



Advanced Mathematics  
Support Programme®

## Why Study Maths?

### Notes to accompany the PowerPoint presentation

These slides form an approximately 30-minute presentation for parents/carers about the importance of studying maths post-GCSE. Please note that the presentation is for students starting Core Maths, AS/A level Mathematics or AS/A level Further Mathematics qualifications from September 2020 onwards.

These notes below provide additional information, advice and guidance for Teachers, Heads of Maths departments, Careers Advisors and Senior Leaders to support them in presenting the 'Why study Maths?' PowerPoint.

**Please add or remove slides to suit your talk/event.** The presentation could also be used as a slideshow running on a loop during an open day/evening event.

For more details about the work of the AMSP visit [www.amsponline.org.uk](http://www.amsponline.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@amsponline.org.uk](mailto:admin@amsponline.org.uk)

Slide numbers	Notes
1	AMSP logo <a href="http://amsponline.org.uk">amsponline.org.uk</a>
2	Information slide – to be deleted before using the PowerPoint
3	Title slide
4	An overview of the reasons why students would benefit from studying A levels in Mathematics and Further Mathematics or Core Maths. This slide also gives the structure of the presentation. <ul style="list-style-type: none"><li>■ Information on the post-16 maths courses/qualifications</li><li>■ How maths supports other subjects</li><li>■ Career opportunities from studying maths</li><li>■ Advanced maths and applying to universities</li></ul>
5	We are a tiny island that is part of a global economy. The UK is one of the few countries in the world where the study of maths is not compulsory after the age of 16. 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. Creative and technological advances will make maths more important than ever. This is why jobs that require maths skills tend to pay more.
6	Post 16 Maths Options – edit as appropriate for your school A key message to students should be that if they achieved a good pass at GCSE in Mathematics then they should not be asking “shall I take maths in the sixth form?”, rather the question should be “which maths course shall I take?”

7	<p>An overview of each post-16 qualification</p> <p>If appropriate for your school/college, mention that each of the A level courses can be taken as an AS level, explaining that this is a smaller qualification that covers approximately the first half of the content. Core Maths is of the same size as an AS level and is therefore ideal for students wanting to continue with some maths, in addition to their A level programme. Students might not yet have a grasp of what a typical level 3 programme of study looks like, so mention that most students take three or four courses (as appropriate to your school/college). Taking Maths and Further Maths could therefore mean spending either half or two thirds of your timetable just on maths – which is likely to appeal to some students.</p>
8-10	<p>A recommendation of the report <a href="#">Towards Universal Participation in Post-16 Mathematics</a> (2013) was that all students in England should be enabled to study maths in upper secondary at an appropriate level. The report recommended the introduction of one new advanced maths pathway aimed at those who have achieved a grade C/4 or above at GCSE but are not currently studying advanced maths. This led to the development of five new qualifications, collectively known as Core Maths qualifications, which were first examined in 2016. For more information see the list of <a href="#">Core Maths Specifications</a>.</p> <p>The <a href="#">Smith Review</a> (2017) advises the government to ensure that the profile of Core Maths is raised and that the qualification is made available to all students at level 3. The Review also stresses the importance of A level Mathematics and Further Mathematics in supporting progression to a wide range of degree courses and careers. In July 2017 the government announced a new £16m support programme to support the implementation of the Smith Review recommendations – this is the AMSP which replaces the previous FMSP and CMSP programmes.</p> <p>Guidance and resources for Core Maths can still be found on the <a href="#">STEM Learning</a> website and also through <a href="#">MEI</a>, which has developed a full set of resources through its online resource platform, <a href="#">Integral</a>.</p> <p>A <a href="#">video</a> and <a href="#">report</a>, <i>Count Us In: Quantitative skills for a new generation</i>, by the British Academy provides a vision for a more numerate society.</p> <p>The AMSP provides support for the teaching and learning of Core Maths, including professional development and teaching resources – see the <a href="#">AMSP website</a>.</p> <p>Tailor slides 8/9 to incorporate the entry requirement for Core Maths in your own school/college. You might like to add how the course is timetabled and whether the examinations are taken at the end of Year 12 or Year 13.</p>
11	<p>This slide provides an overview for AS and A level Mathematics. At this stage, depending on the audience, it may be beneficial to explain what is meant by an AS qualification and how it relates to the A level qualification. Also, state that from 2017 onwards AS Mathematics was decoupled from A level mathematics. This means that marks from an AS qualification will no longer count towards the A level qualification.</p> <p>The rules for the number of subjects taken in your particular school/college could be outlined here, as could your school/college policy relating to whether or not AS levels will be entered.</p>
12 - 13	<p>These slides briefly explain the nature of the two types of application contained in AS / A level qualifications –Mechanics and Statistics.</p> <p>Note that decision mathematics is no longer an element of the AS/A level Mathematics qualification but it is an optional aspect of AS/A Further Mathematics courses, sometimes under the heading ‘discrete mathematics’.</p>

<p>14-17</p>	<ul style="list-style-type: none"> <li>■ Slide 14 explains what A level Further Mathematics is and the differences from A level Mathematics. This slide could be adapted to match your school policy with respect to AS levels.</li> <li>■ Slide 15 gives a very brief overview of the content of the Further Mathematics qualification. The list of possible options could be adapted to reflect those offered in the school/college.</li> <li>■ Slide 16 gives a brief insight into the new areas of pure maths that students would meet in Further Mathematics.</li> <li>■ Slide 17 is optional – it gives an insight into one topic that might be covered in a decision/discrete maths unit. This could be removed if the school/college is not offering options in this area.</li> </ul>
<p>18-21</p>	<p>These slides give an overview of the pattern of entry for Core Maths, A level Mathematics and Further Mathematics over time and how the 2019 entries for these qualifications compare to those in other subjects.</p> <p>There has been a general increase over the last 10-15 years in the number of students studying AS and A level Mathematics. Since 2003 UK entries in A level Mathematics have increased from just over 50,000 to almost 98,000 in 2018. However, the decoupling of AS and A level qualifications is showing a considerable impact on AS numbers which are down from around 160,000 in 2017 to 81,000 in 2018 and are now just under 26,000 in 2019.</p> <p>The number of students taking AS and A level Further Maths has also increased dramatically. Since 2003 entries in A level Further Mathematics have increased from around 5300 entries to over 16,000 in 2018. Similarly AS FM entries have fallen from almost 28,000 in 2017 to approximately 18,500 in 2018 and are now 6000 in 2019. <b>The AMSP advises that AS Further Mathematics be a ‘special case’ as it leads to the student having 1.5 A levels in maths and it can be taught flexibly in the same timetable slot as an EPQ, Core Maths or enrichment activities.</b></p> <p>A level entries for both Maths and Further Maths fell this summer by 5.8% and 10.1% respectively. It is widely regarded that this fall is due to the cohort being the first to experience both the new GCSE in maths and the new linear A level specification.</p> <p>In 2019 Mathematics was (again) the most popular A level subject and Further Maths was the 16<sup>th</sup> most popular, with more entries than PE, Law, Computing or Languages.</p>
<p>22-23</p>	<p>Core Maths had the fourth set of results in 2019, with just over 9000 entries. This represents an increase of over 200% since 2016 and 32% year on year. It is anticipated that these numbers will continue to grow as the qualification becomes more well-known to students, parents, schools and colleges, employers and universities.</p> <p>These slides highlight how mathematical skills are important to support the study of many other subjects.</p> <p>Lots of subjects make use of maths, so if students are planning to study any of these, they should think about taking a maths qualification alongside. The larger the oval the more maths is in a subject, and so FM should be considered. Subjects in smaller ovals would be well supported by either A level Maths or Core Maths. Note that this list is not exhaustive – the blank circles indicate the fact that there are many further subjects that have maths in (product design, music, food studies, graphics etc...)</p> <p>Stress the skill development that comes from studying A level Mathematics – students would benefit from studying the course in conjunction with many other subjects for this reason. Maths can support Biology, Chemistry, Business Studies, Economics, Computing, Physics and Psychology in particular.</p>

	<p>The percentages of maths in other A levels has come directly from the exam board specifications</p> <p><b>Note</b> that girls are more likely than boys to take A level Mathematics in conjunction with non-STEM subjects, so it is important to draw out links with non-STEM subjects as well as STEM subjects.</p>
24	<p>A key national priority is to increase the proportion of girls studying A level Mathematics and Further Mathematics. <i>Data</i> about the participation rates of girls in these, and other science qualifications, has been published. This data is available at school, regional and national level. It shows that of all students taking at least one A level, boys are almost twice as likely to choose A level Mathematics and over 3 times more likely to choose A level Further Mathematics than girls. There are also regional variations with the lowest participation rates by girls occurring in the North East and Yorkshire and Humber regions. Participation rates for boys also vary by region with London and the South East being the highest and the North West of England the lowest</p> <p>The AMSP is working to support an increase in the proportion of girls participating in Core Maths, A level Mathematics and Further Mathematics nationally. In conjunction with the UCL IOE, under FMSP funding, we published a <i>gender literature review</i> and the interim report of a series of <i>gender case studies</i>, both of which provide a series of recommendations for schools and colleges in how they can encourage girls to aspire to study advanced maths. It should be noted that one of the findings of this research is that discussion of low uptake can be a self-fulfilling prophesy, with girls less likely to opt for maths if they perceive it as being a ‘boy’s subject’. It is therefore important to stress that numbers of girls taking the subject is substantial and that Maths is the fourth most popular A level for girls.</p> <p>Boys are more likely to combine A level Mathematics with other STEM A levels, whereas girls are more likely to include it within a broader range of subjects. It is therefore worth stressing the value of A level Mathematics beyond its traditional STEM base.</p> <p>The FMSP also produced a leaflet discussing the <i>Participation of girls in Mathematics</i>. Please contact the AMSP admin team if you would like to receive a printed copy: <a href="mailto:admin@amsp.org.uk">admin@amsp.org.uk</a></p>
25 - 31	<p>This series of slides provide some introductory information about the importance of maths for a range of careers. <b>They may not all be needed.</b></p> <ul style="list-style-type: none"> <li>■ Slide 25: As an introduction to maths in careers this slide lists some possible misconceptions about who might take Core Maths or Mathematics and Further Mathematics at A level. Take the opportunity here to stress that maths is a subject that is relevant to many careers and is not solely associated with physics/engineering type careers. Whilst it is important to dispel the myth that studying maths would <u>only</u> lead to a career as a maths teacher, it is important also to indicate the range of opportunities the teaching profession offers and that there is a shortage of well-qualified specialist maths teachers. Stress that parents and carers can play a key role in positively influencing girls’ subject choices towards maths in particular.</li> </ul> <p>Mathematics and Further Mathematics are versatile qualifications, well-respected by employers and for entry to higher education. Facilitating subjects are no longer referred to but the <i>Informed Choices</i> guide produced by the Russell group is still very useful in demonstrating how useful maths is to a wide range of university courses and careers.</p> <p>Careers for men and women with good maths skills and qualifications are not only well paid, but they are interesting and rewarding. People who have studied</p>

	<p>maths are in the fortunate position of having an excellent choice of career, as illustrated in the wide range of career titles shown in slide 25.</p> <ul style="list-style-type: none"> <li>■ Slide 27: The quote is taken from the <a href="#">Review of Post-16 Mathematics</a> to demonstrate how vital maths skills are not only in STEM occupations.</li> <li>■ Slide 28: The quotes are taken from the Rethinking the Value of Advanced Mathematics Participation (REVAMP) by Professor Andrew Noyes and Dr Mike Adkins, 2016 <a href="http://www.nottingham.ac.uk/education/documents/research/revamp-final-report-3.1.17.pdf">http://www.nottingham.ac.uk/education/documents/research/revamp-final-report-3.1.17.pdf</a> which indicates that there are wage returns of around 11% of taking A level Mathematics.</li> <li>■ Slides 29 – 31 outline a range of careers in STEM and non-STEM disciplines. Of course there are a huge number of careers in which maths is essential or beneficial – the <a href="#">Mathscareers website</a> is a good starting point to provide guidance for students and their parents. They could also look at the AMSP’s <a href="#">careers pages</a> for more information and links.</li> </ul>
32	<p>This may be a good time to mention that it is not essential to have a degree to be successful in a career and draw attention to the rise in the number of higher level and degree apprenticeships that are available after A levels (or equivalent). Similarly, a maths qualification is highly regarded for entry onto an apprenticeship and that many apprenticeships have mathematical aptitude tests that focus on Core Maths skills.</p> <p>This slide only contains a brief outline into what is involved and required in higher/degree apprenticeships.</p> <p>Students and their parents can search degree courses and apprenticeships at <a href="http://ucas.com">ucas.com</a>.</p>
33 - 43	<p>This series of slides relates to university entry requirements and <a href="#">we suggest choosing only a selection of these slides for your presentation</a>. The key message being that even though A level Mathematics may not a specific requirement for a course, students should be advised to consider taking Mathematics at least to AS level.</p> <p>Students may not be yet thinking about university applications but their choice of A level subjects may limit the range of courses they can apply for in 2 years’ time.</p> <p>Previous slides indicate the type of subjects for which A level Mathematics and Further Mathematics are useful preparation. Students should be made aware that even when AS or A level Mathematics is not a specific requirement of a course, many degree courses have a significant quantitative component. Being able to interpret data and draw conclusions is important in any subject where research is being undertaken. Studying mathematics in the sixth form helps develop these important quantitative skills and helps with the transition to learning new mathematical concepts at university.</p> <p>The data on slide 34 contains the percentage of students who had studied A levels (to the nearest whole number) with an A level in Mathematics that have been accepted to an undergraduate degree course for a particular subject. The information is by specific subject category rather than just a subject (e.g. there are other G degrees than just G1 but the data relates to G1 category). The data on slide 35 is the same but for A level Further mathematics</p> <p>This is the most recent data on entry qualification and can be found in <a href="#">this BSRLM paper</a>. The university entry data is for 2016/17.</p> <p>For further reading see the article <a href="#">Transition to STEM Degrees – Further Maths A-level!</a>.</p> <p>The report <a href="#">Popularity of A level subjects among UK university students</a> published in 2013 (relating to academic year 2010-11) shows that 30% of all accepted university</p>

	<p>applicants had A level Mathematics – this was the highest of all A level subjects (the second subject being A level Biology with 21.3% of all accepted applicants having this qualification). The same study showed 27% of students accepted to business and administrative degrees had A level Mathematics; 29% for social studies, 69% for medicine and dentistry; 43% for architecture, building and planning; and even 18% of students entering European languages degrees had studied A level Mathematics.</p> <ul style="list-style-type: none"> <li>■ Slide 36 references the <a href="#">2017 report</a> by Catherine Dilnot of the UCL Institute of in which she explains that students may be held back by their A level subject choices when applying for courses at prestigious universities. Students taking academic subjects were more likely to go on to study at such universities, and the report suggests schools and colleges should be clear on this when advising students on A level subject choices.</li> <li>■ Slides 37 – 40 show some exemplar entry requirements for a range of degree courses (maths, engineering, science and social science examples). These slides illustrate how universities might require or encourage students to take A levels in Mathematics and Further Mathematics.</li> <li>■ Slide 37 shows a differentiated offer which emphasizes the way that FM is considered important in preparation for a mathematics degree. Taking AS FM or A level FM reduces the offer. The second example shows that a failure to take A level Further Mathematics can limit access to the most prestigious STEM course.</li> <li>■ Slide 38 shows that Further Mathematics is often indicated as a preferential qualification for engineering in addition to required subjects. For many engineering degrees courses starting in 2020 A level Maths is now the only compulsory subject.</li> <li>■ Slide 39 has a differentiated offer which shows the importance of maths (as well as other sciences) as the optimal subject combination for entry to a Chemistry degree. It also shows that Mathematics underpins many scientific pathways. At GCSE level many students may identify geography as being the most relevant course to studying subjects such as earth science and meteorology, without realising how mathematical these topics become at undergraduate level</li> <li>■ Slide 40 demonstrates that the generality of A level Mathematics is often preferred to specific subjects more closely related to the degree course being offered. Students may be surprised to see that A levels in Psychology and Economics are not necessarily essential for taking the subject on to degree level, underlining the flexibility and currency of A level Mathematics. In addition to investigating formal entry requirements, students should also be encouraged to consider the profile of undergraduates on courses.</li> </ul> <p>Competition for places on some degree courses is high and students should consider taking A level Mathematics and Further Mathematics in order to distinguish their application, secure a place, and help them succeed once they start the course.</p> <ul style="list-style-type: none"> <li>■ Slide 41 provides a general summary of how to apply to university.</li> </ul>
42-44	<p>These slides demonstrate the value of having an advanced maths qualification (in Core Maths, AS Maths and AS Further Maths in particular) for courses where those qualifications aren't required. The University of Bath was the first to be explicit in giving applicants reduced offers with these maths qualifications. We are confident that others will follow suit and are aware of other universities who have given reduced offers in particular cases.</p>

	Slide 44 indicates it might more beneficial for a student to study Core Maths (a level 3 qualification in maths) than re-taking their GCSE in order to try to get a higher grade.
45	<p>This slide highlights information about how to stretch the most able mathematicians at A level in relation to the additional qualifications:</p> <ul style="list-style-type: none"> <li>■ <b>STEP</b> – Sixth Term Examination Papers (required for entry to Cambridge and also used by other universities such as Warwick to provide reduced offers).</li> <li>■ <b>MAT</b> – Mathematics Admissions Test (required for entrance to Oxford University and Imperial, and encouraged by Warwick).</li> <li>■ <b>TMUA</b> – Test of Mathematics for University Admission (encouraged for applicants for Mathematics degrees by the Universities of Durham, Lancaster, Sheffield and Warwick, as well as for certain courses at The London School of Economics).</li> </ul> <p>These qualifications are required for admission to some degree courses in mathematics and closely related subjects. The AMSP offers a range of support, for both <b>students</b> and <b>teachers</b>, in preparing for these examinations. This takes the form of enrichment and CPD events, problem solving materials and problem solving conferences.</p>
46	Updated links to other relevant websites which students and their parents might find interesting.
47 - 48	Information about the AMSP including contact details.