

Project-based learning in post-16 maths

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MathsConf35

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Biography: @reflectivemaths

- Maths teacher since 2001
- Advanced Skills teacher
- Maths author – Hodder and Stoughton, The Mathematical Association, Integral, Amazon, AQA
- Core Maths advocate with the Advanced Maths Support Programme (AMSP)

Objectives

- To introduce you to Core Maths and how it's different.
- To encourage you to think about maths teaching in an even more creative way.
- To explore how to use a project as a starting point for maths.
- To provide an opportunity to ask questions.
- To share other starting points and resources.

What's available for 'Core Maths'

AQA

AQA Certificate Level 3 Mathematical Studies

Two papers

Three variants:

A: Statistical Techniques

B: Critical Path and Risk
Analysis

C: Graphical Techniques

Edexcel

Mathematics in Context (Level 3 Core Maths)

Two papers

OCR/MEI

Core Maths (MEI) Level 3 Certificate Core Maths

Two papers

Two variants:

A: Critical Maths

B: Statistical Problem
Solving

Core Maths entry requirement

All exam boards have written their courses to be appropriate for students attaining **Grade 4** or higher in GCSE Maths.

Core Maths preliminary material

All exam boards release material before the exam so students know what some of the questions will be based on.

Why did I choose AQA 2A?

Why AQA?

- Fermi estimation is both fun and a good life skill.
- Finance is a significant part, with Income Tax and National Insurance consistently asked.
- Critical Analysis is a specific focus.

Why 2A?

- I was already comfortable with statistics teaching from A-level Maths.
- Psychology, geography and biology are popular at my school.

The main selling points of Core Maths

For students and parents:

- It is so obviously **useful** maths.
- No more “When will I use this?”
- Genuinely supports other A-levels.

For me as a teacher:

- A really fresh approach to teaching maths.
- It got me thinking about maths in a different way.

A short fermi question

AQA Certificate Level 3 Mathematical Studies, June 2017, Paper 1, Question 4

Estimate the number of litres of liquid drunk by the population of a small English town in one month.

State any assumptions that you have made.
You **must** show your working.

[5 marks]

A short fermi question – answer

<p>Makes an assumption about number of litres per person per day in the range 1 litre to 10 litres (or ml equivalents)</p> <p>and</p> <p>assumes a number of days in a month in the range 28 to 31</p> <p>and</p> <p>Makes an assumption about number of people in a small town in the range 1000 to 100000</p>	B3	<p>Must state units</p> <p>eg Minimum for B3</p> <p>(Assume) 5 litres, 28 days, 15000 people</p> <p>or</p> <p>B2 for 2 correct assumptions (one missing or not in range)</p> <p>eg (Assume) 3 litres, 30 days, 300000 people</p> <p>or</p> <p>B2 for all 3 values within range but not stated as assumptions</p> <p>eg $4 \times 30 \times 10000$ seen gets B2 M1</p> <p>or</p> <p>B1 Any one correct assumption stated</p> <p>eg drink about 3 litres per day</p> <p>or</p> <p>Multiplication of 3 values with 2 in range and no units</p> <p>eg</p> <p>$12 \times 31 \times 20000$</p>
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A short fermi question – answer

Multiplies their 3 values together	M1	This may be done in two steps
Accurate answer to their calculation	A1ft	ft their 3 values May be rounded

How to think about maths teaching more creatively

- I'm going to give you two themes – one is fairly narrow, one more broad.
- I'd like you to mind map some thoughts about areas of maths you could explore based on the given themes.
- Try to create as many links as you can!

How to think about maths teaching more creatively

How much do jobs pay?

Festivals

Channelling the ideas: How much do jobs pay?



Can I afford to... ? How much do jobs pay?

Inflation means that the cost of items changes over time. This means that how much people get paid for doing jobs changes too. In this project, we'll look at how salaries have changed over time.

Take a look at this table of median weekly salaries for men aged 21:

Non-manual jobs	1980 (£)	1995 (£)	Percentage increase
Accountant	147.4	470.3	
Electrical engineer	156.1	522	
Fire fighter	114.6	342	
Journalist	147	435.7	
Marketing and sales manager	169.5	535.7	
Medical practitioner	220	779.7	
Police officer	136.6	432.2	
Sales assistant	78.4	184.3	
Secondary teacher	123.8	468.7	
Warehouse manager	131.4	397.5	

Data taken from the New Earnings Surveys published by the Office of National Statistics

- 1) What do you notice?
- 2) Charlotte says, "In 1995, a fire fighter would be earning less than £20 000 per year." Does the data support her claim?
- 3) The percentage increase in pay from 1980 to 1995 for an accountant is 219%. Complete the column of percentage increases for the other jobs.
- 4) Which jobs saw the largest and smallest percentage increases over that time period?
- 5) Dave says, "At this rate of pay increase, an electrical engineer would expect an annual salary of over a quarter of a million pounds in 2025." Does the data support his claim?

Adam is thinking of looking for correlation between the weekly pay for the two years above. He reasons that the medical practitioner and sales assistant pay are too different to the other types of jobs so decides to exclude them from his calculation.

- 6) What is the value of the correlation coefficient (PMCC) between the 1980 and 1995 data for the remaining eight jobs?
- 7) Adam calculates the regression line equation using 1980 as his x value and 1995 as y . He correctly obtains the equation $y = 26.7 + 3.01x$. Use Adam's equation to verify if the medical practitioner and sales assistant weekly pay fit the trend of the other 8 jobs.

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L3 MATHEMATICAL STUDIES – 1350 – CAN I AFFORD TO... ? – HOW MUCH DO JOBS PAY?

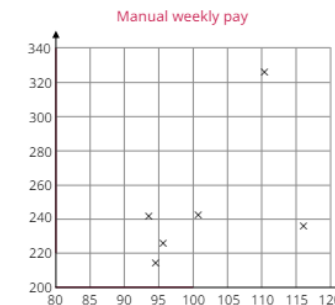
Georgia is interested in the pay of manual workers and finds the following data:

Manual jobs	1980 (£)	1995 (£)	Percentage increase
Bricklayer	101.2	244.1	141%
Bus driver	116.8	237.6	103%
Chef/cook	94.4	216.1	129%
Painter/decorator	93.7	240.4	157%
Plumber	110.5	325	194%
Refuse collector	95.4	227.9	139%

Data taken from the New Earnings Surveys published by the Office of National Statistics

- 8) She says, "This data proves that pay for manual work has not been increasing as much as for non-manual work." Does the data support this claim?
- 9) Jenny looks at both sets of data and thinks that the sales assistant job could be classified as manual. Give two reasons why she might reach this conclusion.

Georgia produces the following scatter graphs for the manual data:



- 10) Georgia concludes that the data for manual pay between 1980 and 1995 shows strong positive correlation. Is she correct?

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Channelling the ideas: How much do jobs pay?

Extended task:

It is easier to find data for more recent salary rates. See if you can complete a similar table for salaries now and 10 years ago. Questions you might like to consider are:

- Is there a strong correlation between salaries from 10 years ago and now?
- Does it make a difference if you look at public sector jobs and private sector jobs?
- For a particular job that you might be interested in, has the pay been in line with inflation over the past 10 years? (You will need to find out the rate of inflation for the last 10 years.)

Channelling the ideas: Festivals


Project packs


We are producing a series of project packs to help teachers with the delivery of Level 3 Mathematical Studies, with the aim of bringing the maths to life and helping to solidify learning by really using the maths they've learnt.


Written by Core Maths expert, Dave Gale, who also writes a [blog](#) containing lots of other teaching ideas, we are going to publish four project packs in the 2023/24 academic year with the aim to cover all the common content in Level 3 Mathematical Studies and the content from option A: Statistical techniques.

The first pack "[Can I afford to...?](#)" is available now, and the others will follow.

Any feedback on these resources is welcome by emailing maths@aqa.org.uk, and if you'd be interested in getting involved next year with writing projects for options B or C, please let us know.

Can I afford to...? Zip file v1.1  13

Downloadable resource in ZIP format. 
01/11/2023

 1.7 MB

Related resources: -

Site management

Sign up to All About Maths

My AQA Maths

exampro

Create, edit, and share assessments quickly and easily with [Exampro Mathematics](#)

Quick links

[AQA Maths](#)

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How I feel when teaching Core Maths

- It's so much more engaging than GCSE, especially for students who didn't love algebra.
- It feels like I'm really teaching students mathematics and to be mathematicians.
- It demonstrates that maths doesn't have to be hard and/or abstract to be interesting.
- Talking to parents is always positive.

Any questions?



All About Maths

Our dedicated, free, secure mathematics resources site

Join All About Maths for free using your school email address

allaboutmaths.aqa.org.uk

The screenshot shows the homepage of the All About Maths website. At the top, there is a navigation bar with the AQA logo and the text "All About Maths Questions matter". To the right of the logo are links for "Help" and "Contact us". Below the navigation bar is a dark purple header with a "Menu" button, a "Log in" button, and input fields for "Email" and "Password", followed by a "Go" button and a link for "Forgotten password?".

The main content area is titled "AQA All About Maths" and features a large image of three people (two men and one woman) looking at a document. To the left of the image are several text links: "MathsConf35 - get your ticket", "New! Example problem past papers", "GCSE Maths: explore our support and insights", and "Explore our Level 2 Further Maths support and resources". To the right of the image is a "Sign up to All About Maths" button.

Below the main content area is a "Welcome to All About Maths" section. It contains the following text: "The site holds supporting documents and resources to help you deliver our specifications. If you have any questions you can call 0161 957 3852 or email maths@aqa.org.uk. We hope you enjoy using All About Maths! Best wishes David Taylor and the AQA Mathematics team".

Below the welcome message is a section titled "Updates from the AQA Maths team". It contains the text: "Read the latest updates from the AQA Maths team. To sign up for these updates, please fill out this [webform](#)." Below this text are three update cards, each with a heart icon and a number in a circle:

- AQA Maths Update September 2023**: Downloadable resource in PDF format. 19/09/2023. Related resources: -
- AQA Maths Update March 2023**: Downloadable resource in PDF format. 14/03/2023. Related resources: -
- AQA Maths Update December 2022**: Downloadable resource in PDF format. 16/12/2022. Related resources: -

At the bottom right of the page, there is a "Quick links" section with the following links: "AQA Maths", "AQA exams and results services", and "AQA CFD".

Handy Links Guide

Access all AQA resources from one place

Level 3 Mathematical Studies Handy links resource guide



Stay up to date with new resources, insights and events. [Make Assessment Count](#)

[MORE INFO](#)

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[Explanation of our Mock Exam Analysers](#)
[Practice papers](#)
[Additional Practice Questions](#)

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[Lesson plans and supporting resources](#)
new [Project packs](#)
[Solving estimation problems](#)

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Examprom

[Examprom Maths](#)

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Some resources



Menu

[Home](#) / [Level 3 Mathematical Studies \(Core Maths\)](#) / [*New* Project packs](#)




Project packs

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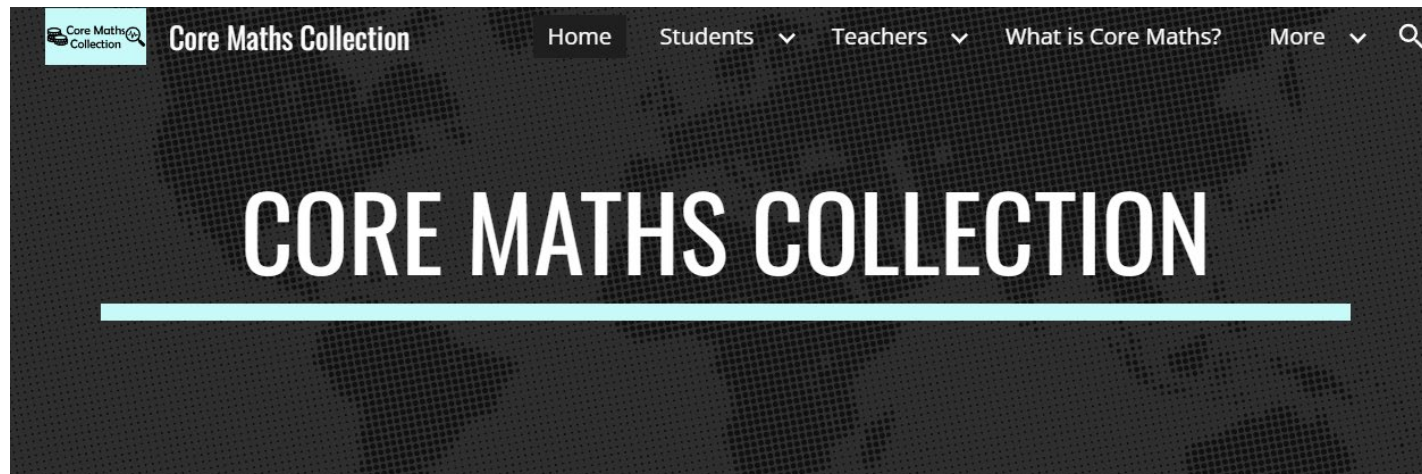




Some resources

- **Quibans** – questions inspired by a news story
- <https://quibans.blogspot.com/>

Some resources



Welcome to the Core Maths Collection!

This website is in its very early stages and I'm building it as a way to draw together a variety of resources for people that are interested in Core Maths.

My main aims are:

1. Provide a place where students can find revision materials,
2. Draw together the best resources for teaching Core Maths.

Frequently Asked Questions (FAQ) about Core Maths



Here are some quick answers to some commonly asked questions by both students and teachers. If you

© Core Maths Collection

Some resources



Q What are you looking for >

CONTACT US

MENU ≡



Supporting the teaching and learning of **Core Maths**, **AS/A level Mathematics** and **Further Mathematics**

A DfE-funded initiative, providing support for teachers and students in state-funded schools and colleges in England.



Additional funding available for Core Maths

The Government has announced additional funding for each Level 3 Core Maths student through the Core Maths Premium. Click here to find out how the AMSP can support your school's Core Maths provision.

FIND OUT MORE >>

What is the Advanced Mathematics Support Programme?

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Getting started with Core Maths

- Register for an All About Maths account and browse the AQA resources
- Bookmark the Handy Links Guide
- Sign up for our mailing list
- Make yourself known to the AMSP
- On demand Getting Started e-learning course

Get in touch

Our friendly team will be happy to support you between 8am and 5pm, Monday to Friday.

Tel: 0161 957 3852

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Thank you