Curriculum Map: Core Maths (AQA Mathematical Studies)

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Content Declarative knowledge 'I Know'	**Personal Finance 1** • Budgeting • Income and National insurance tax • Controlling debt • APR/AER **Analysis of Data** • Data and sampling • Averages • Measures of spread • Box and whisker plots • Cumulative frequency • Histograms	**Personal Finance 2** • Mortgages • Savings and investments • VAT and other percentages • Exchange rates • Inflation **Modelling and Estimation** • Modelling • Standard form • Estimation techniques • Useful facts and formulae	**The Normal Distribution** • Features of a normal distribution • The standard normal distribution • Calculating probabilities **Critical Path Analysis** • Networks and algorithms • Activity networks • Critical activities • Gantt charts (cascade diagrams)	**Option 1 – Correlation and Regression** • Lines of best fit • Regression lines • Pearson's product moment correlation coefficient **Option 2 – Expectation** • Venn diagrams • Equally likely events • Probability • Tree diagrams • Conditional probability • Expected value **Option 1 – Confidence Intervals** • Quality control • The sample mean • Confidence intervals **Option 2 – Cost- benefit Analysis** • Cost benefit principle • Control measures and uncertainty • Insurance myths	**Critical Path Analysis** • Clarity • Selectivity of data • Sampling and trialling • Misleading with data • Critical analysis of models **Revision**	**Public Exams**
Skills Procedural Knowledge 'I know how to'	**Personal Finance 1** • Budget and manage flows of money. • Interpret pay slips. • Work out income tax for both low and high earners. • Work out National insurance tax for both low and high earners. • Work out student loan repayments. • Work out APR using the given formula.	**Personal Finance 2** • Work out how long a mortgage will take to be paid off. • Find outstanding mortgage balances at different points throughout a payment plan. • Work out the price of a product before and after VAT is added. • Convert between different currencies. • Understand the concept of inflation and the effects these can have on goods and services.	**The Normal Distribution** • Understand the features of a normal distribution and how this can be used to model real life situations. • Sketch a normal distribution from its standard deviation and mean. • Use the standard normal distribution and a calculator/table of values to work out probabilities. • Work out a standardised score and use this to help calculate probabilities.	**Option 1 – Correlation and Regression** • Understand how to plot a scatter graph. • Describe the correlation by eye and interpret what this means. • Find and plot the plotted mean to help with the accuracy of the line of best fit. • Use a calculator to find the line of regression. • Plot the line of regression and understand what this means in context.	**Critical Path Analysis** • Understand how to summarise and write reports. • Compare results from a model with real data. • Critically analyse data-related quotes in the media, political campaigns and marketing.	

• Work out the value of an instalment when paying back a loan. • Calculate the AER of an investment. • Work out the interest accumulated knowing the AER or nominal rate. **Analysis of Data** • The advantages and disadvantages of different sampling techniques. • Describe different sampling techniques and when they should be used. • Define different data terms. • Work out different averages. • Represent data in a stem and leaf diagram. • Work with the inter-quartile range, range, and standard deviation. • Construct and interpret box and whisker plots. • Find averages from a frequency table. • Construct and interpret a cumulative frequency diagram. • Construct and interpret histograms.	**Modelling and Estimation** • Using familiar quantities, or quantities that are easier to estimate, answer real life estimation questions. • Work with putting very large and very small numbers in and out of standard form. • State assumptions you are making whilst answering an estimation style question.	**Critical Path Analysis** • Represent compound projects by activity networks. • Use early time and late time algorithms to identify critical activities and find the critical path(s). • Use Gantt charts to present project activities.	• Use the equation of a regression line to predict information. • Use a calculator to calculate Pearson's Moment Correlation Coefficient and understand what this means in context. **Option 2 – Expectation** • Understand how to construct a Venn diagram to represent a given set of data. • Understand how to read probabilities from a Venn diagram including when notation is used. • Understand how to construct a tree diagram. • Understand how to calculate probabilities from a tree diagram, including the use of notation. • Understand how to calculate conditional probabilities. • Understand how to estimate probabilities and expected outcomes. **Option 1 – Confidence Intervals** • Be able to work out the standard error. • Understand the term confidence intervals and how they can be used to give a range of possibilities rather than a single point estimate. • Be able to construct confidence intervals. **Option 2 – Cost-benefit Analysis** • Use the cost-benefit principle to work out if taking an action will result in a benefit greater than the cost. • Understand how to manage risk by taking steps called control measures.		

Strategies	Personal Finance 1	Personal Finance 2	The Normal Distribution	Option 1 – Correlation and Regression	Critical Path Analysis	
Conditional Knowledge 'I know when to'	**Personal Finance 1** • Apply the correct method of finding insurance (income or national insurance) and when one/both isn't necessary in certain scenarios. • The difference between APR and AER and when they should be calculated. • The difference between working out a single instalment, the total loan, or the APR. • Use bounds to work out the maximum/minimum amount earned in a savings account. **Analysis of Data** • Apply a certain sampling technique and why it may be more appropriate than another. • Use different averages, and why one may be more appropriate than another. • Use a different measure of spread, and why one may be more appropriate than another. • Use different forms of analysing and presenting data, and why some may be more appropriate than others.	**Personal Finance 2** • The difference between working out a mortgage repayment and the remaining balance of a mortgage. • Work out the original amount knowing VAT has been added or the new amount given the VAT. • Work between different currencies in a problem-solving context. **Modelling and Estimation** • Apply different modelling techniques to provide as accurate an estimation calculation as possible. • Apply a variety of skills (potentially learned at GCSE) in different contexts to allow for as accurate answers as possible. • State any assumptions made during an estimation calculation.	**The Normal Distribution** • Standardise scores and how this can be used to find probabilities when a variable is normally distributed. • Sketch a normal distribution, and how this can be helpful when working out different proportions/probabilities from the curve. • Use your table of probabilities to work backwards to find the correct value, given the probability. **Critical Path Analysis** • Know when to apply suitable activity networks to different situations.	**Option 1 – Correlation and Regression** • Describe and analyse correlation in the context of the question, including using the PMCC. • Use the equation of a regression line to predict results. • Use the line of best fit to predict results. • Use the plotted mean to make the line of best fit/regression line as accurate as possible. **Option 2 – Expectation** • Know when to apply ideas of randomness, fairness, and equally likely outcomes to calculate expected outcomes. • Know when to apply Venn diagrams and simple tree diagrams. • Know how to apply set notation. **Option 1 – Confidence Intervals** • Know how to apply different levels of confidence intervals to different sized samples. **Option 2 – Cost Benefit Analysis** • Know what actions can be taken to reduce or avoid specific risks and understand that these actions may have their own costs. • Know when to use probabilities to help calculate expected values for costs and benefits of decisions.	**Critical Path Analysis** • Know when data and information from the media is reliable including the analysis of resources and statements. • Use a variety of skills from GCSE maths as well as skills from personal finance to analyse data, including in spreadsheets.	

Key Questions	Personal Finance 1	Personal Finance 2	The Normal Distribution	Option 1 – Correlation and Regression	Critical Path Analysis
	Personal Finance 1 1) Sam works 20 hours a week at £10.50 per hour. He wants to save £800 for a holiday. He pays only national insurance and income tax. What fraction of his earnings would he have to save if he wanted to save £800 in total in 6 months? 2) Andrew wants to borrow £1500. A lender offers him a loan on the basis that he repays in three equal instalments. The APR is advertised at 7.5%. How much would each of Andrew's instalments be? 3) Paul put some money in a savings account at 4% compound interest (rounded to the nearest per cent). What is the minimum amount of money he can make in 4 years? **Analysis of Data** 1)100 children between the ages of 11 and 15 were asked how much sugar they consumed on a typical day. Draw a suitable frequency diagram to represent this data. 	Amount of sugar, s (grams)	Frequency
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$0 \leqslant s < 40$	12
$40 \leqslant s < 60$	18
$60 \leqslant s < 70$	23
$70 \leqslant s < 80$	27
$80 \leqslant s < 120$	20		**Personal Finance 2** 1) Sarah and her partner would like to buy a house which is on the market for £250,000. They have a joint income of £70,000 and have savings of £40,000. They can borrow up to 3.5 times their joint income from their mortgage lender. a) How much deposit will they need? b) What percentage of the purchase price will this be? 2) A set of textbooks cost £300 including 20% VAT. What was the price of the books before VAT was added? **Modelling and Estimation** 1) Estimate the number of times a person blinks in a year. State any assumptions you make.	**The Normal Distribution** 1) The scores in a test are normally distributed with a mean of 70 marks and a standard deviation of 6 marks. a) What is the probability that a student picked at random scored more than 75 marks? b) 26% of students passed the test. What mark was the pass mark? c) 15 students scored more than 78 marks. How many students took the test in total? **Critical Path Analysis** 1) Paul is getting ready to go to school. In the table below, list at least six separate activities this might involve. For each activity, indicate its likely duration and state the immediate preceding activities. | Activity	Immediate predecessor	Duration (minutes)
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				Option 1 – Correlation and Regression 1) Complete the scatter graph. 2) Calculate the regression line and plot this on your scatter graph. 3) Use your regression line to predict …. 4) Calculate the PMCC for a new set of data. What does this mean in context? **Option 2 – Expectation** 1) 80 students in Year 4 are asked about whether they like sharks, crocodiles or hippos. • All 80 students like at least 1 of the animals. • 15 students like all 3 animals. • 14 students like sharks and crocodiles, but do not like hippos. • 23 students like crocodiles and hippos. • 21 students like sharks and hippos. • 44 students like crocodiles. • 12 students like only sharks. Draw a Venn diagram to show the above information. **Option 1 – Confidence Intervals** Human body temperature can be modelled by a normal distribution with a mean of 36 degrees and a variance of 2 degrees. Construct a 90% confidence interval. **Option 2 – Cost Benefit Analysis** Martha is considering buying a car. She has decided on a particular model of car and has several options for buying it. Analyse the options below and advise Martha on the best option and the expected cost.	**Critical Path Analysis** 1) A headline in a local newspaper ran 'Transport costs increase by less than 25% between 2012 and 2015'. Using the data in the previous table, determine whether the headline was justified. 2) A second headline ran 'Visiting the cinema is cheaper than it has ever been'. Using the data given in the table, critically analyse this statement.	

Assessment topics			PPE for Paper 1		PPEs for Paper 1 and Paper 2		
Cross curricular links/ Character Education	**Personal Finance 1** • Tax and APR are topics regularly seen in Economics and Business. **Analysis of Data** • Sampling techniques are used in Psychology as a way in which researchers obtain participants in a study. Students must be able to analyse which sampling method is the most appropriate and why. • The analysis of graphs and the decision to pick an appropriate graphical representation is used regularly in Geography, for example representing unemployment in human geography or rainfall in physical geography.	**Personal Finance 2** • Ideas of appreciation and depreciation are important when thinking about investments (including pension funds), the value of cars, houses and other major purchases including those made by businesses. **Modelling and Estimation** • Standard form is used in Science to write very large or small numbers; it is also called scientific notation. • Estimation is included in the requirements for Biology, Chemistry, Psychology, Geography, Geology, and Environmental Science A levels.	**The Normal Distribution** • The Normal distribution is used as a model in Biology and Psychology; related distributions are used in Economics. **Critical Path Analysis** • Gantt charts are used in ICT/Computer Science A Levels to help plan out and track specific tasks in a project.		**Option 1 – Correlation and Regression** • Understanding the relationship between two variables is used in Geography, Biology and Business. **Option 2 – Expectation** • An understanding of conditional probability is important in both medicine and law and is therefore used in both Business/Economics A levels and in Biology/Chemistry A levels. **Option 2 – Cost Benefit Analysis** • Understanding risk is important in both Business and Science A levels. • Making decisions to do with risk is connected to Psychology, Business and Economics.	**Critical Path Analysis** • Being able to critically evaluate statements is important in English and Media A levels. • Being able to analyse and create valid arguments is key across many A levels, including Business and Economics.	