

Year 12/13 Core Maths Scheme of Work

This year Core maths ([AQA Level 3 in Mathematical Studies](#)) is being delivered as a component of the TechBach Qualification. It is being taught by one teacher so Topics have been listed in a possible teaching order but fine detail of when each topic will be finished by has been omitted so that the teacher has freedom to slow down or speed up depending on prior knowledge of the group.

In previous years we taught Core Maths split between two teachers and found that we had covered most of the content in the first year which gave us time to revisit topics that pupils struggled with. This scheme is designed to work in the same way, allowing greater flexibility for the teacher to select which topics to revisit in Year 2.

Core Maths Topics (2A Scheme – Statistical Techniques Optional Unit selected)	
All Units to be covered over the two-year course (links are hyperlinked to Integral Website)	
• Analysing critically • Estimation/Fermi estimates • Percentages • Exchanging currency • Finance - saving and borrowing • Finance - taxation • Exponential growth and decay • Motion graphs and the meaning of gradient • Numerical calculations and modelling (from CMSP resources) • Representing and interpreting data • Sampling • Types of variable, data and levels of measurement	
Half Term 1	• Analysing critically • Estimation/Fermi estimates
Half Term 2	• Percentages • Exchanging currency
Half Term 3	• Finance - saving and borrowing • Finance - taxation
Half Term 4	• Exponential growth and decay • Motion graphs and the meaning of gradient • Numerical calculations and modelling (from CMSP resources)
Half Term 5	• Representing and interpreting data
Half Term 6	• Sampling • Types of variable, data and levels of measurement

Paper 2A (Year 13)

3.4 Critical analysis of given data and models (including spreadsheets and tabular data)

Students will be expected to use the data and models they are given and to be mathematically critical of these.

C1 Presenting logical and reasoned arguments in context

	Content	Additional information
C1.1	criticising the arguments of others	

C2 Communicating mathematical approaches and solutions

	Content	Additional information
C2.1	summarising and report writing	

C3 Analysing critically

	Content	Additional information
C3.1	comparing results from a model with real data	
C3.2	critical analysis of data quoted in media, political campaigns, marketing etc	

In addition to the content presented in standard type within GCSE Mathematics criteria, students will be expected to draw on the mathematical content of analysis of data and maths for personal finance.

In critical analysis, questions will concentrate on the analysis of numerical and graphical data. Numerical data will usually be given in spreadsheet or tabular form.

3.5 The Normal Distribution

S1 Properties of the normal distribution

	Content	Additional information
S1.1	knowledge that this is a symmetrical distribution and that the area underneath the normal 'bell' shaped curve represents probability	knowledge that approximately $\frac{2}{3}$ of observations lie within 1 standard deviation of the mean and that approximately 95% of observations lie within 2 standard deviations of the mean

S2 Notation

	Content	Additional information
S2.1	use of the notation $N(\mu, \sigma^2)$ to describe a normal distribution in terms of mean and standard deviation	use of the notation $N(0, 1)$ for the standardised normal distribution with mean = 0 and standard deviation = 1

S3 Calculating probabilities

	Content	Additional information
S3.1	using a calculator or tables to find probabilities for normally distributed data with known mean and standard deviation	the finding of an unknown mean or standard deviation by making use of percentage points will not be required

3.6 Probabilities and estimation

S4 Population and sample

	Content	Additional information
S4.1	understanding what is meant by the term 'population' in statistical terms	
S4.2	developing ideas of sampling to include the concept of a simple random sample from a population	

S5 The mean of sample size n

	Content	Additional information
S5.1	knowing that the mean of a sample is called a 'point estimate' for the mean of the population	appreciating that accuracy is likely to be improved by increasing the sample size

S6 Confidence intervals

	Content	Additional information
S6.1	confidence intervals for the mean of a normally distributed population of known variance using σ^2/n	confidence intervals will always be symmetrical the confidence level required and the sample size will always be stated

3.7 Correlation and regression

S7 Correlation

	Content	Additional information
S7.1	recognising when pairs of data are uncorrelated, correlated, strongly correlated, positively correlated and negatively correlated	the laws of logarithms will not be required
S7.2	appreciating that correlation does not necessarily imply causation	
S7.3	understanding the idea of an outlier	identifying and understanding outliers and make decisions whether or not to include them when drawing a line of best fit

S8 The product moment correlation coefficient (pmcc)

	Content	Additional information
S8.1	understanding that the strength of correlation is given by the pmcc	knowing that the gradient at any point on the graph of $y = e^x$ is equal to the y value of that point
S8.2	understanding that pmcc always has a value in the range from -1 to $+1$	
S8.3	appreciating the significance of a positive, zero or negative value of pmcc in terms of correlation of data	

S9 Regression lines

	Content	Additional information
S9.1	the plotting of data pairs on scatter diagrams and the drawing, by eye, of a line of best fit through the mean point	the idea of residuals will not be required
S9.2	understanding the concept of a regression line	
S9.3	plotting a regression line from its equation	
S9.4	using interpolation with regression lines to make predictions	
S9.5	understanding the potential problems of extrapolation	

S10 Calculations

	Content	Additional information
S10.1	where raw data is given, students will be expected to use a calculator to calculate the pmcc and the equation of the regression line	calculations from grouped data will not be required

Scheme of assessment

Find past papers and mark schemes, and specimen papers for new courses, on our website at aqa.org.uk/pastpapers

This specification is designed to be taken over two years with all assessments taken at the end of the course. Level 3 Certificate Mathematical Studies exams and certification for this specification are available for the first time in May/June 2016 and then every May/June for the life of the specification.

This is a linear qualification. In order to achieve the award, students must complete all exams in May/ June in a single year. All assessments must be taken in the same series.

All exams in mathematics must include questions that allow students to draw on elements from within and across different topic areas, and questions that allow students to provide extended responses.

All materials are available in English only.

Aims

This Level 3 Certificate Mathematical Studies qualification will consolidate students' mathematical understanding, build their confidence and competence in applying mathematical techniques to solve a range of problems and introduce them to new techniques and concepts that will prepare them for further study and future employment within a broad range of academic, professional and technical fields.

Mathematical Studies aims to prepare students for the mathematical demands of higher education and work where there is a distinct mathematical or statistical element, but where the mathematical demands do not stretch to a requirement for A-level Mathematics.

A course of study leading to this qualification should enable students to:

- study a mathematics curriculum that is integrated with other areas of their study, work or interest leading to the application of mathematics in these areas
- develop mathematical modelling, evaluating and reasoning skills
- solve problems some of which will not be well defined and may not have a unique solution
- solve substantial and real life problems encountered by adults
- use ICT as an exploratory tool for developing mathematical understanding and when solving problems
- develop skills in the communication, selection, use and interpretation of their mathematics
- enjoy mathematics and develop confidence in using mathematics.

Assessment objectives

The assessment objectives (AOs) have been set by AQA under guidance from the Department for Education and Ofqual.

The exams will measure how students have achieved the following assessment objectives.

AO1: Use and apply standard techniques

Students should be able to:

- accurately recall facts, terminology and definitions
- accurately carry out set tasks in contexts requiring single- and multi-step solutions.

AO2: Select appropriate techniques to solve problems in a mathematical or non-mathematical context and analyse data and represent situations mathematically

Students should be able to:

- select the mathematics required to solve a problem
- analyse data and/or given information in order to draw conclusions
- represent situations mathematically.

AO3: Devise strategies to solve problems where the method is not obvious and communicate processes and results

Students should be able to:

- devise strategies to solve problems where the method is not obvious
- make realistic assumptions to enable solutions to be obtained
- evaluate the reasonableness of a solution
- communicate clearly using appropriate mathematical notation, language and diagrammatic representation.

The balance of the assessment objectives may not be equal on each paper.

Weighting of assessment objectives for Level 3 Certificate Mathematical Studies

Assessment objectives (AO)	Component weightings (approx. %)		Overall Weighting (approx. %)
	Paper 1	Paper 2	
AO1	25 - 30	25 - 30	25 - 30
AO2	31 – 40	31 – 40	31 – 40
AO3	31 - 40	31 - 40	31 - 40
Overall weighting of components	50	50	100

Assessment weightings

The marks awarded on the papers will be scaled to meet the weighting of the components. Students' final marks will be calculated by adding together the scaled marks for each component. Grade boundaries will be set using this total scaled mark. The scaling and total scaled marks are shown in the table below.

Component	Maximum raw mark	Scaling factor	Maximum scaled mark
Paper 1	60	X 1	60
Paper 2A	60	X 1	60
Total scaled mark			120