

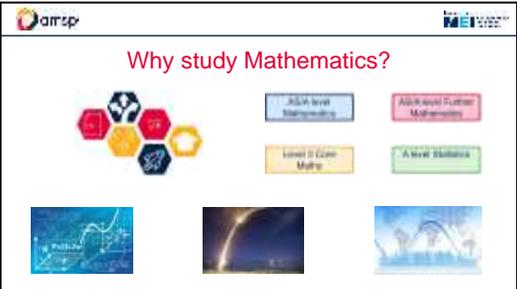
Why Study Maths?

Transcript for video - What post-16 maths options are available?

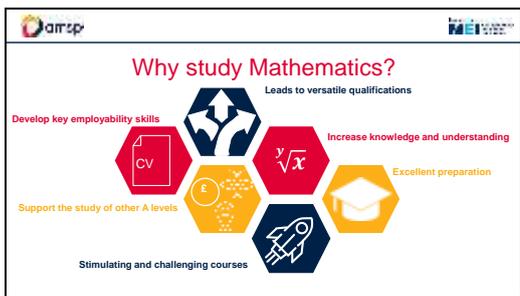
The transcript below is for you to use if you would like to record your own school specific version of the materials.

The contents of the video are based on the information in the comprehensive Why Study Maths? presentation. The presentation is available for you use and share with students and parents to promote level 3 maths courses. It can be downloaded from <https://amsp.org.uk/resource/why-study-maths>

For more details about the work of the AMSP visit www.amsp.org.uk. If you would like copies of the **Maths - Opening the door to your future** leaflet sent to your school, please contact the AMSP admin team: admin@amsp.org.uk

<p>Slide 1</p> 	<p>Hello and Welcome</p>
<p>Slide 2</p> 	<p>In this video, from the Advanced Maths Support Programme, we aim to give you a picture of what taking maths further after GCSE might be like, the different options that are available and how choosing an Advanced Maths Qualification could benefit you throughout life.</p>
<p>Slide 3</p> 	<p>First, we'll consider some general reasons for continuing with maths in the 6th form or at college. Then we'll look at what the different options are and what each of them might involve.</p>

Slide 4



Here are some key reasons for studying maths beyond GCSE.

Leads to versatile qualifications well-respected by employers and higher education

Develop key employability skills e.g. problem-solving, communication, logical reasoning and resilience

Increase knowledge and understanding of mathematical techniques and their applications

Support the study of many other A levels and level 3 courses

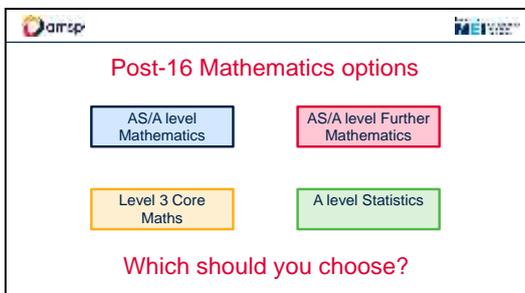
Slide 5



Image: <https://pixabay.com/en/map-world-motley-texture-1254058/>

The UK is one of the few countries in the world where the study of maths is not compulsory after the age of 16. We are a tiny island that is part of a global economy. Students will be competing for jobs with people who have studied maths at least up to the age of 18, especially if they are considering studying or working abroad.

Slide 6



So what are the maths options?

You should check with your school/college exactly what they offer but it will be some or all of these. Mathematics and Further Mathematics can be taken as an AS level (as well as A level), this is a smaller qualification that covers approximately the first half of the content.

Most students end up taking three or maybe four courses (A levels, BTECs, CTECs). So by taking Maths and Further Maths that could mean spending either half or two thirds of their timetable just on maths – This is likely to appeal to some students.

We'll take a brief look at what each of them entails. Starting with Core Maths.

Slide 7

What is **Core Maths**?

Versatile qualification equal in size to an AS level

Maths you will face in life and in the workplace

A course that will develop valuable mathematics skills

Supportive of the maths in other courses.

Excellent preparation for university

For any student with at least a GCSE mathematics grade 4

1. Core Maths is a level 3 qualification and is equal in size to an AS level. Different exam boards give the qualification slightly different names so check with your school which they are offering but they are all commonly referred to as Core Maths

2. Such as interpreting solutions in the context of the problem, working with data, financial maths, spreadsheets and understanding risk

3. Such as percentage change, interpretation of graphs and using exponential functions to model growth and decay

4. As well as the topics we've just mentioned students look at analysing data, statistical tests, correlation and understanding sources of error and bias. Can be taken alongside A levels or vocational courses

5. A lot of degree courses across all subjects have a quantitative element so having taken a level 3 maths qualification is an advantage so much so that some Universities give reduced offers for students that have taken it.

6. And that is the best news really – anyone with a grade 4 to a grade 9 can take it and it is useful for everyone!

As always if you want to know more about the qualification, then speak with your teacher.

Slide 8

What is **Core Maths** like?

How much domestic water does the UK require every year?

A newly qualified teacher earns £23,000 per year, has no student loans, and pays 7.4% of their salary into a pension scheme. What is the teacher's net monthly salary after tax and national insurance contributions?

A genetic disease occurs in one in every 10,000 people. A test for the disease is accurate 98% of the time. If you are tested and the result is positive, what are the chances of you actually having the disease?

The speed of cars driving down a road with a speed limit of 50mph is recorded. The mean speed was 47mph and the standard deviation of the speeds 5mph. What percentage of the cars were breaking the speed limit?

Not that we have time in this video, or that we're going to stop and do some maths now (you could pause here though or come back to this section later if you'd like) but here are a few example questions. Your lessons and the content should feel 'different' to GCSE maths but 80% of the course is based on GCSE content – it is just applied in real life scenarios.

Next, let's think about A level Mathematics.

Slide 9

What is covered in AS/A level Mathematics?

All of the content in the AS/A level Mathematics qualification is compulsory and is the same for all examination boards.

Pure Mathematics	Statistics	Mechanics
66%	17%	17%

A level Mathematics-Extends GCSE Maths and introduces new ideas – Also you will look at two of the main applications of maths, Statistics and Mechanics.

Over the next few slides we'll briefly take a look at what each of those areas of maths entails and give some examples for you to think about so that you also get a feel for the types of problems you might be asked to solve.

Slide 10

What is Pure Mathematics?

Methods and techniques which underpin the study of all other areas of mathematics, such as, proof, algebra, trigonometry, calculus, and vectors

Pure maths underpins everything!

Slide 11

What is Pure Mathematics?

Methods and techniques which underpin the study of all other areas of mathematics, such as, proof, algebra, trigonometry, calculus, and vectors

The points A and B have coordinates (4,-2) and (10,6) respectively.

Find the equation of the circle that has AB as a diameter.

You will also be introduced to some of the big ideas in mathematics such as calculus (differentiation and integration)

Slide 12

What is Statistics?

Reaching conclusions from data and calculating the likelihood of an event occurring.

Images: <https://pixabay.com/en/flood-danube-sandbag-park-139000/>

<https://pixabay.com/photos/car-accident-clash-rome-highway-2165210/>

Statistics is what we would call applied maths and forms a part of A level maths and

Slide 13

What is Statistics?

Reaching conclusions from data and calculating the likelihood of an event occurring.

What is the probability of two '100 year floods' happening within the space of 5 years?

What assumptions have you made?

"The majority of private sector organisations believe the use of data analytics will be the most important factor in increasing growth in UK businesses"

Professor Sir Adrian Smith



Recently we have all become aware of how data is increasingly important to our day to day lives. There may be the possibility for you to study Statistics as a whole A level in its own right (check if your school offers that)

Slide 14

What is Mechanics?

The modelling of the world around us, the motion of objects and the forces acting on them.



<https://pixabay.com/photos/water-drop-liquid-splash-wet-1759703/>

<https://pixabay.com/illustrations/world-globe-earth-planet-blue-1303628/>

<https://pixabay.com/photos/golf-golf-course-grass-sport-green-3685616/>

Slide 15

What is Mechanics?

The modelling of the world around us, the motion of objects and the forces acting on them.

A golfer drives their ball from a tee on horizontal ground so that it has an initial velocity of 50ms^{-1} at an angle of 40 degrees above the horizontal.

How far down the fairway will the ball land?



Students planning careers in physics or engineering would find mechanics particularly useful.

Slide 16

What is Further Mathematics?

Further Mathematics is an additional AS/A level qualification taken in **addition** to an AS/A level in Mathematics.



<https://pixabay.com/illustrations/mathematics-formula-physics-school-1230074/>

<https://pixabay.com/illustrations/fractal-art-3d-fractals-3206739/>

If you love maths you can take a second A level in it. Further Maths.

Slide 17

What is Further Mathematics?

Further Mathematics is an additional AS/A level qualification taken in **addition** to an AS/A level in Mathematics.

The quadratic equation $x^2 + 2x + 5 = 0$ has two non-real solutions $x = a$ and $x = b$. Find a different quadratic equation that has solutions $x = 2a$ and $x = 2b$.

It is designed to stretch and challenge able mathematicians and prepare them for university courses in mathematics and related quantitative and scientific subjects.

The example here asks for the non-real solutions to a quadratic equation. Further Maths will introduce you to the world of imaginary and Complex numbers.

But what else is in Further Maths?

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What is covered in Further Mathematics?

AS Level

- Pure Mathematics
- Additional Pure, Statistics, Mechanics or Decision Mathematics

A Level

- Pure Mathematics
- Additional Pure, Statistics, Mechanics or Decision Mathematics

Well – there is still a lot of Pure mathematics content, making up at least 30% of the AS level and at least 50% of the A level.

Another example of an important Further pure topics, other than complex numbers is matrices. Matrices can be used to solve sets of simultaneous equations, to represent transformations and are used a lot in the digital world.

The remainder of the content is made up of options which will include some of:

Additional pure mathematics

Additional statistics and/or mechanics or another type of applied maths

Discrete / Decision mathematics

As a little taster for you...

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What is Discrete/Decision Maths?

Many of the problems in Discrete maths involve Optimisation – finding an efficient solution – and hence methods are applicable to many real world situations.

What would be the most efficient route for delivering post around this network of streets?

One area of discrete mathematics is graph theory, which includes solving problems such as this one:

In particular this area of maths makes use of algorithms - vital in computer science. If you find you like this kind of maths then you might be interested in studying it further so look for courses in Operational Research.

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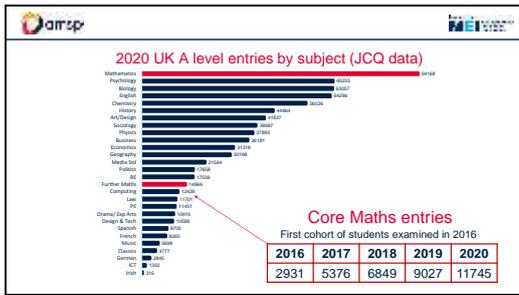
2020 UK A level entries by subject (JCQ data)

Subject	Entries
Mathematics	94,000
Science	84,000
English	82,000
Chemistry	78,000
History	75,000
Art/Design	72,000
Sociology	70,000
Physics	68,000
Business	65,000
Geography	62,000
Media/Art	60,000
Psychology	58,000
Further Maths	15,000
Computing	14,000
Latin	13,000
Religion	12,000
Music	11,000
French	10,000
Spanish	9,000
Design & Tech	8,000
Classical Civilisation	7,000
German	6,000
Italian	5,000

To end with, lets have a look at the current picture across the UK at what students typically study.

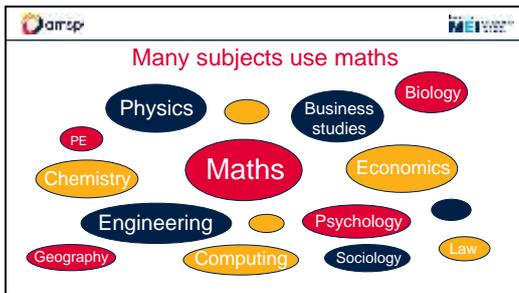
Maths is the most popular A level (over 94 000 entries) and has been since 2015. Around 15 000 students also take further maths.

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Just to show you where CM fits into that picture – almost as many entries as Computing A level.

Slide 22



As we eluded to at the start of the video taking a level 3 maths qualification will support the study of other subjects.

In this graphic you will probably have worked out that the larger the shape the more mathematical its content. Some of those you will have been expecting to see and some perhaps not?

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- Maths in other A levels**
- Geography** (no specific percentage but geographical skills include quantitative and qualitative skills equally)
 - Economics** (at least 20%)
 - Biology** (at least 10%)
 - Business** (at least 10%)
 - Psychology** (at least 10%)
 - PE** (at least 5%)
 - Sociology** (no specific percentage but you will be analysing data)

Here are some of those, possibly less obvious subjects that are very popular with students. Mathematical or quantitative content is mentioned in all of their specifications.

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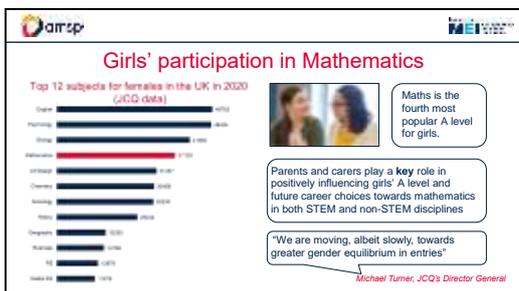


Image: amsp website

Data: Joint Qualification Council

A final message that we want to re-iterate is that there is a post-16 maths qualification for everyone. A previously held view is that maths was seen as more of a boys subject but as you can see from this chart not only do a lot of girls take maths, but they also take a wide range subjects that we just looked at with a significant mathematical or quantitative element. for example 46.8% of the students who take Core Maths are female. From research we know that students' post-16 choices are influenced by their parents so we believe it is important that these up to date and key messages are shared.

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For further information There are two more videos available or you could ask your teacher for a copy of our Opening the door to your future leaflet, which contains more detail on the different types of qualifications, what is involved with each one and they types of careers they might lead on to. Or you can look at it online...

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www.amsponline.org.uk', 'Maths Careers website www.mathscareers.org.uk', 'Apprenticeship websites e.g. www.amazingapprenticeships.com', 'Universities and Colleges Admissions Service (UCAS) www.ucas.com', and 'Russell Group Universities www.informedchoices.ac.uk'."/>

AMSP website www.amsponline.org.uk
Maths Careers website www.mathscareers.org.uk
Apprenticeship websites e.g. www.amazingapprenticeships.com
Universities and Colleges Admissions Service (UCAS) www.ucas.com
Russell Group Universities www.informedchoices.ac.uk

...on the first address given here – along with some other really useful websites with up to date information.

Thank you for watching and good luck with whatever you choose to do after your GCSEs

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About the AMSP

- A government-funded initiative, managed by MEI, providing national support for teachers and students in all state-funded schools and colleges in England.
- It aims to increase participation in AS/A level Mathematics and Further Mathematics, and Core Maths, and improve the teaching of these qualifications.
- Additional support is given to those in priority areas to boost social mobility so that, whatever their gender, background or location, students can choose their best maths pathway post-16, and have access to high quality maths teaching.

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Contact the AMSP

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