

## Core Maths

**Welcome to Newman 6th Maths department!** Thank you for choosing to study Core Maths (AQA Level 3 Certificate in Mathematical Studies) as your future pathway in our sixth form. Core Maths is a course for the maths you will use everyday and it is the application and interpretation of the maths you met at GCSE. At Newman 6th, you will have 5 lessons a fortnight and you will sit an exam at the end of Year 12.

Core Maths must be taken seriously as there are numerous benefits to studying this course; the skills developed in the study of Core Maths are increasingly important in the workplace and higher education. Also, taking Level 3 Core Maths, as a future pathway, can result in receiving alternative offers from many universities (University of Bath, University of Sheffield and many more). Below is an excerpt from the University of Sheffield website;

From September 2019, if we offer you a place on certain courses with a GCSE Maths requirement, and you're taking one of the following Core Maths qualifications, we'll make you an alternative offer equivalent to one A Level grade below the standard entry requirements for your course, subject to you achieving a specific grade in Core Maths.

- AQA Level 3 Certificate Mathematical Studies

So, as we now know how important it is to do well in Core Maths, we want to help you bridge the gap from wherever you may be up to at GCSE, to the point where you can make a smooth transition into the Level 3 Mathematical Studies course.

We hope you enjoy the first of these Bridging Tasks and find it useful in your progression from GCSE to AS-Level and beyond! To give you an insight to the course, here are some aspects you can expect to study:

### **1. Representing and Interpreting Data**

This section is about comparing and interpreting data and being able to justify and explain which set of data is 'better' and doing so in context.

### **2. Maths for Personal Finance**

This section is about the maths most adults say they wish they learnt at school. You will learn how to calculate income tax, national insurance, student loan repayments. You will start to understand AER and APR. This section will mostly be applying the percentages used throughout GCSE Maths.

### **3. Fermi Estimation**

"How many hairs on the average human's head?"

"How many chips are stolen by seagulls in Torquay in the summer months?"

This section is about getting a 'rough' answer to a calculation you will never get the exact answer to! The questions above cannot have an exact answer – there are too many factors involved. In a group of 20 people, there could be 20 different answers, each of which would be correct if you can state the assumptions you make and justify YOUR calculations.

Watch this video to see how these sorts of calculations work and why they are called Fermi Estimations:

<https://ed.ted.com/lessons/michael-mitchell-a-clever-way-to-estimate-enormous-numbers>

#### 4. Critical Analysis of Data

“81.6% of all statistics are made up on the spot!”

This section is about being able to look behind the statistics, graphs and claims made in the media and being able to unpick whether the graph or claim is valid.

“3 Ways To Spot A Bad Statistic”

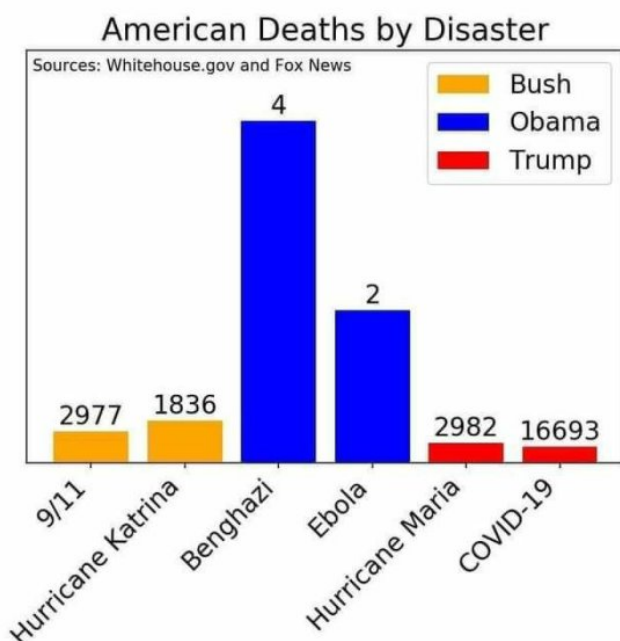
[https://www.ted.com/talks/mona\\_chalabi\\_3\\_ways\\_to\\_spot\\_a\\_bad\\_statistic/footnotes?c=207625](https://www.ted.com/talks/mona_chalabi_3_ways_to_spot_a_bad_statistic/footnotes?c=207625)

- The graphs below are actually from News and Media outlets around the world on Coronavirus Covid-19.
- What is wrong with them? What do you think they are trying to convey with these graphs?

#### a) This graph was projected by channel FOX31 (United States)



#### b) This bar chart was shown on FOX News and apparently projected by the White House



As you can see, data is an important part of Core Maths, and so we need to ensure your knowledge of handling data from GCSE is up to standard. If you are comfortable with these topics, you will have a solid grounding in Core Maths and be well on your way to achieving the best outcome. So, for the first phase of this bridging unit, we will focus only on data topics which appear frequently in the Core Maths exam.

## Task

Below are some videos on Data from Corbett Maths ([www.corbettmaths.com](http://www.corbettmaths.com)) which can help you prepare for Core Maths in September. Click on the website, click on 'Videos' or 'Worksheets'. Search the video numbers, watch the videos, attempt the practice or textbook exercises to have a solid foundation in your GCSE Maths and begin in September with confidence!

\*Topics highlighted in **bold** are of utmost importance, you must watch the videos, make notes, and attempt the practice questions\*

Topic	Corbett Maths
<b>Types of Data</b>	<b>342 - Types of data: Qualitative &amp; Quantitative</b> <b>343 - Types of data: discrete &amp; continuous</b> <b>343a - Types of data: primary &amp; secondary</b>
<b>Collecting &amp; Sampling Data</b>	<b>281 - Sampling: stratified</b> <b>282 - Sampling: random</b>
<b>Numerical Representations of Data</b>	50 - Averages: median <b>51 - Averages: median (frequency table)</b> <b>52 - Averages: median (grouped data)</b> 53 - Averages: mean <b>54 - Averages: mean (frequency table)</b> <b>55 - Averages: mean (estimated)</b> 56 - Averages: mode 57 - Averages: range
<b>Diagrammatic Representations of Data</b>	<b>149 - Graphs: box plots- draw \ interpret</b> <b>150 - Graphs: box plots (compare)</b> 151 - Graphs: conversion graphs (draw) 152 - Graphs: conversion graphs (interpret) <b>153 - Graphs: cumulative frequency (draw)</b> <b>154 - Graphs: cumulative frequency (reading)</b> 155 - Graphs: frequency polygons (draw) 156 - Graphs: frequency polygons (reading) <b>157 - Graphs: histograms (draw)</b> <b>158 - Graphs: histograms (interpret)</b> <b>159 - Graphs: histograms harder</b> 160 - Graphs: line graphs 169 - Graphs: stem and leaf (draw) 170 - Graphs: stem and leaf (interpret)

The best investment you can make is in yourself.

Warren Buffett

## Core Maths – Phase 2

For Part 2, we will be focusing on skills needed for the Finance section of Core Maths.

There are many parts to Finance: Exchange rates, APR, AER, interest, National Insurance, Tax, Student Loans, mortgages etc. All of the topics mentioned require students to have a solid grounding in using the four operation with Money, use of percentages, ratios and decimal multipliers.

Money is an extremely necessary part of life likewise calculating with money and being financially savvy is just as important, we need to know how to spend wisely, budget, see if a discount is credible, calculate our earnings after tax and there are other many well-known factors why Cash is King!

In the final task, I have attached a video of a typical real-life scenario in regards to a salary that is earned and it will show you how Tax and National Insurance is deducted. It is also the type of question you will be asked in your exam next summer!

### **Task 1**

1. Below are a selection of GCSE videos from Corbett Maths ([www.corbettmaths.com](http://www.corbettmaths.com)) which can help you prepare for Maths in Personal Finance topic in Core Maths. Read your way down the list and look at which topics you will need a refresher
2. I have hyperlinked the video numbers in the table which will take you the relevant video. Likewise, I have hyperlinked the topic names in the table, if you click on the topic, it will take you to the appropriate worksheet where you will be able to test your understanding. If there is no link attached, that means there is no video coinciding with that subject.
3. Alternatively, you can click on the website, click on 'Videos' or 'Worksheets'. Search the video numbers, watch the videos, attempt the practice or textbook exercises to have a solid foundation in your GCSE Maths and begin Maths for Personal Finance in confidence!

Topic	Video - Worksheet
<b>Percentages</b>	<a href="#">233 – Percentage Change</a> <a href="#">235 – Percentages of an amount (calculator)</a> <a href="#">236 – Percentages: Compound Interest</a> <a href="#">238 – Percentages: Increasing/Decreasing</a> <a href="#">239 – Percentages: Multipliers</a> <a href="#">240 – Percentages: Reverse</a>
<b>Exchange Rates &amp; Money</b>	<a href="#">214a – Number: Currency (Exchange Rates)</a> 8 – <a href="#">Money Problems</a>
<b>Ratio</b>	<a href="#">210 – Number: Best Buys</a> <a href="#">270 – Ratio: Sharing the total</a> <a href="#">271b – Ratio: difference between</a> 271e – <a href="#">Ratio: Problem Solving</a>

### **Task 2**

This task is for you to gain an insight and an overview into the world of wages and salaries, click on the following link:

<https://www.bbc.co.uk/bitesize/guides/z8wjh39/revision/2>

Once you have access to the link, you will see 3 tabs, then follow these instructions:

1. Click on the middle tab labelled 'Video'. Watch the video and make notes.
2. Click on the left tab labelled 'Revise'. Have a read of the information, go through all 5 slides, make notes on key pieces of information, attempt the examples at the end of the pages and copy the answers to ensure you have correct notes in your book.
3. Finally, click on the right tab labelled 'Test'. Attempt the 10 questions to the best of your ability, once you have completed the test, click on 'Check Score' and reflect on how well you have done and what you have learnt from this exercise.

### **Task 3**

If you earn £50,000 a year, how much money would you take home each month after deducting Tax and National Insurance? On the next page you will find the rates of Income Tax and National Insurance you will pay dependant on how much you earn for the Tax Year 2017-18, there is also small pieces of information how to calculate your deductions. Use the tables below to calculate your 'take-home' pay. Once you have calculated your 'take-home' pay, watch the following video and see if your answer is correct!

Video: [Income Tax & NI - £50,000 a year](#)

# Income Tax and National Insurance 2017–2018

## Income tax 2017–2018

Everyone in the UK has a personal allowance. This is their annual amount of tax-free income. The standard personal allowance for 2017–2018 is £11 500

The rates of income tax you pay depend on how much **taxable income** you have above your personal allowance.

## Income tax rates and taxable bands 2017–2018

Rate	Taxable income
Basic: 20%	up to £33 500
Higher: 40%	over £33 500 and up to £150 000
Additional: 45%	over £150 000

## Calculating your income tax

Find your taxable income by subtracting your personal tax allowance from your annual gross income.

You pay income tax at 20% on the first £33 500 of your taxable income.

You pay income tax at 40% on your taxable income over £33 500 and up to £150 000

## National Insurance (NI) 2017–2018

Percentage NI due	Minimum weekly income	Maximum weekly income	Minimum yearly income	Maximum yearly income
0%		£157		£8164
12%	£157.01	£866	£8164.01	£45 032
2%	above £866		above £45 032	

## Examples

A person who had a weekly income of £350 paid 12% on the amount above £157

A person who had a weekly income of £950 paid 12% on the amount between £157.01 and £866 plus 2% of the amount above £866