PREREQUISITE KNOWLEDGE & SKILLS *The foundations needed to thrive in this subject.*	**Who should study this subject?** Mathematics is, inherently, a sequential subject. There is a progression of material through all levels at which the subject is studied. It is assumed that students will already have confidence and competence in the content presented in standard type within the GCSE mathematics criteria. Students will make use of elements of this content when addressing problems within this Level 3 Certificate Mathematical Studies specification but this is not explicitly set out in subject content. This Level 3 Certificate Mathematical Studies specification aims to build on the knowledge, understanding and skills established in GCSE mathematics. Core Maths has been developed for students who wish to: - Continue your studies and experience of mathematics beyond GCSE - Explore real world applications of maths, including financial calculations such as income tax, inflation, mortgages and loans - Develop the increasingly important skill of critical analysis of data - Recognised and highly regarded by universities - Gain a qualification equivalent to an AS level in UCAS tariff points - Fits in well with subjects such as Accounting, Biology, Geography, Psychology, Business Studies and Economics, or as a standalone qualification to broaden and enrich your Level 3 studies **St George's course entry requirements:** Sixth Form Entry Requirements only
QUALIFICATION *Exam Board, aims and objectives.*	**A Level Mathematics, Edexcel** https://www.aqa.org.uk/subjects/mathematics/aqa-certificate/mathematical-studies-1350/specification-at-a-glance
ASSESSMENT *Internal monitoring and final assessment.*	**External Assessment** • Two exams, 1 hour 30 minutes each **at the end of Year 12** • Both exams allow use of a calculator • Preliminary material released on 1 March • Qualification is graded from A – E Content Paper 1 covers topics on personal finance, analysis of data and estimation techniques Paper 2 Option A: Statistical techniques **Internal Assessment** Mock examination at Christmas
ENRICHMENT *Trips & Visits, wider reading, etc.*	**Visits and Events:** ● University of Hertfordshire Problem Solving Workshops ● Mathsfest ● More or Less on BBC Radio 4 https://www.bbc.co.uk/programmes/b006qshd **Wider reading:** Lots of wider reading suggestions can be found here: https://reflectivemaths.wordpress.com/wp-content/uploads/2022/06/core-maths-recommended-reading-list-2022.pdf ● The Art of Statistics by David Spiegelhalter ● Math on Trial by Coralie Colmez and Leila Schneps

	- [Factfulness](#) by Hans Rosling - [The Undercover Economist](#) by Tim Harford - [Why do Buses Come in Threes?](#) by Rob Eastaway - [Maths on the back of an Envelope](#) by Rob Eastaway - available to pre-order now! - [The Life Changing Magic of Numbers](#) by Bobby Seagull - [Invisible Women](#) by Caroline Criado Perez - [The Perils of Perception](#) by Bobby Duffy - [Humble Pi](#) by Matt Parker
NEXT STEPS *Where this subject can take you.*	Core Maths is an ideal course for students who wish to support their other A Level subjects and enhance them with more mathematical study, or students who wish to complement their A Level studies with some maths. The content within the course will benefit students for life skills and transferable skills for the workplace, university study and beyond. **Related University Courses:** Core Maths will enhance many courses of university study. Some universities show their recognition of the importance of level 3 maths qualifications through the admissions information on their websites for some degree courses. The following universities make alternative offers to students with Core Maths qualifications, who apply for some of their degree courses. - Aston University - University of Bath - University of Essex - University of Exeter - University of Huddersfield - Keele University - Lancaster University - University of Leeds - University of Sheffield - University of York These universities recognise the benefits students gain from taking Core Maths, which will not only support their university studies, but also their future career and employment. Other universities, whilst not making formal reduced offers, do offer strong encouragement for the study of Core Maths and recognise its usefulness in preparation for their degree courses. For example: https://amsp.org.uk/universities/university-admissions/alternatives-admissions/ **Career Paths:** Mathematics is contained and used within a wide variety of careers, it opens doorways to careers within Accounting, Engineering, Technology and Zoology, to name a few. As a consequence, it can be considered as one of the most useful, diverse and powerful subjects that can be taken at this level.

	Year 12	
Autumn Term	D1 Data	

	Content	Additional information

	Content	Additional information
D1.1	appreciating the difference between qualitative and quantitative data	including the difference between discrete and continuous quantitative data
D1.2	appreciating the difference between primary and secondary data	including the use of secondary data that have been processed eg grouped
D1.3	collecting quantitative and qualitative primary and secondary data	

D2 Collecting and sampling data

	Content	Additional information
D2.1	inferring properties of populations or distributions from a sample, whilst knowing the limitations of sampling	
D2.2	appreciating the strengths and limitations of random, cluster, stratified and quota sampling methods and applying this understanding when designing sampling strategies	appreciating that improving accuracy by removing bias and increasing sample size may cost/save both time and money

D3 Representing data numerically

	Content	Additional information
D3.1	calculating/identifying mean, median, mode, quartiles, percentiles, range, interquartile range, standard deviation	either from raw data or from cumulative frequency diagrams, stem-and-leaf diagrams or box plots
D3.2	interpreting these numerical measures and reaching conclusions based on these measures	

D4 Representing data diagrammatically

	Content	Additional information

	Content	Additional information
D4.1	constructing and interpreting diagrams for grouped discrete data and continuous data, knowing their appropriate use and reaching conclusions based on these diagrams	including histograms with equal and unequal class intervals and cumulative frequency graphs, box and whisker plots, stem-and-leaf diagrams (including back-to-back)

3.2 Maths for personal finance

Students will be expected to develop and demonstrate confidence and competence in the understanding and application of the following calculations in the solution of problems relating to personal finance.

F1 Numerical calculations

	Content	Additional information
F1.1	**substituting numerical values into formulae, spreadsheets and financial expressions**	**including bank accounts**
F1.2	**using conventional notation for priority of operations, including brackets, powers, roots and reciprocals**	
F1.3	**applying and interpreting limits of accuracy, specifying simple error intervals due to truncation or rounding**	
F1.4	**finding approximate solutions to problems in financial contexts**	

F2 Percentages

	Content	Additional information
F2.1	**interpreting percentages and percentage changes as a fraction or a decimal and interpreting these multiplicatively**	
F2.2	**expressing one quantity as a percentage of another**	

	Content	Additional information
F2.3	comparing two quantities using percentages	
F2.4	working with percentages over 100%	
F2.5	solving problems involving percentage change	including percentage increase/decrease and original value problems including simple and compound interest

F3 Interest rates

	Content	Additional information
F3.1	simple and compound interest	Annual Equivalent Rate (AER)
F3.2	savings and investments	

F4 Repayments and the cost of credit

	Content	Additional information
F4.1	student loans and mortgages	Annual Percentage Rate (APR)

F5 Graphical representation

	Content	Additional information
F5.1	graphical representation	plotting points to create graphs and interpreting results from graphs in financial contexts

F6 Taxation

	Content	Additional information
F6.1	income tax, National Insurance, Value Added Tax (VAT)	

F7 Solution to financial problems

	Content	Additional information
F7.1	the effect of inflation	Retail Price Index (RPI), Consumer Price Index (CPI)
F7.2	setting up, solving and interpreting the solutions to financial problems, including those that involve compound interest using iterative methods	
F7.3	currency exchange rates including commission	
F7.4	budgeting	

3.3 Estimation

Students should become familiar with and gain confidence in ideas concerning the formulation of mathematical models.

E1 The modelling cycle

	Content	Additional information
E1.1	representing a situation mathematically, making assumptions and simplifications	students will engage in the tackling of 'open' mathematical problem-solving where there may not be a clear single approach or 'correct' answer
E1.2	selecting and using appropriate mathematical techniques for problems and situations	
E1.3	interpreting results in the context of a given problem	
E1.4	evaluating methods and solutions including how they may have been affected by assumptions made	

E2 Fermi estimation

	Content	Additional information

E2.1	**making fast, rough estimates of quantities which are either difficult or impossible to measure directly**	

In estimation, questions could draw upon all the content of paper 1 and the content presented in standard type within GCSE mathematics criteria.

Spring Term

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

Students should be able to recognise that many things closely follow a Normal Distribution, eg heights of people, size of things produced by machines, errors in measurements, blood pressure, marks on a test etc. In these and similar situations, a graph of the distribution will have a 'bell' shaped curve.

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 23 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 $N(\mu,\sigma2)$ 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 $\sigma2n$	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	
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	

	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**

Summer Term	**Revision and Examination**