

Advanced Mathematics Support Programme®





MEI holds the NCETM CPD Standard

The CPD Standard supports maths teachers to access information about the wide range of CPD provision on offer and to be assured of its appropriateness and quality.

ncetm.org.uk/cpdstandard

Continuing Professional Development Standard

National Centre

for Excellence in the Teaching of Mathematics







Offering Further Mathematics

Continuing Professional Development Standard

National Centre for Excellence in the

Teaching of Mathematics

TR Version 1.2 23/01/2020

Views about Further Maths

- On your tables are some cards. In discussion with a partner arrange them in a line across your desk.
- The further to the right a statement is placed, the more strongly you agree with it.

Further Maths in your school/college

What is the current status of Further Maths in your school/college?

- Is it offered this year?
- Will it be offered next year?
- Are FM students taught in a separate group?
- Are there alternative routes through (e.g. is AS level Further Maths available)?

Aims of the session

- To explore some of the issues related to offering Further Maths in schools and colleges.
- To share ideas of strategies that might be helpful in sustaining this provision, or introducing it where it does not currently exist.

Government incentives

- High Value Course Premium: £400 per student per year if at least two of their A levels are indemand (essentially STEM) subjects
- Advanced Maths Premium: £600 per year, per course for every additional student studying a level 3 maths course (so £2400 over two years for a student taking A level and FM)
- Large Programme Uplift: 10% extra funding for students gaining at least a grade B in 4 A levels (C allowed in Further Maths!)

https://amsp.org.uk/leadership/funding

Different specifications for FM

Students can take different specifications for Further Maths and A level Maths, offering greater flexibility.

	AS Further Maths	A level Further Maths
AQA	¹ / ₂ Pure ¹ / ₂ Applied (2 options)	² ∕ ₃ Pure ¹ ∕ ₃ Applied (2 options)
Edexcel	1/2 Pure 1/2 Applied / Pure (2 options)	¹ ⁄ ₂ Pure ¹ ⁄ ₂ Applied / Pure (2 options)
MEI	¹ ∕ ₃ Pure ² ∕ ₃ Applied / Pure (2 options)	¹ / ₂ Pure ¹ / ₂ Applied / Pure (3 options)
OCR	¹ ∕ ₃ Pure ² ∕ ₃ Applied / Pure (2 options)	¹ ⁄ ₂ Pure ¹ ⁄ ₂ Applied / Pure (2 options)

Discussion

- What are the pros and cons of each specification?
- Are there other factors beyond specification content that should be considered when choosing an awarding body?
- Would reviewing your choice of awarding organisation make it easier to offer FM in parallel or in sequence to A level Maths?
- If AS level is offered is it co-taught with full A level or offered separately?

AMSP support

Contact time for Further Maths students can be lower than other A level subjects. The AMSP can help with the associated challenges!

Resources: Integral

- Free to all schools/colleges that register
- Resources tailored to all major specifications
- Features:
 - Notes and examples
 - Walkthroughs
 - FM videos
 - Exercises (Level 1, 2, 3)
 - Section tests and topic assessments
 - Teacher support

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(Announcemen	ts					
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Fu	urther calcu	ılus					
Co	omplex nur	nbers and	geometry				
м	atrices and	their inve	rses				

integralmaths.org

FM Videos

- Short videos that introduce topics.
- Freely available to registered schools via Integral.
- Integrated into courses on the teacher account
- AMSP registered schools receive a single student account for the videos: You should not pass on the teacher account

Complex numbers 2: The Argand diagram	
Before you start	
You need to have covered the previous section.	
Teaching resources	
Teaching activities (hidden from students)	
Le: Home My courses + Contact us + Using Integral + Free resources + Other links + Topics + Thi	s course +
Image:	
Dashboard > My courses > FM_Videos > Edexcel Further Mathematics videos > Edexcel Year 1 (AS) Core Pure	
De Edexcel Year 1 (AS) Core Pure	
Matrices 1: Introduction and matrix multiplication	
1.1 Basic operations with matrices	
1.2 Multiplying matrices	
1.3 Properties of matrix multiplication	
1.4 Using zero and identity matrices	
Matrices 2: Transformations and invariance	
2.1 Reflections in 2-D	
2.2 Rotations in 2-D	
2.3 Stretches and enlargements in 2-D	
2.4 Successive transformations in 2-D	
2.5 Transformations in 3-D	
2.6 Invariant lines and points	

FM Video+ accounts

- Student accounts with videos plus all the Integral resources for FM.
- Teacher access to student tracking system.
- £30 per student.

amsp.org.uk/teachers/a-level-further/resources

FM tuition

- Can be used to supplement schoolbased teaching
- Online options available
- Some possibility for locally organised faceto-face tuition
- Speak to your local Area Coordinator

https://amsp.org.uk/teachers/a-level-further/student-tuition

University preparation (STEP, MAT and TMUA)

- Online and face-to-face tutorial support
- Student conferences and Problem Solving Matters
- Extension resources
- PD for teachers to support students

https://amsp.org.uk/students/university _admission-tests/step-mat-tmua

Professional development

- Sustained courses
- One-day courses
- Live Online PD
- On Demand PD
- PD videos

amsp.org.uk/teachers/a-level-further/professional-development

Raising participation

- What are the barriers to more students taking Further Maths? (Try to ignore internal logistical issues this time!)
- What sort of outreach work is successful?
- Is there a difference in participation rates between boys and girls? If so, what strategies might overcome this?

A level Mathematics and Further Mathematics entries by gender in England in 2019 (JCQ data)

Male Female

Gender split for A level entries in the UK 2019 (JCQ data)

Male Female

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2019 A level entries in England by subject – female (JCQ data)

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2019 A level entries in England by subject – male (JCQ data)

Strategies for promoting FM to students

- Promotion/tasters of FM to Year 11 students
- Offer AS level FM in Year 13
- Inform the school's IAG policy
- Provide information to parents/carers
- Review FM entry requirements
- Take advantage of AMSP enrichment events!

https://amsp.org.uk/teachers/11-16maths/transition-to-level-3-maths

Progression to university

- Some universities (including Cambridge, Durham and UCL) now require FM for Mathematics degree programmes
- Many others will give a lower grade offer to students with FM

https://amsp.org.uk/students/a-level-further/what-next

Next steps

- Contact your Area Coordinator (if you aren't already in contact with them)
- Planning:
 - Is the way we offer (or plan to offer) Further Maths optimal?
 - How should we promote Further Maths to students?
 - Do we need to access or develop resources?
 - Do we have any professional development needs?

amsp.org.uk

Click on your region under 'Local support' for contact details of your Area Coordinator

About the AMSP

- A government-funded initiative, managed by <u>MEI</u>, 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.

Contact the AMSP

01225 716 492

Offering Further Mathematics

How strongly do you agree or disagree with these statements?

Despite the scaling back of AS levels, Further Maths is a special case that should continue to be available as an AS level	Students should only take Further Maths as an extra, not as part of a three A level programme of study		
School Leadership Teams rarely understand the issues involved in delivering Further Maths	A students needs at least grade 8 at GCSE to be able to access Further Maths		
There are rarely enough students wanting to take Further Maths to make the course viable	Further Maths students tend to need less support than most other A level students		
Further Maths can be taught with less contact time than other A levels	It is impossible to find a scheme of work for Further Maths that can fit comfortably around an A level Maths scheme of work		
It is hard to find teachers willing and/or able to teach Further Maths	Maths and Further Maths together should not be worth two full A levels		

Additional funding to support your advanced mathematics offer

Increasing participation in level 3 maths is a key part of the government's Industrial Strategy to equip more young people with important maths skills and create a more productive economy. The government has introduced several funding incentives to support and increase participation in level 3 maths qualifications.

If your school or college has students studying level 3 maths, you may be eligible for additional funding.

- If you have students studying 2 or more A levels in maths or other STEM subjects, you will be eligible for the High Value Course Premium.
- If you are increasing student participation in any of the advanced (i.e. level 3) maths qualifications, including Core Maths, you may be eligible for the Advanced Maths Premium.
- If you have students studying maths as one of four (or more) A levels, you may be eligible for the Large Programme Uplift.

More detailed information is available on our dedicated webpage: <u>amsp.org.uk/leadership/funding</u>

High Value Course premium (HVCP)

This is **additional funding** to encourage and support the teaching of selected level 3 courses in subjects that research indicates lead to higher salaries. The aim is to increase participation in these, mainly STEM, subjects.

A level Mathematics, Further Mathematics and Statistics are all included in the list of qualifications that attract the HVCP alongside other science A levels and some level 3 vocational qualifications with 360 or more Guided Learning Hours (GLH).

Students enrolled on at least 2 of the selected A levels will attract the premium, which is £400 per student per year the student is on their study programme. This is in addition to any AMP funding.

Advanced Maths Premium (AMP)

This funding is designed to encourage greater participation in the advanced maths qualifications including Core Maths, AS and A level Mathematics and Further Mathematics.

- The premium is £600 per year per additional student, above a baseline, studying an advanced maths qualification.
- The baseline is calculated from the mean number of your students studying advanced maths qualifications in academic years 2015-16 and 2016-17 within your school/college.
- For new providers the baseline is determined from a national average.
- Eligible advanced maths qualifications include: Core Maths, AS/A level Mathematics, AS/A level Further Mathematics and AS/A level Statistics.

Students studying A level Mathematics alongside A level Further Mathematics are counted twice for each year of the two-year course.

Large Programme Uplift (LPU)

Following the decoupling of AS/A levels, many students now study only three A level subjects in both Year 12 and 13. However there is an additional funding uplift for students who are studying **four or more A level subjects** (10% for four A level subject or 20% for five A level subjects). To be eligible, students must achieve grade B or higher in all their A level subjects (or a grade C or higher in Further Mathematics if that is one of the four).

A level Further Mathematics: Structure/Assessment

Specification	Assessment structure	Weightings	Compulsory Pure topics	Optional components
AQA	3 × 2 hours 2 Compulsory Pure 1 Applied	⅔ Compulsory Pure ⅓ Options	 Proof Complex numbers Matrices Further algebra & functions Further calculus Further vectors Polar coordinates Hyperbolic functions Differential equations Trigonometry Numerical methods 	1 examination, students select 2 out of 3 sections from Discrete, Mechanics and Statistics
Edexcel	4 × 1 hour 30 minutes 2 Compulsory Pure 2 Optional	1 ∕2 Compulsory Pure 1 ∕2 Options	 Proof Complex numbers Matrices Vectors Algebra Series Hyperbolic functions Further calculus Polar coordinates Differential equations 	2 optional units, each with a separate examination, from: - Further Pure 1 - Further Pure 2 - Mechanics 1 - Mechanics 2 - Statistics 1 - Statistics 2 - Decision 1 - Decision 2
MEI	- 2 hour 40 minutes (Pure) - 2 hour 15 minutes (major) - 1 hour 15 minutes (minor) <i>or</i> - 2 hour 40 minutes (Further Pure) - 3 × 1 hour 15 minutes (minor)	1 ∕2 Compulsory Pure 1 ∕2 Options	 Proof Complex numbers Matrices Vectors Algebra Series Hyperbolic functions Further calculus Polar coordinates Differential equations 	1 major and 1 minor option or 3 minor options, each with a separate examination, from: <i>Major options</i> - Mechanics - Statistics <i>Minor options</i> - Mechanics - Statistics - Modelling with algorithms - Numerical methods - Extra pure - Further pure with technology
OCR A	4 × 1 hour 30 minutes 2 Compulsory Pure 2 Optional	1 ∕₂ Compulsory Pure 1 ∕₂ Options	 Proof Complex numbers Matrices Vectors Algebra Series Hyperbolic functions Further calculus Polar coordinates Differential equations 	2 optional units, each with a separate examination, from: - Statistics - Mechanics - Discrete Mathematics - Additional Pure Mathematics

AS level Further Mathematics: Structure/Assessment

Specification	Assessment structure	Weightings	Compulsory Pure topics	Optional components
AQA	2 × 1 hour 30 minutes 1 Pure, 1 Applied	1/2 Compulsory Pure 1/2 Options	 Proof Complex numbers Matrices Further algebra and functions Further calculus Further vectors Polar coordinates Hyperbolic functions 	1 examination, students select 2 out of 3 sections from Discrete, Mechanics and Statistics
Edexcel	2 × 1 hour 40 minutes 1 Compulsory Pure 1 Paper covering 2 options	¹ ∕₂ Compulsory Pure 1∕₂ Options	 Proof Complex numbers Matrices Further algebra and functions Further calculus Further vectors 	 1 Paper covering 2 options from: Further Pure 1 and Further Pure 2 Further Pure 1 and Statistics 1 Further Pure 1 and Mechanics 1 Further Pure 1 and Decision 1 Statistics 1 and Mechanics 1 Statistics 1 and Decision 1 Statistics 1 and Statistics 2 Mechanics 1 and Decision 1 Mechanics 1 and Mechanics 2 Decision 1 and Decision 2
MEI	3 × 1 hour 15 minutes 1 Pure 2 options	¹ ⁄₃ Compulsory Pure ⅔ Options	 Complex numbers Matrices Proof by induction Sums of standard series Vectors 	2 options, each with a separate examination, from: - Mechanics a - Statistics a - Modelling with algorithms - Numerical methods - Mechanics b - Statistics b
OCR A	3 × 1 hour 15 minutes 1 Pure 2 options	¹ ⁄₃ Compulsory Pure ⅔ Options	- Proof - Complex numbers - Matrices - Vectors - Algebra	2 optional units, each with a separate examination, from: - Statistics - Mechanics - Discrete Mathematics - Additional Pure Mathematics

These tables are provided for guidance only. For further details please see the full specifications and sample assessment materials:

AQA: aqa.org.uk/subjects/mathematics/as-and-a-level

Edexcel: <u>qualifications.pearson.com/en/qualifications/edexcel-a-levels/mathematics-2017.html</u>

MEI: ocr.org.uk/qualifications/as-a-level-gce-further-mathematics-b-mei-h635-h645-from-2017/

OCR 'A': ocr.org.uk/qualifications/as-a-level-gce-further-mathematics-a-h235-h245-from-2017/

