

Mathematics

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

Year 13 Level 3 Mathematical Studies (Core Maths)

Term One

Content of study	<i>Mathematical Studies</i>
What are the aims and objectives of this term?	2.20 Alcohol – Friend or Foes? Critical Analysis 2.21 Misleading Claims Critical Analysis 2.26 Are birthdays good for your health? Correlation and Outliers 2.27 The old wine is the best wine Correlation – PMCC
What previous knowledge is required?	2.20 N7 calculate with roots, and with integer indices A12 recognise, sketch and interpret graphs of linear functions, quadratic 2.26 A9 plot graphs of equations that correspond to straight-line graphs in the coordinate plane A12 recognise, sketch and interpret graphs of linear functions, quadratic 2.27 S6 use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions. S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)

How will this term's content help with future learning?	<i>The content covered this term will support future learning on regression lines (in term 2) and efforts on exam style questions on Critical analysis.</i>
Resources	- Tutorial videos for all topics and interactive questions available at www.hegartymaths.com. All students provided with an account - Students are provided with Exam style questions in their assessment folders. - All classroom resources are published onto teams
Links to the national curriculum/specification	2.20 C1.1 Criticising the arguments of others C2.1 Summarising and report writing C3.1 Comparing results from a model with real data C3.2 Critical analysis of data quoted in media, political campaigns, marketing etc 2.21 C1.1 Criticising the arguments of others C2.1 Summarising and report writing C3.2 Critical analysis of data quoted in media, political campaigns, marketing etc Knowing and using the mathematical content of analysis of data 2.26 S7.1 Recognising when pairs of data are uncorrelated, correlated, strongly correlated, positively correlated and negatively correlated S7.2 Appreciating that correlation does not necessarily imply causation S7.3 Understanding the idea of an outlier; identifying and understanding outliers and making decisions whether to include them when drawing a line of best fit 2.27 S8.1 Understanding that the strength of correlation is given by the PMCC S8.2 Understanding that the PMCC always has a value in the range -1 to 1 S8.3 Appreciating the significance of a positive, zero or negative value of PMCC in terms of correlation of data S10.1 Using a calculator to calculate the PMCC of raw data
Assessments	<i>Critical Analysis unit assessment in week 7</i>
Term Two	
Content of study	<i>Mathematical Studies</i>
What are the aims and objectives of this term?	2.22 Consumer protection for packaged goods Normal distribution 2.23 Am I normal? Normal distribution – calculating probabilities 2.24 Poker Hands Sampling 2.28 Apportioning blame in traffic accidents Regression lines

What previous knowledge is required?	2.22 S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (median, mean, mode and modal class) N12 interpret fractions and percentages as operators P1 record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees S3 construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use 2.23 N12 and P1 see above A12 recognise, sketch and interpret graphs of linear functions, quadratic 2.24 S1 infer properties of populations or distributions from a sample, while knowing the limitations of sampling 2.28 S6 use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends while knowing the dangers of so doing A12 recognise, sketch and interpret graphs of linear functions, quadratic A2 substitute numerical values into formulae and expressions, including scientific formulae
How will this term's content help with future learning?	<i>The content covered this term will support future learning on Confidence intervals (in term 3) and efforts on exam style questions on Statistical techniques.</i>
Resources	• Tutorial videos for all topics and interactive questions available at www.hegartymaths.com. All students provided with an account • Students are provided with Exam style questions in their assessment folders. • All classroom resources are published onto teams
Links to the national curriculum/specification	2.22 S1.1 Knowledge that the normal distribution is a symmetrical distribution and that the area underneath the normal 'bell' shaped curve represents probability. Knowledge that approximately 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 2.23 S2.1 Use of the notation $N(\mu, \sigma^2)$

	to describe a normal distribution in terms of mean and standard deviation and use of the notation $N(0,1)$ for the standardised normal distribution with mean=0 and standard deviation=1 S3.1 Using a calculator or tables to find probabilities for normally distributed data with known mean and standard deviation. 2.24 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 and a systematic sample 2.28 S9.1 Plotting data pairs on scatter diagrams and drawing, by eye a line of best fit through the mean point 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 S10.1 Use a calculator to calculate the equation of the regression line
Assessments	Statistical techniques unit assessment in week 6
Term Three	
Content of study	Mathematical Studies
What are the aims and objectives of this term?	2.25 Quality Control Confidence intervals
What previous knowledge is required?	2.25 Knowledge gained from chapters 2.22 and 2.23 will be need for this chapter: - Understanding the shape of the normal distribution curve - Understanding tables to find probabilities from any normal distribution - Calculating the mean and standard deviation
How will this term's content help with future learning?	The content covered this term will support the efforts on exam style questions on Statistical techniques.
Resources	- Tutorial videos for all topics and interactive questions available at www.hegartymaths.com. All students provided with an account - Students are provided with Exam style questions in their assessment folders. - All classroom resources are published onto teams
Links to the national curriculum/specification	2.25 S5.1 Knowing that the mean of a sample is called a 'point estimate' for the mean of the population; appreciating that the accuracy is likely to be improved by increasing the sample size S6.1 Confidence intervals for the mean of a normally distributed population of known variance using $\frac{s}{\sqrt{n}}$

	<i>; confidence intervals will be symmetrical, the confidence level required and the sample size will be stated.</i>
Assessments	<i>Statistical techniques unit assessment in week 6</i>
Term Four	
Content of study	<i>Mathematical Studies</i>
What are the aims and objectives of this term?	Revision for external exams Following the release of the preliminary materials on 1st March, the teachers concerned will work alongside students to create a bank of possible exam questions based on these materials which the group will then work through. In addition to engaging with these questions, time will be spent researching the topics covered by the preliminary materials and exploring all mathematical connections in preparation for the exam.
What previous knowledge is required?	All topics which have been covered over the course
How will this term's content help with future learning?	<i>The content covered this term will support the efforts on exam style questions. Initially focusing on Paper 1 content, namely Personal finance, Data Analysis and Estimation.</i>
Resources	• Tutorial videos for all topics and interactive questions available at www.hegartymaths.com. All students provided with an account • Students are provided with Exam style questions in their assessment folders. • All classroom resources are published onto team
Links to the national curriculum/specification	<i>The content covered this term will link will each aspect of the curriculum.</i>
Assessments	<i>All Gap analyses from previous end of unit tests and formal internal examinations will be used to tailor a revision schedule for each student. In class teacher will model solutions for questions which were highlighted as an area of weakness and provide students with further questions to aid learning and assessment new understandings.</i>
Term Five	
Content of study	<i>Mathematical Studies</i>
What are the aims and objectives of this term?	Revision for external exams Following the release of the preliminary materials on 1st March, the teachers concerned will work alongside students to create a bank of possible exam questions based on these materials which the group will then work through. In addition to engaging with these questions, time will be spent researching the topics covered by the preliminary materials and exploring all mathematical connections in preparation for the exam. <i>Exam dates:</i> 8th May – Paper 1 14th May – Paper 2
What previous knowledge is required?	All topics which have been covered over the course

How will this term's content help with future learning?	<i>The content covered this term will support the efforts on exam style questions. Initially focusing on Paper 1 content, namely Personal finance, Data Analysis and Estimation.</i>
Resources	• Tutorial videos for all topics and interactive questions available at www.hegartymaths.com. All students provided with an account • <i>Students are provided with Exam style questions in their assessment folders.</i> • <i>All classroom resources are published onto team</i>
Links to the national curriculum/specification	<i>The content covered this term will link will each aspect of the curriculum.</i>
Assessments	<i>All Gap analyses from previous end of unit tests and formal internal examinations will be used to tailor a revision schedule for each student. In class teacher will model solutions for questions which were highlighted as an area of weakness and provide students with further questions to aid learning and assessment new understandings.</i>