

50 years at the forefront of Mathematics Education



When, what and how are changes being made in 14-19 maths education (a view from a curriculum development body)

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Information in this presentation was understood to be correct at the time of creation, but some regulations etc may have since changed.





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Registered charity

MEI exists to improve education in mathematics and to support mathematics learning in the workplace





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A level specification and cross-specification resources

Consultation responses





The extent of the FMSP:

- Engages with around **4000** schools and colleges providing news, information, support and resources
- Delivers over 2000 teacher days of CPD each year through a range of innovative and flexible courses, both face-to-face and online, for GCSE and A level Mathematics and Further Mathematics, including support for developing problem-solving skills and preparation for STEP, AEA and the MAT examinations



The extent of the FMSP:

- Promotes the study of A level Mathematics and Further Mathematics to over 10000 secondary students each year through a variety enrichment events, talks and careers presentations
- Provides face-to face and online tuition so that schools/colleges can offer Further Mathematics. The FMSP has provided tuition to thousands of students, tutoring over 400 students each year
- Maintains *local networks of teachers* to share and develop good practice



A and AS level Mathematics entries (UK)





A and AS level Further Mathematics entries (UK)





2005 A level entries by subject





2015 A level entries by subject







2005 2015



Gender Split for A level Entries – UK 2015





- New curriculum from September 2015, *first exam 2017*
- Intention more demanding, more content, greater emphasis on problem solving, taught in more time (though this is schools' choice)
- *Linear* qualifications
- Numerical grades from **9** to **1** (9 high)
- Recent performance table rules mean far fewer early/ multiple entries (only 1st attempt counts in tables)
- HE applications for Autumn 2019 (English GCSE also reformed from Sept 2015, other GCSEs later. From 2019, for a few years, HE applicants will have GCSEs with a mixture of 9-1 grades and A*-G)



Numerical grades:

•1 to 3 = G to D, 4 to 6 = C to B and 7 to 9 = A to A*

A*	⊧	A	B		C	
6.1	7	11.6	19.0		30.5	
9	8	7	6	5	4	
3.7	7.3	7.3	12.7	16.5	20.3	

•a grade 5 will be awarded to the *top third of students* gaining the equivalent of a grade C or bottom third of a grade B. The DfE has said grade 5 will be a 'good pass'.

•the *top 20%* of those who get a grade 7 or above will be awarded a grade 9

"For the academic year starting August 2015, all full time students starting their study programme *who have a grade D GCSE* or equivalent in maths and/or English must be enrolled on a *GCSE or approved IGCSE qualification in maths* and/or English, rather than an approved stepping stone qualification.

Full time students are those on a study programme of at least 540 planned hours if age 16 to 17 or at least 450 hours if age 18."

This summer 30,000 17 year olds re-sat, with a 34% pass rate.



- First teaching from September 2015, first exam 2017, *HE applications for Autumn 2017*. 'Early adopters' a year earlier.
- No fixed content. At least 20% must be beyond GCSE Higher tier. (+ technical guidance that has to be met)
- Same 'size' as AS, but intended to be taught over two years in addition to other academic or vocational qualifications (Has UCAS points A=60, B=50, C=40, D=30, E=20)
- "Core Maths qualifications should consolidate and build on students' mathematical understanding and develop further mathematical understanding and skills in the application of maths to authentic problems, thereby offering progression from GCSE mathematics.



- "Qualifications should provide a sound basis for the mathematical demands that students will face at university and within employment across a broad range of academic, professional and technical fields."
- 6 qualifications available, *all different* and *NOT called* Core Maths!
 - City & Guilds: L3 certificate in using and applying maths
 - OCR (MEI): L3 certificate in quantitative problem solving
 - OCR (MEI): L3 certificate in quantitative reasoning
 - Edexcel: L3 certificate in mathematics in context
 - AQA: L3 certificate in mathematical studies
 (WJEC: L3 certificate in mathematics for work and life)



Quantitative Reasoning

- Modelling
- Statistics
- Financial problem solving
- Working with exponentials
- Working with graphs and gradients
- Measures and scaling
- Probability and risk
- Estimation
- Problem solving
- Communicating solutions
- Use of technology

Quantitative Problem Solving

- Modelling
- Statistics
- Financial problem solving
- Working with exponentials
- Working with graphs and gradients
- Measures and scaling
- Prphahility and risk
- Es Statistical problem solving
- St Problem analysis
- St Data collection
- Us Process and presentation
 - Reporting and interpretation



- Reformed Maths AS/A levels first teaching from September 2017, first AS level exams in 2018 and A level in 2019.
- HE applications for Autumn 2019 same cohort of students who started on new GCSEs.
 (Other A levels are being reformed earlier eg Sciences and English from Sept 2015, HE applications Autumn 2017.)
- Linear qualifications.
- Same grade set (A-E for AS, A*- E for A level).
- AS de-coupled from A level. Maths and Further Maths separate qualifications, so *no overlap in content* between Maths and Further Maths as there is now.



- Content chosen by ALCAB.
 - Fixed for all A level maths: some pure, some mechanics and some statistics. No decision maths. Students have no choice.
 - Pure content for *Further Maths A level* fixed and equals 50% of course. The remaining 50% is optional, depending on what each board offers could be more pure, more mechanics and/or statistics, other applications...
- Increased emphasis on problem solving, modelling, reasoning and proof with use of technology encouraged: not meant to be harder
- New approach to statistics in A level maths a large data set to be explored during the course, using technology. The emphasis is on interpreting data rather than on performing calculations or drawing diagrams. Normal distribution and a couple of hypothesis tests included in A level maths.



- The MEI specification:
- Widely consulted with teachers throughout
 - Have specific working groups on the different strands which includes teachers, academics, industry people
- Further Pure with Technology (able to use computer algebra systems) is one of our recent innovations
- We want to provide suitable A levels for progression to HE in the 21st century, so will continue to innovate



Impact and issues

- Where will the maths teachers come from for GCSE resit and Core Maths?
- CPD needed for teachers as mechanics is now compulsory and there is a new approach to statistics
- There will be considerable upheaval in the school system for several years (and this is wider than just reformed qualifications).
 - Funding cuts are a huge area for concern, see UCAS research 'Unpacking Qualification Reform', Jan 2015.



Impact and issues

- Numbers taking AS/A levels in Maths, and particularly Further Maths, may drop due to
 - Linear qualifications, with AS decoupled maths has flourished under the 'try a bit, succeed at it, now try some more' approach possible with a modular system. Committing to a 2 year course in A level Further Maths when you are 16 is risky.
 - Funding cuts, making it less likely that students can take 4 subjects. This certainly will affect Further Maths, but it will also affect students who up until now would take AS Maths as their 4th subject in Year 12, and then some of these would do well at it and continue to A level.

(enhanced funding for a 4th subject for 4 grade B or above only)

 Students, particularly with grade B/C at GCSE, might be encouraged to take Core Maths, and struggling A level students might be encouraged to change to Core Maths



Final thought....

MEI exists to improve education in mathematics and to support mathematics learning – A level maths hasn't changed for over a decade, we have the opportunity now to take account of the changes in technology and to ensure the new A levels better meet the demands of HE...

...the challenge is to do this whilst seeking to still increase the uptake!



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