

KS5 Long Term Curriculum Plan: **Mathematics - Year 12**

Curriculum Aim: The aims and objectives of this qualification are to enable students to:

- understand mathematics and mathematical processes in a way that promotes confidence, fosters enjoyment and provides a strong foundation for progress to further study
- extend their range of mathematical skills and techniques
- understand coherence and progression in mathematics and how different areas of mathematics are connected
- apply mathematics in other fields of study and be aware of the relevance of mathematics to the world of work and to situations in society in general

Link to prior learning: The subject builds on key skills learnt in KS4 Maths. Students must apply prior learning in order to learn the new content.

Rationale of sequencing: We follow the Edexcel A Level Syllabus which consistently requires knowledge of previous topics in order to advance through the course. Students start with the pure/algebra topics that follow on from GCSE specification before becoming more advanced. Students then move on to the applied modules of statistics and mechanics. The sequencing is designed in a way that allows students to learn new skills and be tested on them, which will then be required to progress to the next topic. These skills are then applied to statistical and physical models and the end of the course when students move on to the statistics and mechanics modules.

	Focus / Topic	Knowledge & Skills (from NC/Programmes of Study)	Assessment
Autumn 1	Algebraic expressions, Quadratics, Equations and inequalities, Transformations of graphs, Straight lines, Circles, Algebraic methods	<p>Pupils will:</p> <ul style="list-style-type: none"> ● Understand and use the laws of indices for all rational exponents. ● Work with quadratic functions and their graphs. ● Solve simultaneous equations in two variables by elimination and by substitution, including one linear and one quadratic equation. ● Understand and use the coordinate geometry of the circle including using the equation of a circle in the form $(x - a)^2 + (y - b)^2 = r^2$ ● Understand and use the equation of a straight line ● Manipulate polynomials algebraically, including expanding brackets and collecting like terms, factorisation and simple algebraic division; use of the factor theorem. ● Understand and use the structure of mathematical proof, proceeding from given assumptions through a series of logical steps to a conclusion 	Assessment on chapters learnt during the half term
Autumn 2	Binomial expansion, Trigonometric ratios, Trigonometric identities and equations, Differentiation,	<p>Pupils will:</p> <ul style="list-style-type: none"> ● Understand and use the binomial expansion ● Understand and use the sine, cosine and tangent functions; their graphs, symmetries and periodicity ● Solve simple trigonometric equations in a given interval, including quadratic equations in sin, cos and tan and equations involving multiples of the unknown angle. ● Understand and use the derivative of $f(x)$ as the gradient of the tangent to the graph of $y = f(x)$ 	Assessment on chapters learnt during the half term

Spring 1	Vectors, Integration, Exponentials and Logarithms	<p>Pupils will:</p> <ul style="list-style-type: none"> ● Calculate the magnitude and direction of a vector and convert between component form and magnitude/direction form. ● Understand and use the second derivative ● Integrate x^n (excluding $n = -1$) and related sums, differences and constant multiples. ● Evaluate definite integrals; use a definite integral to find the area under a curve ● Know and use the function e^x and its graph. ● Understand and use the laws of logarithms 	Assessment on chapters learnt during the half term
Spring 2	Data collection, Measures of location and spread, Representation of data, Modelling in Mechanics, Constant acceleration, Forces and motion	<p>Pupils will:</p> <ul style="list-style-type: none"> ● Select or critique sampling techniques in the context of solving a statistical problem, including understanding that different samples can lead to different conclusions about the population. ● Interpret diagrams for single-variable data, including understanding that area in a histogram represents frequency ● Understand, use and derive the formulae for constant acceleration for motion in a straight line. ● Understand the concept of a force; understand and use Newton's first law. 	Assessment on all year 1 Pure content
Summer 1	Correlation, Probability, Statistical distributions, Variable acceleration, Hypothesis testing	<p>Pupils will:</p> <ul style="list-style-type: none"> ● Understand and use mutually exclusive and independent events when calculating probabilities. ● 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. ● Use calculus in kinematics for motion in a straight line: ● Understand and apply the language of statistical hypothesis testing, developed through a binomial model: null hypothesis, alternative hypothesis, significance level, test statistic, 1-tail test, 2-tail test, critical value, critical region, acceptance region, p-value; ● 	Assessment on Year 1 Statistics and Mechanics content
Summer 2	Year 2 Algebraic methods, Year 2 Functions and graphs,	<p>Pupils will:</p> <ul style="list-style-type: none"> ● Proof by contradiction (including proof of the irrationality of $\sqrt{2}$ and the infinity of primes, and application to unfamiliar proofs). ● 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 the effect of simple transformations on the graph of $y = f(x)$ ● Understand and use composite functions; inverse functions and their graphs. 	End of year assessments based on AS examinations.

Further Information

Exam board – **Edexcel** – the specification can be found here: <https://qualifications.pearson.com/content/dam/pdf/A%20Level/Mathematics/2017/specification-and-sample-assesment/a-level-l3-mathematics-specification.pdf> All students require a Casio Classwiz calculator for this course: https://www.amazon.co.uk/Casio-FX-991EX-S-UH-Scientific-Calculator-Resolution/dp/B0719FWP3X/ref=sr_1_1?keywords=casio+classwiz+calculator&qid=1562138320&s=gateway&sr=8-1

We use the Edexcel textbooks for this course:

<https://www.pearsonschooolsandfecolleges.co.uk/secondary/Mathematics/16plus/EdexcelASandAlevelMathematics2017/EdexcelASandAlevelMathematics2017.aspx>