

Mathematics

Year 12

AS Applied Mathematics Scheme of Learning 2023 - 2024

Subject leader: K Ellender

Topics by term	Topic overview for 12 – AS Level maths					
	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
	STATISTICS Data Collection 1.1 Populations and Samples 1.2 Sampling 1.3 Non-Random Sampling 1.4 Types of Data 1.5 The Large Data Set Measures of Location and Spread 2.1 Measures of Central Tendency 2.2 Other Measures of Location 2.3 Measures of Spread 2.4 Variance and Standard Deviation 2.5 Coding	Representations of Data 3.1 Outliers 3.2 Box Plots 3.3 Cumulative Frequency 3.4 Histograms 3.5 Comparing Data Correlation 4.1 Correlation 4.2 Linear Regression Probability 5.1 Calculating Probabilities 5.2 Venn Diagrams 5.3 Mutually Exclusive and Independent Events 5.4 Tree Diagrams	Statistical Distributions 6.1 Probability Distributions 6.2 The Binomial Distribution 6.3 Cumulative Probabilities Hypothesis Testing 7.1 Hypothesis Testing 7.2 Finding Critical Values 7.3 One-Tailed Tests 7.4 Two-Tailed Tests Statistics Revision	MECHANICS Modelling in Mechanics 8.1 Constructing a Model 8.2 Modelling Assumptions 8.3 Quantities and Units 8.4 Working with Vectors Constant Acceleration 9.1 Displacement-Time Graphs 9.2 Velocity-Time Graphs 9.3 Constant Acceleration Formulae 1 9.4 Constant Acceleration Formula 2	Constant Acceleration 9.5 Vertical Motion Under Gravity Forces and Motion 10.1 Force Diagrams 10.2 Forces as Vectors 10.3 Forces and Acceleration 10.4 Motion in 2 Dimensions 10.5 Connected Particles 10.6 Pulleys	Variable Acceleration 11.1 Functions of Time 11.2 Using Differentiation 11.3 Maxima and Minima Problems 11.4 Using Integration 11.5 Constant Acceleration Formula Mechanics Revision Statistics Revision End of Year Exams

Exam Board - Edexcel							
Spec Referen ces	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 - STATISTICS							
Data Collection – Week 2-4							
1.1	What factors must be considered to affect the validity of a data set?	1.1 Populations and Samples 1.2 Sampling 1.3 Non-Random Sampling 1.4 Types of Data 1.5 The Large Data Set	By the end of this topic, students should be able to... - understand ‘population’, ‘sample’, and ‘census’, and comment on the advantages and disadvantages of each. - understand the advantages and disadvantages of simple random sampling, systematic sampling, stratified sampling, quota sampling, and opportunity sampling. - define qualitative, quantitative, discrete and continuous data, and understand grouped data. - understand the large data set and how to collect data from it, identify types of data and calculate simple statistics.	- Population - Sample - Census - Systematic - Stratified - Quote - Quantitative - Qualitative - Continuous - Discrete - Classes	Unit 1 - Exercises from the Year 1 Statistics and Mechanics Textbook and Practice Book by Pearsons	Mathsbox, Pearson Textbook and Practice Book, Maths genie.	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. Ref: Office of National statistics.
Measures of Location and Spread – Week 5-7							
2.3	How can we represent the properties of a data set numerically?	2.1 Measures of Central Tendency 2.2 Other Measures of Location 2.3 Measures of Spread	By the end of this topic, students should be able to... calculate measures of central tendency such as the mean, median, and mode.	- Mean - Median - Mode - Quartile - Percentile	Unit 2 - Exercises from the Year 1 Statistics and Mechanics	Mathsbox, Pearson Textbook and Practice Book, Maths genie.	Modelling relevance. Statistical interpretations. Critical thinking in contextual problems.

		2.4 Variance and Standard Deviation 2.5 Coding	- calculate measures of location such as percentiles and deciles. - calculate measures of spread such as range, interquartile range, and interpercentile range. - calculate variance and standard deviation. - understand and use coding.	Range Variance Standard Deviation	Textbook and Practice Book by Pearsons		Construction of arguments. Data ethics
Term 2							
Representations of Data – Week 1-3 (8-10)							
2.1 2.4	How can we represent the properties of a data set visually?	3.1 Outliers 3.2 Box Plots 3.3 Cumulative Frequency 3.4 Histograms 3.5 Comparing Data	By the end of this topic, students should be able to... - identify outliers in data sets. - draw and interpret box plots. - draw and interpret cumulative frequency diagrams. - draw and interpret histograms. - compare two data sets.	Frequency Density Outlier	Unit 3 - Exercises from the Year 1 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
Correlation – Week 4 (11)							
2.2	In what ways can we use data to make predictions and associations?	4.1 Correlation 4.2 Linear Regression	By the end of this topic, students should be able to... - draw and interpret scatter diagrams for bivariate data. - interpret correlation and understand that it does not imply causation. - interpret the coefficients of a regression line equation for bivariate data. - understand when you can use a regression line to make predictions.	Bivariate Correlation Regression Line	Unit 4 - Exercises from the Year 1 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
Probability – Week 5-7 (12-14)							
3.1 3.2	How can probability	5.1 Calculating Probabilities 5.2 Venn Diagrams	By the end of this topic, students should be able to...	Venn	Unit 5 - Exercises from	Mathsbox,	Modelling relevance.

3.3	diagrams help us to model real-life events?	5.3 Mutually Exclusive and Independent Events	- calculate probabilities for single events. - draw and interpret Venn diagrams. - understand mutually exclusive and independent events, and determine whether two events are independent. - use and understand tree diagrams.	- Mutually Exclusive - Independent - Tree Diagram	the Year 1 Statistics and Mechanics Textbook and Practice Book by Pearsons	Pearson Textbook and Practice Book, Mathsgenie.	Statistical interpretations. Critical thinking in contextual problems. Construction of arguments. Data ethics
		5.4 Tree Diagram					
Term 3							
Statistical Distributions – Week 1-3 (15-17)							
4.1	How do we fully describe the probabilities of all outcomes in a sample space?	6.1 Probability Distributions	By the end of this topic, students should be able to... - understand and use simple discrete probability distributions including the discrete uniform distribution. - understand the binomial distribution as a model and comment on appropriateness. - calculate individual and cumulative probabilities for the binomial distribution.	- Probability Distribution - Binomial Distribution - Trial - Probability Mass Function	Unit 6 - Exercises from the Year 1 Statistics and Mechanics Textbook and Practice Book by Pearsons	Mathsbox, Pearson Textbook and Practice Book, Mathsgenie.	Modelling relevance. Statistical interpretations. Critical thinking in contextual problems. Construction of arguments. Data ethics
		6.2 The Binomial Distribution					
		6.3 Cumulative Probabilities					
Hypothesis Testing – Week 4-6 (18-20)							
5.1 5.2	How can we measure the accuracy of a prediction?	7.1 Hypothesis Testing	By the end of this topic, students should be able to... - understanding the language and concept of hypothesis testing. - understand that a sample is used to make inference about a population. - find critical values of a binomial distribution using tables. - carry out one and two-tailed tests for the proportion of the binomial distribution and interpret the results.	- Null Hypothesis - Significance - Critical Region	Unit 7 - Exercises from the Year 1 Statistics and Mechanics Textbook and Practice Book by Pearsons	Mathsbox, Pearson Textbook and Practice Book, Mathsgenie.	Modelling relevance. Statistical interpretations. Critical thinking in contextual problems. Construction of arguments. Data ethics
		7.2 Finding Critical Values					
		7.3 One Tailed Tests					
		7.4 Two Tailed Tests					

Statistics Revision							
Term 4 - MECHANICS							
Modelling in Mechanics – Week 1-3 (21-23)							
6.1 7.	What kinds of notation are important for modelling physical processes?	8.1 Constructing a Model 8.2 Modelling Assumptions 8.3 Quantities and Units 8.4 Working with Vectors	By the end of this topic, students should be able to... - understand how the concept of a mathematical model applies to mechanics. - understand and be able to apply some of the common assumptions used in mechanical models. - know SI units for quantities and derived quantities used in mechanics. - know the difference between scalar and vector quantities.	○ Simulate ○ Model ○ SI Units ○ Vector ○ Scalar ○ Magnitude ○ Displacement	Unit 8 - Exercises from the Year 1 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.
Constant Acceleration – Week 4-6 (24-26)							
7.2 7.3	How can we model situations involving constant acceleration?	9.1 Displacement-Time Graphs 9.2 Velocity-Time Graphs 9.3 Constant Acceleration Formulae 1 9.4 Constant Acceleration Formulae 2	By the end of this topic, students should be able to... - understand and interpret displacement-time graphs. - understand and interpret velocity-time graphs. - derive constant acceleration formulae and use them to solve problems, including those involving vertical motion under gravity.	○ Rate of Change ○ Gradient ○ Gravity ○ Acceleration ○ Particle	Unit 9 - Exercises from the Year 1 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 5							
Constant Accelerations – Week 1 (27)							
		9.5 Vertical Motion Under Gravity					
Forces and Motion – Week 2-6 (28-32)							
8.1 8.2	How should we model	10.1 Force Diagrams 10.2 Forces as Vectors	By the end of this topic, students should be able to...	○ Newtons Laws ○ Resultant	Unit 10 - Exercises from	Mathsbox,	

8.4 8.5	situations involving multiple forces?	10.3 Forces and Acceleration	- draw force diagrams and calculate resultant forces. - understand and use Newton’s first law. - calculate resultant forces by adding vectors. - understand and use Newton’s second law, $F = ma$. - apply Newton’s second law to vector forces and acceleration. - understand and use Newton’s third law. - solve problems involving connected particles.	$F=ma$ $W=mg$	the Year 1 Statistics and Mechanics Textbook and Practice Book by Pearsons	Pearson Textbook and Practice Book, Mathsgenie.	Modelling relevance. Critical thinking in contextual problems. Mathematical reasoning. Construction of arguments.
10.4 Motion in 2 Dimensions							
10.5 Connected Particles							
10.6 Pulleys							
Term 6							
Variable Acceleration – Week 1-4 (33-36)							
7.5 8.3	How can our knowledge of differentiation and integration help us in modelling real-life scenarios?	11.1 Functions of Time	By the end of this topic, students should be able to... - understand that displacement, velocity, and acceleration may be given as a function of time. - use differentiation to solve kinematics problem. - use calculus to solve problems involving maxima and minima. - use integration to solve kinematics problems. - use calculus to derive constant acceleration formulae.	ifferentiate egrate xima nima	Unit 11 - Exercises from the Year 1 Statistics and Mechanics Textbook and Practice Book by Pearsons	Mathsbox, Pearson Textbook and Practice Book, Mathsgenie.	Modelling relevance. Critical thinking in contextual problems. Mathematical reasoning. Construction of arguments.
		11.2 Using Differentiation					
		11.3 Maxima and Minima Problems					
		11.4 Using Integration					
		11.5 Constant Acceleration Formula					
Mechanics and Statistics End of Year Revision							