

Mathematics

Year 13

A-Level Applied Mathematics Scheme of Learning 2023 - 2024

Subject leader: K Ellender

Topics by term	Topic overview for 13 – A Level maths (Applied)					
	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
	MECHANICS Moments 4.1 Moments 4.2 Resultant Moments 4.3 Equilibrium 4.4 Centres of mass 4.5 Tilting Forces and Friction 5.1 Resolving forces 5.2 Inclined planes 5.3 Friction Projectiles 6.1 Horizontal projection 6.2 Horizontal and vertical components 6.3 Projection at any angle 6.4 Projectile motion formulae	Applications of Forces 7.1 Static particles 7.2 Modelling with statics 7.3 Friction and static particles 7.4 Static rigid bodies 7.5 Dynamics and inclined planes 7.6 Connected particles Further Kinematics 8.1 Vectors in kinematics 8.2 Vector methods with projectiles 8.3 Variable acceleration in one dimension 8.4 Differentiating vectors 8.5 Integrating vectors	STATISTICS Regression 1.1 Exponential Models 1.2 Measuring correlation 1.3 Hypothesis testing for zero correlation Conditional Probability 2.1 Set Notation 2.2 Conditional probability 2.3 Conditional probabilities in Venn diagrams 2.4 Probability formulae 2.5 Tree Diagrams	Normal Distribution 3.1 The Normal Distribution 3.2 Finding probabilities for normal distributions. 3.3 The inverse normal distribution function 3.4 The standard normal distribution 3.5 Finding μ and σ 3.6 Approximating a Binomial distribution 3.7 Hypothesis testing with the normal distribution	Revision	N/A

Exam Board - Edexcel							
Spec References	Big Questions	Topic area: Main Items	Outcomes	Key Terms and Concepts Literacy Numeracy	Assessment and homework tasks	Resources	Personal Development Curriculum links (SMSC, British Values, WPD)
Term 1 - MECHANICS							
Moments – Week 2-3							
	How do we model situations involving pivoting?	4.1 Moments 4.2 Resultant Moments 4.3 Equilibrium 4.4 Centres of Mass 4.5 Tilting	By the end of this topic, students should be able to... - Calculate the turning effect of a force applied to a rigid body - Calculate the resultant moment of a set of forces acting on a rigid body - Solve problems involving uniform rods in equilibrium - Solve problems involving non uniform rods - Solve problems involving rods on the point of tilting	Moment Reaction Tilting Pivot Resultant force	Unit 4 - Exercises from the Year 2 Statistics and Mechanics Textbook and Practice Book by Pearsons	Mathsbox, Pearson Textbook and Practice Book, Mathsgeenie.	The course content encourages students to apply logic, reason, construct arguments, critically analyse and communicate effectively. These skills are applied to both number based practice and to wider areas of mathematical application in context as students consider where these ideas could be used in the wider world
Forces and Friction – Week 3-4							
	How do we model situations involving friction between surfaces?	5.1 Resolving Forces 5.2 Inclined Planes 5.3 Friction	By the end of this topic, students should be able to... Resolve forces into components Use the triangle law to find a resultant force Solve problems involving smooth or rough inclined planes Understand friction and the coefficient of friction Use $F \leq \mu R$	Magnitude Direction Parallel Perpendicular Friction Normal reaction Limiting value	Unit 5 - Exercises from the Year 2 Statistics and Mechanics Textbook and Practice Book by Pearsons	Mathsbox, Pearson Textbook and Practice Book, Mathsgeenie.	Modelling relevance. Critical thinking in contextual problems. Mathematical reasoning. Construction of arguments.

Projectiles – Week 5-6							
	How do we model projectiles?	6.1 Horizontal Projection 6.2 Horizontal and Vertical Components 6.3 Projection at any Angle 6.4 Projectile Motion Formulae	By the end of this topic, students should be able to... • Model motion under gravity for an object projected horizontally • Resolve velocity into components • Solve problems involving particles projected at an angle • Derive the formula for time of flight, range and greatest height, and the equation of the path of a projectile	○ Velocity ○ Horizontal component ○ Vertical component ○ acceleration ○ Projectile ○ Gravity	Unit 6 - Exercises from the Year 2 Statistics and Mechanics Textbook and Practice Book by Pearsons	Mathsbox, Pearson Textbook and Practice Book, Mathsgeenie.	Modelling relevance. Critical thinking in contextual problems. Mathematical reasoning. Construction of arguments.
Term 2							
Applications of Forces – Week 1-4 (8-11)							
	How do we model problems involving connected particles?	7.1 Static Particles 7.2 Modelling with Statics 7.3 Friction and Static Particles 7.4 Static Rigid Bodies 7.5 Dynamics and Inclined Planes 7.6 Connected Particles	By the end of this topic, students should be able to... • Find an unknown force when a system is in equilibrium • Solve statics problems involving weight, tension and pulleys • Understand and solve problems involving limiting equilibrium • Solve problems involving motion on rough or smooth inclined planes • Solve problems involving connected particles that require the resolution of forces	○ Rigid body ○ Static equilibrium ○ Resultant force ○ Limiting equilibrium ○ Stationary ○ Friction	Unit 7 - Exercises from the Year 2 Statistics and Mechanics Textbook and Practice Book by Pearsons	Mathsbox, Pearson Textbook and Practice Book, Mathsgeenie.	Modelling relevance. Critical thinking in contextual problems. Mathematical reasoning. Construction of arguments.
Further Kinematics – Week 4-7 (11-14)							
	How can vectors help us solve	8.1 Vectors in Kinematics	By the end of this topic, students should be able to...	○ Position vector ○ Displacement	Unit 8 - Exercises from	Mathsbox,	Modelling relevance.

	problems in kinematics?	8.2 Vector Methods with Projectiles 8.3 Variable Acceleration in one Dimension	• Work with vectors for displacement, velocity and acceleration when using the vector equations of motion • Use calculus with harder functions of time involving variable acceleration • Differentiate and integrate vectors with respect to time	○ Initial velocity ○ Constant acceleration ○ Variable acceleration	the Year 2 Statistics and Mechanics Textbook and Practice Book by Pearsons	Pearson Textbook and Practice Book, Mathsgeenie.	Critical thinking in contextual problems. Mathematical reasoning. Construction of arguments.
Term 3 STATISTICS							
Regression – Week 1-3 (15-17)							
	How do we apply The product moment correlation coefficient?	1.1 Exponential Models 1.2 Measuring Correlation 1.3 Hypothesis Testing for Zero Correlation	By the end of this topic, students should be able to... • Understand exponential models in bivariate data • Use a change of variable to estimate coefficients in an exponential model • Understand and calculate the product moment correlation coefficient • Carry out a hypothesis test for zero correlation	○ Product moment correlation coefficient ○ One tailed test ○ Two tailed test ○ Exponential ○ Logarithm	Unit 1 - Exercises from the Year 2 Statistics and Mechanics Textbook and Practice Book by Pearsons	Mathsbox, Pearson Textbook and Practice Book, Mathsgeenie.	Modelling relevance. Statistical interpretations. Critical thinking in contextual problems. Construction of arguments. Data ethics Ref: Office of National statistics
Conditional Probability – Week 4-6 (18-20)							
	How can different diagrams help us model conditional probability?	2.1 Set Notation 2.2 Conditional Probability 2.3 Conditional Probabilities in Venn Diagrams 2.4 Probability Formulae 2.5 Tree Diagrams	By the end of this topic, students should be able to... • Understand set notation in probability • Understand conditional probability • Solve conditional probability problems using two way tables and Venn diagrams • Use probability formula to solve problems • Solve conditional probability using tree diagrams	○ Intersection ○ Union ○ Complement ○ Set notation ○ Probability	Unit 2 - Exercises from the Year 2 Statistics and Mechanics Textbook and Practice Book by Pearsons	Mathsbox, Pearson Textbook and Practice Book, Mathsgeenie.	Modelling relevance. Statistical interpretations. Critical thinking in contextual problems. Construction of arguments. Data ethics
Term 4							

Normal Distribution – Week 1-6 (21-26)							
	How do we apply the normal distribution in modelling real life problems?	3.1 The Normal Distribution 3.2 Finding Probabilities for Normal Distributions 3.3 The Inverse Normal Distribution 3.4 The Standard Normal Distribution 3.5 Find μ and σ 3.6 Approximating a Binomial Distribution 3.7 Hypothesis Testing with the Normal Distribution.	By the end of this topic, students should be able to... • Understand the normal distribution and the characteristics of a normal distribution curve • Find percentage points on a standard normal curve • Calculate values on a standard normal curve • Find unknown means and or standard deviations for a normal distribution • approximate a binomial distribution using a normal distribution • select appropriate distributions and solve real life problems in context • carry out hypothesis test for the mean of a normal distribution	○ continuous probability distribution ○ Random variable ○ Population mean ○ Population variance ○ Bell shaped ○ Points of Inflexion ○ Standard normal distribution ○ Standard deviation ○ Continuity correction ○ Binomial distribution	Unit 3- Exercises from the Year 2 Statistics and Mechanics Textbook and Practice Book by Pearsons	Mathsbox, Pearson Textbook and Practice Book, Maths genie.	Modelling relevance. Statistical interpretations. Critical thinking in contextual problems. Construction of arguments. Data ethics
Term 5 – Revision in preparation for A-Level Exams.							
	How do we recognise and correct gaps in our understanding?		During this term students will complete personalised revision programs, using a combination of past papers and review exercises to identify areas of weakness, along with practice exercises and workshops to develop those areas.	○ Resilience ○ Accuracy ○ Communication ○ Persistence ○ Drive • Focus	A-Level Maths Exams	Mathsbox, Pearson Textbook and Practice Book, Maths genie, Past Papers.	