

MATHS YEAR 12 AS Level

INTENT The intent at KS5 is to build on GCSE knowledge, developing a deeper understanding of both pure and applied mathematics (statistics and mechanics). It aims to foster problem-solving, mathematical reasoning, and the ability to apply mathematical concepts to real world situations. Ultimately, it prepares students for further study in mathematics and related fields and equip them with valuable skills for the wider world.

	Prior learning	The curriculum is designed so students will review topics taught from year 10 and 11 with interleaving learning to support the recall and retention of previously learned content.
	Course	Exam Board: Edexcel Paper 1: Pure Paper 1 (2 hours) Paper 2: Pure Paper 2 (2 hours) Paper 3: Statistics and Mechanics (2 hours)
	Extra-curricular	All the students will participate in the Intermediate Mathematical Challenge

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
TOPIC/KNOWLEDGE	In this term will focus on pure maths, statistics and mechanics. Students will know: AS Pure Maths 1- Manipulate Surds. Factorise and solve linear and quadratic equations and inequalities both algebraically and graphically. AS Statistics 1 Know and use the different sampling techniques and be aware of their advantages and disadvantages. Be able to select or critique sampling techniques in the context of solving a statistical problem. AS Mechanics 6 and 7 Understand and use fundamental quantities and units in the S.I. system: length, time and mass. Be able to draw and interpret kinematics graphs, knowing the significance (where appropriate) of their gradients and the areas underneath them. Solve problems using the SUVAT formulae when appropriate	In this term will focus on mechanics, pure maths and statistics. Students will know: AS Mechanics and 7continued Solve problems using the SUVAT formulae when appropriate AS Pure Maths 2– Understand and use the equation of a straight line. Know the conditions when lines are parallel and perpendicular. Be able to find the points of intersection between a circle and a line. Solve problems using the properties of chords and tangents. AS Statistics 2 Be able to calculate measures of variation, standard deviation, variance, range and inter-percentile range. Be able to interpret and draw inferences from summary statistics. AS Statistics 3 Understand and be able to use mutually exclusive and independent events when calculating probabilities AS Pure Maths 3 Be able to know and apply the factor theorem. They should be able to factorise fully cubic functions. Understand and be able to use the structure of mathematical proof, proceeding from given assumptions through a series of logical steps to a conclusion.	In this term will focus on mechanics, pure maths and statistics. Students will know: AS Pure Maths 3continued Understand and be able to use the binomial expansion of $(a + bx)^n$ for positive integers; Find the coefficient of Binomial expansion. AS Mechanics 8 Understand and apply Newton's first, second and third laws of forces, motion and equilibrium to solve problems. AS Pure Maths 4a Students should be able to use the sine rule, cosine rule and the formulae area of triangle = $1/2ab\sin C$ to solve problems. Sketch graphs of trigonometric functions and transform them within the given limits.	In this term will focus on pure maths and statistics. Students will know: AS Pure Maths 4b Use trigonometric identities to solve trigonometric equations applying their knowledge of quadratic equations. AS Pure Maths 5 Calculate the magnitude and direction of vectors. Perform the algebraic operations of vector addition and multiplication by scalars and understand their geometrical interpretations. AS Statistics 4 Understand and be able to use discrete probability distributions, including the binomial distribution to calculate probabilities. AS Pure Maths 6 Understand the process of differentiation from first principles and it interpretation. Use differentiation to find the equation of a tangent and normal to a function.	In this term will focus on mechanics, pure maths and statistics. Students will know: AS Pure Maths 6continued Use differentiation to find tangents, normal and stationary points of given function. AS Statistics 5 Conduct a statistical hypothesis test for the proportion in the binomial distribution and interpret the results in context. Decide whether to accept or reject the null hypothesis at a given significance level. AS Pure Maths 7 Understand the process of differentiation and integration. Using differentiation to find the rate of change and integration to find the distance travelled from velocity-time functions (or graphs). AS Mechanics 9 Apply differentiation in kinematics to model motion in a straight line for a particle moving with variable acceleration. Use integration in kinematics when the particle is under the action of variable force.	In this term will focus on mechanics, pure maths and statistics. Students will know: AS Pure Maths 8 Students will learn to sketch graphs of exponential functions and transform them. Differentiate exponentials and relate to models such population growth. Understand that the inverse of an exponential function is called a logarithm. Apply the laws of logarithms and solve equations involving logarithms. Relate to models of exponential growth and decay. A2 Pure Maths 1 Understand that there are different types of proof and disproof (e.g. deduction and contradiction) and decide on the method. A2 Pure Maths 2 The four operations of algebraic fractions giving an answer in its simplest form. This leads into splitting the fractions into partial fractions. A2 Statistics 1 Understand exponential models in bivariate data and change the variable to the coefficient in an exponential model. Calculate the product moment correlation coefficient and carry out a carry A2 Mechanics 4 Learn that forces can produce turning effects on a rigid body. Calculate the moment of force using the formula. Use diagrams to solve problems uniform rods in equilibrium and rods on the point of tilting.
SKILLS	A-level Mathematics course will develop a wide range of valuable skills, including problem-solving, logical thinking, and analytical abilities, which are applicable to various fields beyond mathematics. Students will gain expertise in areas such as algebra, calculus, statistics and mechanics while also enhancing their critical thinking, quantitative literacy, and ability to interpret numerical information.					
ASSESSMENT	For each lesson, teachers will assess students understanding through directed questioning, using mini-whiteboards for instant feedback and live marking in lesson so teachers can adapt and help students progress. Every two weeks, students will sit a low-stakes quiz consisting of questions which will assess students on the topics they have been taught in the previous weeks as a way of helping with retention and assess student's knowledge Students will sit a baseline assessment in September based on year 11 higher skills. They will sit mock exams in November and June, consisting of a pure paper and an applied paper. The results will be used to predict end of course grades.					
VOCAB	Quadratic equations, functions, simultaneous, discriminants, indices, surds, transformation, sampling, population, census, gradient, kinematics, velocity, acceleration, vector, scalar, mass, displacement.	Parallel, perpendicular, line segment, standard deviation, variance, mean, inter-percentile range, correlation, regression line, exclusive and independent events, continuous and discrete data.	Factor theorem, coefficient, Binomial, force, equilibrium, resolve, pulleys, sine, cosine, tangent, Sine rule, cosine rule, periodicity	Trigonometric equations and identities vectors, magnitude, scalars, discrete distribution, binomial distribution, probabilities, differentiate, derivative,	Maxima, minima, stationary points, normal, polynomials. Hypothesis, null, alternative, testing, significance level, rejecting. Integration, integral, limits, acceleration, velocity, kinematics formulae.	Logarithms, exponential, asymptotes, growth, decay, contradiction, deduction, proof, algebraic fractions, partial fractions, regression line, product moment correlation coefficient.

READING SKILLS

Decoding, fluency, vocabulary, prior knowledge and summarising will all be necessary for this year.

CAREERS LINKS

Studying mathematics opens up a range of sectors such as IT, finance, engineering, space science and teaching.

Accountant, Actuary, Data Scientist, Financial Manager, Engineering, Financial Analyst, Operations Researcher, Quantity Surveyor, Software Engineer, Data Analyst...

CORE

'A' level maths will equip students with an array of skills applicable to numerous real-world problems. The students will learn to apply mathematical modelling to various situations and develop critical thinking by breaking down complex problems and reach a logical conclusion.

SUPPORTING STUDENT'S AT HOME

You will get compulsory homework twice a week. Sparx Maths may also be used as a homework platform. Along with this you can do as much independent learning as you like to support your learning in the classroom.

CURRICULUM AND ASSESSMENT PLAN

MATHS YEAR 13 A Level



INTENT

The intent at KS5 is to build on GCSE knowledge, developing a deeper understanding of both pure and applied mathematics (statistics and mechanics). It aims to foster problem-solving, mathematical reasoning, and the ability to apply mathematical concepts to real world situations. Ultimately, it prepares students for further study in mathematics and related fields and equip them with valuable skills for the wider world.

	Prior learning	The curriculum is designed so students will review topics taught from Year 12 with interleaving learning to support the recall and retention of previously learned content.
	A level Course	Exam Board: Edexcel Paper 1: Pure Paper 1 (2 hours) Paper 2: Pure Paper 2 (2 hours) Paper 3: Statistics and Mechanics (2 hours)
	Extra-curricular	All the students will participate in the Intermediate Mathematical Challenge

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
TOPIC/KNOWLEDGE	In this term will focus on pure maths, statistics and mechanics. Students will know: A2 Pure Maths 1 Understand that there are different types of proof and disproof (e.g. deduction and contradiction) and know which method to use and when. A2 Pure Maths 2 The four operations of algebraic fractions giving an answer in its simplest form. This leads into splitting the fractions into partial fractions. A2 Statistics 1 Understand exponential models in bivariate data and change the variable to the coefficient in an exponential model. Calculate the product moment correlation coefficient and carry out a carry A2 Pure Maths 3 Understand the modulus of a linear function. Sketch graphs, solve equations and inequalities involving modulus functions. A2 Mechanics 4 Learn that forces can produce turning effects on a rigid body. Calculate the moment of force using the formula. Use diagrams to solve problems uniform rods in equilibrium and rods on the point of tilting. A2 Pure Maths 4 Find the nth term of arithmetic and geometric sequences. Prove and use the formula of the first n terms of arithmetic series and the sum of finite geometric series. Model real life situations with sequences and series. A2 Pure Maths 5 Carry out Binomial expansion $(a + bx)^n$ for any rational constant n and determine the range of values of x for which the expansion is valid. Use partial fraction to expand fractional expressions. A2 Pure Maths 6 Convert between radians and degrees and apply to trigonometric graphs and their functions. Know the exact angles for sin, cos and tan in radians. Find the lengths of arcs and areas of sectors and segments using radians.	In this term will focus on pure maths, statistics and mechanics. Students will know: A2 Mechanics 5 Resolve the component forces and use trigonometry to find the resultant forces. Solve problems involving rough and smooth inclines. Identifying the forces acting on a particle and finding the resultant of several concurrent forces by vector addition. Use the formula $F \leq \mu R$. To find the frictional force relating to the 'roughness' of a surface. A2 Pure Maths 7 Understand the difference between Cartesian and parametric co-ordinates and convert between one to the other. Recognise some standard curves in parametric form and how they can be used for modelling. A2 Pure Maths 8 Differentiate trigonometric functions, exponentials and logarithms using chain, product and quotient rules. Solve problems involving connected rates of change and construct simple differential equations.	In this term will focus on pure maths, statistics and mechanics. Students will know: A2 Mechanics 6 Derive formulae to find the greatest height, the time of flight and the horizontal range of a projectile. Solve problems involving particles projected at an angle. A2 Statistics 2 Use set notation in probability. Solve probability problems by using two-way tables Venn diagrams and tree diagrams. A2 Mechanics 7 Solve problems involving equilibrium of a particle under coplanar forces, including particles on inclined planes. Also, solve statics problems for a system of forces which are not concurrent by applying the principle of moments for forces at any angle. A2 Pure Maths 9 Use iterative method and the Newton-Raphson methods to find solutions of functions of the form $f(x)=0$. Use numerical methods to solve problems in context.	In this term will focus on pure maths, statistics and mechanics. Students will know: A2 Pure Maths 10 Integrating x^n (including when $n = -1$), exponentials and trigonometric functions. Using the reverse of differentiation and using trigonometric identities to manipulate integrals A2 Statistics 3 Work out the mean and variance of a Binomial Distribution. Finding probabilities using the normal distribution. Use the Normal distribution as an approximation to the binomial distribution.	In this term will focus on pure maths, statistics and mechanics. Students will know: A2 Statistics 3 continued Conduct a statistical hypothesis test for the mean of the Normal distribution and interpret the results in context. A2 Pure Maths 11 Integrate functions by methods of substitution and by parts. Use integration to find the area under graphs and between two functions. Use the Trapezium rule to find approximate area under the curve. Use a differential equation as a model to solve a problem. A2 Mechanics 8 Use vectors of displacement, velocity and acceleration to solve equation of motion. Use calculus with vectors to solve problems involving motion in two dimensions with variable acceleration.	In this term will focus on pure maths, statistics and mechanics. Students will know:
SKILLS	A-level Mathematics course will develop a wide range of valuable skills, including problem-solving, logical thinking, and analytical abilities, which are applicable to various fields beyond mathematics. Students will gain expertise in areas such as algebra, calculus, statistics and mechanics while also enhancing their critical thinking, quantitative literacy, and ability to interpret numerical information.					
ASSESSMENT	For each lesson, teachers will assess students understanding through directed questioning, using mini-whiteboards for instant feedback and live marking in lesson so teachers can adapt and help students progress. Every two weeks, students will sit a low-stakes quiz consisting of questions which will assess students on the topics they have been taught in the previous weeks as a way of helping with retention and assess student's knowledge Students will sit mock exams in November and February. The November exams will consist two papers, a pure paper and an applied paper. Whilst the February assessment will consist of the three full papers – two pure papers and one applied paper This is to fully prepare them for the real thing in the summer and to assess student's knowledge and pick up any topics that need to be re-taught.					
VOCAB	Logarithms, exponential, asymptotes, growth, decay, contradiction, deduction, algebraic fractions, partial fractions, regression line, product moment correlation coefficient, modulus function, domain, mapping, secant, cosecant, cotangent, identities radians, degrees,	Turning affects, rigid bodies, coplanar, parametric, Cartesian, product rule, quotient rule, chain rule	Projectile, projection, component, vectors, resolve, set, conditional, complement, intersection, union, sample space, mutually exclusive, pulleys, weight, inclined, numerical, approximation, iteration,	Integration, integrals, continuous random variable, discrete random variable, normal distribution, inflection, standard deviation, cumulative, coding,	Identities, trapezium rule, substitution, integration by parts, vectors, acceleration, velocity, displacement.	

READING SKILLS

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