><u>Applied</u></p> <ul style="list-style-type: none"> • Quantities and units in Mechanics • Kinematics 	<ul style="list-style-type: none"> • Understand and use the definitions of sine, cosine and tangent for all arguments; Use of x and y coordinates of points on the unit circle to give cosine and sine respectively, the sine and cosine rules; the area of a triangle in the form $\frac{1}{2}ab\sin C$ (Engineering link) <p><u>Applied</u></p> <ul style="list-style-type: none"> • Understand and use fundamental quantities and units in the S.I. system: length, time, mass. Understand and use derived quantities and units: velocity, acceleration, force, weight, moment. (Physics links) • Understand, use and interpret graphs in kinematics for motion in a straight line: displacement against time and interpretation of gradient; velocity against time and interpretation of gradient and area under the graph. 	<p>Trigonometry is linked to engineering.</p> <p>Quantities and units in Mechanics, and kinematics are linked to engineering, products design etc.</p>

TERM 4 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<p style="text-align: center;"><u>Pure</u></p> <ul style="list-style-type: none"> • Exponentials and Logarithms • Differentiation <p style="text-align: center;"><u>Applied</u></p> <ul style="list-style-type: none"> • Variable acceleration • Probability • Forces and Newton's Law 	<ul style="list-style-type: none"> • Understand and use exponential growth and decay; use in modelling (examples may include the use of e in continuous compound interest, (Business links) radioactive decay, drug concentration decay, exponential growth as a model for population growth); consideration of limitations and refinements of exponential models. (Geography links) • Understand and use the second derivative as the rate of change of gradient; connection to convex and concave sections of curves and points of inflection. <p><u>Applied</u></p> <ul style="list-style-type: none"> • Understand the concept of a force; understand and use Newton's first law. • Understand and use mutually exclusive and independent events when calculating probabilities. (Physics links) 	<p>Medicine and Pharmaceutical links to radioactive decay to determine expiry date of drugs and foods,</p> <p>Business links to compound interest to forecast profits on investments etc.</p>
TERM 5 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<p style="text-align: center;"><u>Pure</u></p> <ul style="list-style-type: none"> • Integration <p style="text-align: center;"><u>Applied</u></p> <ul style="list-style-type: none"> • Statistical Distribution • Statistical Hypothesis Testing 	<ul style="list-style-type: none"> • Evaluate definite integrals; use a definite integral to find the area under a curve and the area between two curves. (Engineering link) <p><u>Applied</u></p> <ul style="list-style-type: none"> • Understand and use simple, discrete probability distributions (calculation of mean and variance of discrete random variables is excluded), including the binomial distribution, as a model; calculate probabilities using the binomial distribution. (Computing science link) • Understand and apply the language of statistical hypothesis testing, developed through a binomial model: null hypothesis, alternative hypothesis, significance level, test statistic, 1-tail 	<p>Integration is linked to manufacturing and engineering.</p> <p>Statistical Distribution and statistical Hypothesis testing are linked to careers like; Research fellows, scientist, computer programming, predictions etc.</p>

	test, 2-tail test, critical value, critical region, acceptance region, p-value;	
TERM 6 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
Revision		

KS5 Curriculum Overview (Mathematics)

Year 13

TERM 1 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<p><u>Pure</u></p> <ul style="list-style-type: none"> Algebra & Functions Sequences and Series The Binomial Expansion Trigonometry Radians <p><u>Applied</u></p> <ul style="list-style-type: none"> Correlation & Regression Kinematics 	<ul style="list-style-type: none"> Understand and use composite functions, inverse functions, and their graphs. Decompose rational functions into partial fractions (denominators not more complicated than squared linear terms and with no more than 3 terms, numerators constant or linear). Understand and work with geometric sequences and series, including the formulae for the nth term and the sum of a finite geometric series; the sum to infinity of a convergent geometric series, including the use of $r < 1$; modulus notation. Work with radian measure, including use for arc length and area of sector. Understand and use the standard small angle approximations of sine, cosine and tangent <p><u>Applied</u></p> <ul style="list-style-type: none"> Model motion under gravity in a vertical plane using vectors; projectiles. (Design & Technology, and Engineering links) Understand, use and interpret graphs in kinematics for motion in a straight line: displacement against time and 	

	interpretation of gradient; velocity against time and interpretation of gradient and area under the graph. (Physics Link)	
TERM 2 TOPIC/s	*Key Skills/Subject Links	*Career links & BV
<p><u>Pure</u></p> <ul style="list-style-type: none"> ▪ Trigonometry Identities and functions ▪ Coordinate Geometry in the (x,y) Plane ▪ Vectors <p><u>Applied</u></p> <ul style="list-style-type: none"> • Probability • Forces and Friction 	<ul style="list-style-type: none"> • Understand and use the definitions of secant, cosecant and cotangent and of arcsin, arccos and arctan; their relationships to sine, cosine and tangent; understanding of their graphs; their ranges and domains. • Understand and use double angle formulae; use of formulae for $\sin(A \pm B)$, $\cos(A \pm B)$, and $\tan(A \pm B)$, • Understand and use the parametric equations of curves and conversion between Cartesian and parametric forms. • Use vectors in two dimensions and in three dimensions. (Engineering link) <p><u>Applied</u></p> <ul style="list-style-type: none"> • Understand and use conditional probability, including the use of tree diagrams, Venn diagrams, two-way tables. Understand and use the conditional probability formula. • Understand and use Newton's third law; equilibrium of forces on a particle and motion in a straight line (restricted to forces in two perpendicular directions or simple cases of forces given as 2-D vectors); application to problems involving smooth pulleys and connected particles. • Understand and use the $F \leq R \mu$ model for friction; coefficient of friction; motion of a body on a rough surface; limiting friction and statics. (Physics and Engineering links) 	
TERM 3 TOPIC/s	*Key Skills/Subject Links	*Career links & BV

<p style="text-align: center;"><u>Pure</u></p> <ul style="list-style-type: none"> ▪ Differentiation ▪ Integration <p style="text-align: center;"><u>Applied</u></p> <ul style="list-style-type: none"> • Normal Distribution 	<ul style="list-style-type: none"> • Differentiate using the product rule, the quotient rule and the chain rule, including problems involving connected rates of change and inverse functions. • Differentiate simple functions and relations defined implicitly or parametrically, for first derivative only. (Engineering link) <p>Applied</p> <ul style="list-style-type: none"> • Conduct a statistical hypothesis test for the mean of a Normal distribution with known, given or assumed variance and interpret the results in context. 	
TERM 4 TOPIC/s	▪ *Key Skills/Subject Links	*Career links & BV
<p style="text-align: center;"><u>Pure</u></p> <ul style="list-style-type: none"> ▪ Numerical Methods ▪ Proofs <p style="text-align: center;"><u>Applied</u></p> <ul style="list-style-type: none"> • Moments 	<ul style="list-style-type: none"> • Locate roots of $f(x) = 0$ by considering changes of sign of $f(x)$ in an interval of x on which $f(x)$ is sufficiently well behaved. Students should know that sign change is appropriate for continuous functions in a small interval. Understand how change of sign methods can fail. • Solve equations approximately using simple iterative methods; be able to draw associated cobweb and staircase diagrams. <p>Applied</p> <ul style="list-style-type: none"> • Understand and use moments in simple static contexts. 	
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