Year 12 Curriculum Grid

# Mathematics

| Year/Term | Unit | Intent |
|---|---|---|
| Overall | | To inspire students, nurture a passion for Mathematics, lay the groundwork for further study in mathematically related courses whilst providing numerous opportunities to equip students with the essential practical skills they need for future mathematical study. |
| Autumn | Pure - Algebraic Expressions | Index laws. Expanding brackets. Factorising. Negative and fractional indices. Surds. Rationalising denominators. |
| | Pure - Quadratics | Solving quadratic equations. Completing the square. Functions. Quadratic graphs. The discriminant. Modelling with quadratics. |
| | Pure - Expressions and Inequalities | Linear simultaneous equations. Quadratic simultaneous equations. Simultaneous equations on graphs. Linear inequalities. Quadratic inequalities. Inequalities on graphs. Regions. |
| | Pure - Graphs and Transformations | Cubic graphs. Quartic graphs. Reciprocal graphs. Points of intersection. Translating graphs. Stretching graphs. Transforming functions. |
| | Pure - Straight Line Graphs | $y = mx + c$. Equations of straight lines. Parallel and perpendicular lines. Length and area. Modelling with straight lines. |
| | Pure - Algebraic Methods | Algebraic fractions. Dividing polynomials. The factor theorem. Mathematical proof. Methods of proof. |
| | Pure - Trigonometric ratios | The cosine rule. The sine rule. Areas of triangles. Solving triangle problems. Graphs of sine, cosine and tangent. Transforming trigonometric graphs. |
| | Pure - Trigonometric Identities and Equations | Angles in all four quadrants. Exact values of trigonometrical ratios. Trigonometric identities. Simple trigonometric equations. Harder trigonometric equations. Equations and identities. |
| | Pure - Differentiation | Gradients of curves. Finding the derivative. Differentiating $x^n$, quadratics, functions with two or more terms. Gradients, tangents, normal. Increasing and decreasing functions. Second order derivatives. Stationary points. Sketching gradient functions. Modelling with differentiation. |
| Spring | Pure - Circles | Midpoints and perpendicular bisectors. Equation of a circle. Intersections of straight lines and circles. Use tangent and chord properties. Circles and triangles. |
| | Pure - Integration | Integrating $x^n$. Indefinite integrals. Finding functions. Definite integrals. Areas under curves. Area under the x-axis. Areas between curves and lines. |

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| | Pure - The Binomial Expansion | Pascal's triangle. Factorial notation. The binomial expansion. Solving binomial problems. Binomial estimation. |
| | Pure - Vectors | Representing vectors. Magnitude and direction. Position vectors. Solving geometric problems. Modelling with vectors. |
| | Pure - Exponentials and Logarithms | Exponential functions. $y = e^x$. Exponential modelling. Logarithms. Laws of logarithms. Solving equations using logarithms. Working with natural logarithms. Logarithms and non-linear data. |
| | Mechanics – Modelling in Mechanics | Constructing a model. Modelling assumptions. Quantities and units. Working with vectors. |
| | Mechanics – Constant Acceleration | Displacement-time graphs. Velocity-time graphs. Constant acceleration formulas. Vertical motion under gravity. |
| | Statistics – Data Collection | Populations and samples. Sampling. Non-random sampling. Types of data. The large data set. |
| | Statistics – Measures of Location and Spread | Measures of central tendency. Other measures of location. Measures of spread. Variance and standard deviation. Coding. |
| | Statistics – Representations of Data | Outliers. Box plots. Cumulative frequency. Histograms. Comparing data. |
| Summer | Mechanics – Forces and motion | Force diagrams. Forces as vectors. Forces and acceleration. Motion in 2 dimensions. Connected particles. Pulleys. |
| | Mechanics – Variable Acceleration | Functions of time. Using differentiation. Maxima and minima problems. Using integration. Constant acceleration formulae. |
| | Statistics – Correlation | Correlation. Linear regression. |
| | Statistics – Probability | Calculating probabilities. Venn diagrams. Mutually exclusive and independent events. Tree diagrams. |
| | Statistics – Statistical Distributions | Probability distributions. The binomial distributions. Cumulative probabilities. |
| | Statistics – Hypothesis Testing | Hypothesis testing. Finding critical values. One-tailed tests. Two-tailed tests. |

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