



Investigating the impact of curriculum and funding changes on Level 3 mathematics uptake

Comparison of A level Mathematics/
Further Mathematics and Core Maths
uptake in 2016-17 and 2017-18

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Foreword

The 2017-18 academic year is a key year for Level 3 mathematics (AS/A level Mathematics, AS/A level Further Mathematics and Core Maths) because it immediately follows the first sitting of the new, more challenging, GCSE Mathematics examinations, and it is also the first year of teaching of the reformed AS/A levels in Mathematics and Further Mathematics.

Increasing participation in Level 3 mathematics is a national priority. However, there has been much speculation in the mathematics education community that the changes to the mathematics curriculum, combined with changes to post-16 education funding and the de-coupling of AS and A level qualifications, will result in a reduction in the uptake of Level 3 mathematics.

To inform policies aimed at maintaining and increasing Level 3 mathematics participation, MEI felt that a large-scale survey was required to determine, as far as possible, how the uptake for Level 3 mathematics this year in England's schools and colleges compared with the previous academic year. With the help of the A level Mathematics Advisory Board (ALMAB), a contact group of the Royal Society, MEI has conducted a detailed survey of institutions across England that offer Level 3 mathematics.

This report analyses the results of the survey. However, MEI has chosen not to make recommendations or draw firm conclusions in this report. The intention is to make the results available in a neutral way to all interested parties.



Charlie Stripp MBE
MEI Chief Executive

Acknowledgements

MEI would like to thank the hundreds of teachers who took time to complete the extensive survey – this report wouldn't have been possible without their responses.

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Executive Summary

Background

The cohort of students who entered Year 12 in September 2017 was the first to experience the recent major changes to England's mathematics curriculum.

- A new curriculum and grading system for GCSE Mathematics
- A new linear AS/A level curriculum for Mathematics and Further Mathematics

These follow changes to the funding regime for post-16 education, the de-coupling of AS and A level qualifications and the introduction of Core Maths qualifications.

Concern has been expressed that these changes might lead to a reduction in the uptake of Level 3 mathematics.

The true picture of Level 3 mathematics participation rates for the post-16 cohort starting in academic year 2017-18 will not be known until examination entry figures are released in the summers of 2018 and 2019.

In order to give early notice of any underlying changes in participation rates, MEI undertook a national online survey of schools and colleges in December 2017, one term into the first academic year of teaching for the new mathematics AS/A level qualifications.



This report

Valid responses were received from 437 institutions that offer A level Mathematics. Our analysis suggests that the responses were reasonably representative of the national population of schools and colleges offering Level 3 mathematics.

The focus of the questions was on aspects of the situation that could be measured objectively. However, there were open sections in which many respondents wrote about subjective matters, such as students' confidence and motivation.

The report sets out findings from the survey.

Responses to the objective questions are summarised in data tables and charts.

The opinions expressed by respondents are covered through a large number of quotes.

The report ends with 10 short case studies based on the responses from particular institutions.

Key findings

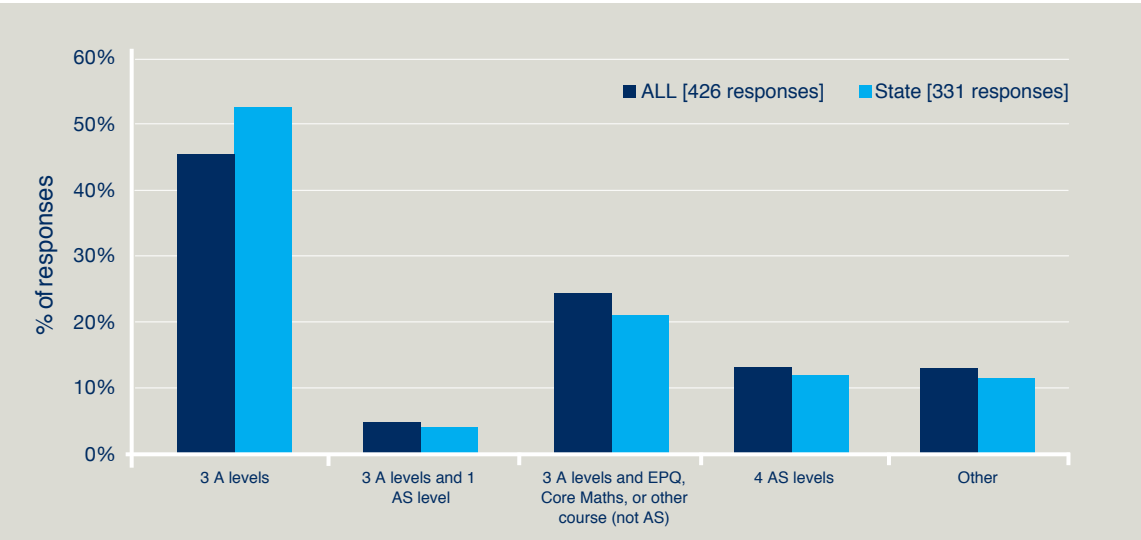
The survey collected data about the Year 12 student cohorts in academic years 2016-17 and 2017-18.

Analysis was conducted across four major themes:

1. Institutional policy on entries to AS/A levels
2. Changes in entry requirements for students taking AS/A level Mathematics and Further Mathematics
3. Changes in participation and provision in AS/A level Mathematics and Further Mathematics
4. Changes in participation in Core Maths

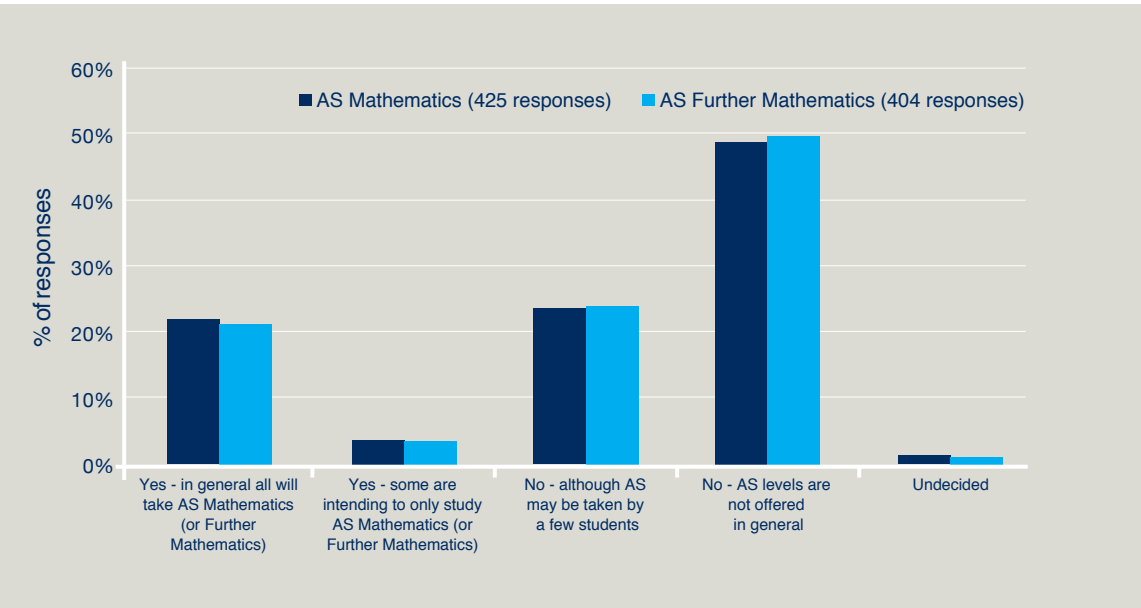
1. Institutional policy on entries to AS and A levels

The most common ‘standard offer’, for all subjects, across all institutions in the survey was 3 A levels only; this was followed by 3 A levels and EPQ, Core Maths, or other course (not AS). Over 60% of state sector Sixth Form colleges/FE colleges offer three A levels only¹.



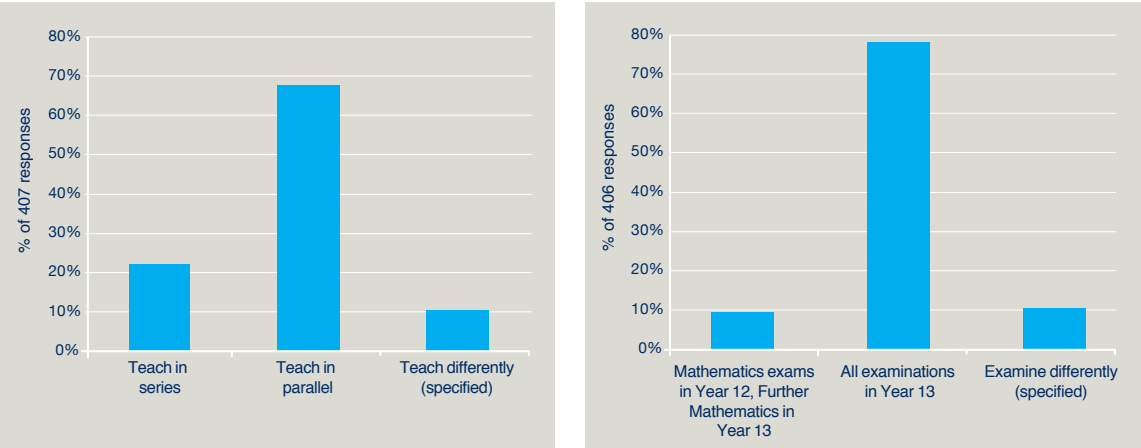
Almost three quarters of responses indicated that ‘AS levels are not offered in general’ or that they ‘may only be taken by a few students’.

Responses to questions in the survey indicate the impact that institutions’ general policies are having on AS levels in Mathematics and Further Mathematics. In only around a quarter of institutions are AS levels in either subject being offered as part of a standard AS/A level programme.



¹ A full breakdown by institution ‘type’ can be seen in table 5.

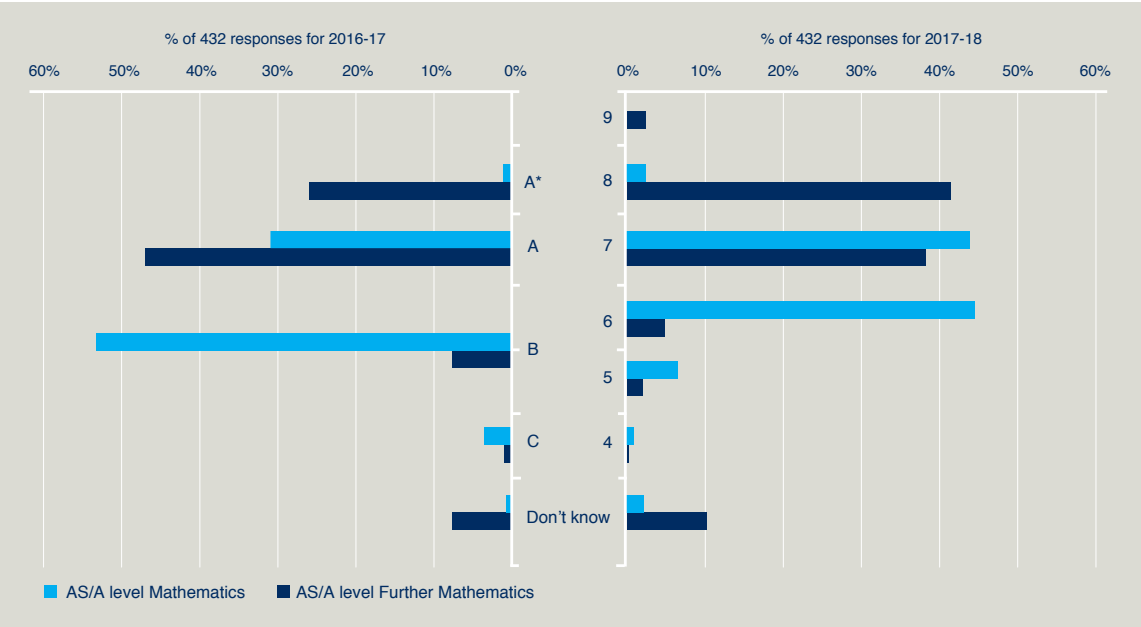
The survey asked how the teaching of Further Mathematics is organised. For those institutions in the survey offering A level Further Mathematics around two-thirds teach A level Mathematics and Further Mathematics in ‘parallel’, meaning they teach both subjects equally across Year 12 and Year 13. Almost four-fifths of those in the survey that offered A level Further Mathematics planned to enter students for both A level Mathematics and Further Mathematics examinations at the end of Year 13.



2. Changes in entry requirements for students taking AS/A level Mathematics and Further Mathematics

Entry requirements in institutions in the survey have increased for both AS/A level Mathematics and AS/A Level Further Mathematics.

The cumulative percentage requiring grades 7 or 8 in 2017-18 is more than 10 percentage points higher than required A or A* for Mathematics in 2016-17². For Further Mathematics the cumulative percentage requiring grades 8 or 9 in 2017-18 is nearly 20 percentage points higher than required A* in 2016-17.

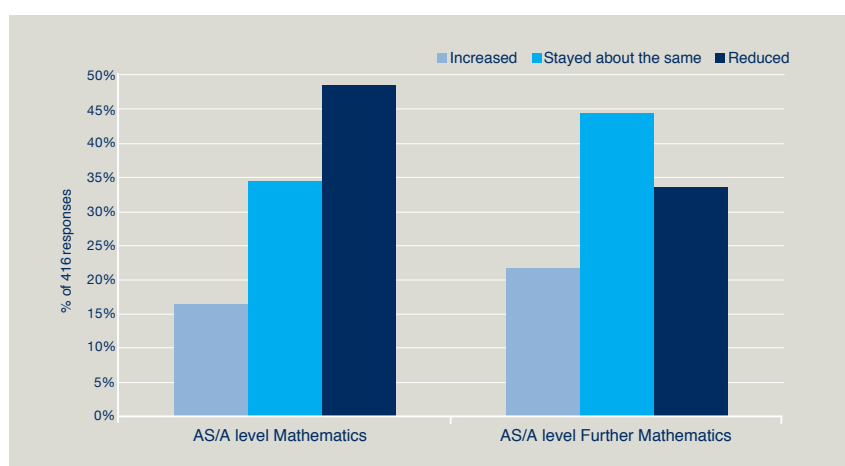


² Ofqual guidance on changing of GCSE grades: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/638308/Grading_new_GCSEs_from_2017.pdf

3. Changes in participation and provision in AS/A level Mathematics and Further Mathematics

Overall, almost half of the respondents indicated that the uptake of AS/A level Mathematics had reduced in their institutions for the academic year 2017-18, when compared with 2016-17.

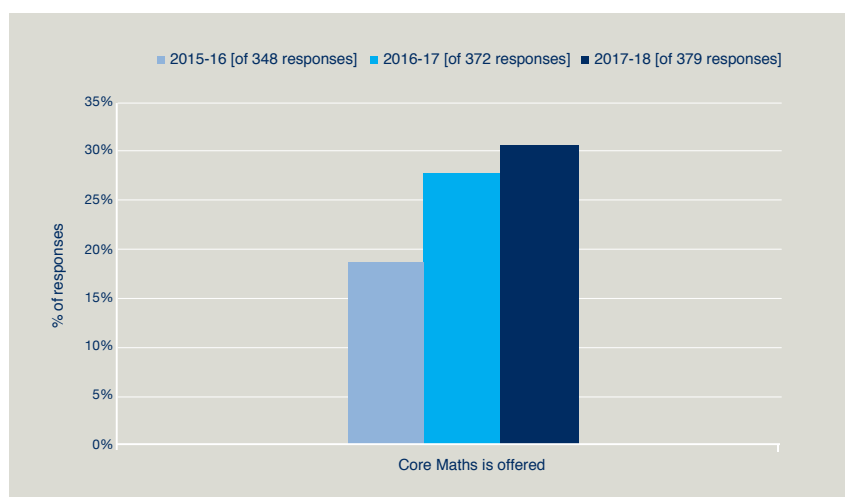
The mean number of Year 12 students per institution in the survey studying AS/A level Mathematics decreased by 8.2%, from 48.5 in academic year 2016-17 to 44.5 in 2017-18. By contrast, the equivalent figure for AS/A level Further Mathematics increased by 3.6% from 11.2 in 2016-17 to 11.6 in 2017-18.



4. Changes in participation in Core Maths between academic years 2015-16 and 2017-18

The proportion of institutions in the survey where Core Maths is offered has increased from 18.7% in 2015-16 to 30.6% in 2017-18.

In institutions in the survey offering Core Maths, the mean number of Year 12 students participating in Core Maths increased from 13.6 in academic year 2016-17 to 17.4 in 2017-18.



Conclusions

Broad conclusions suggested by the survey data are:

In academic year 2017-18

- Most institutions offer Year 12 students on A level programmes the opportunity to study 3 A level subjects

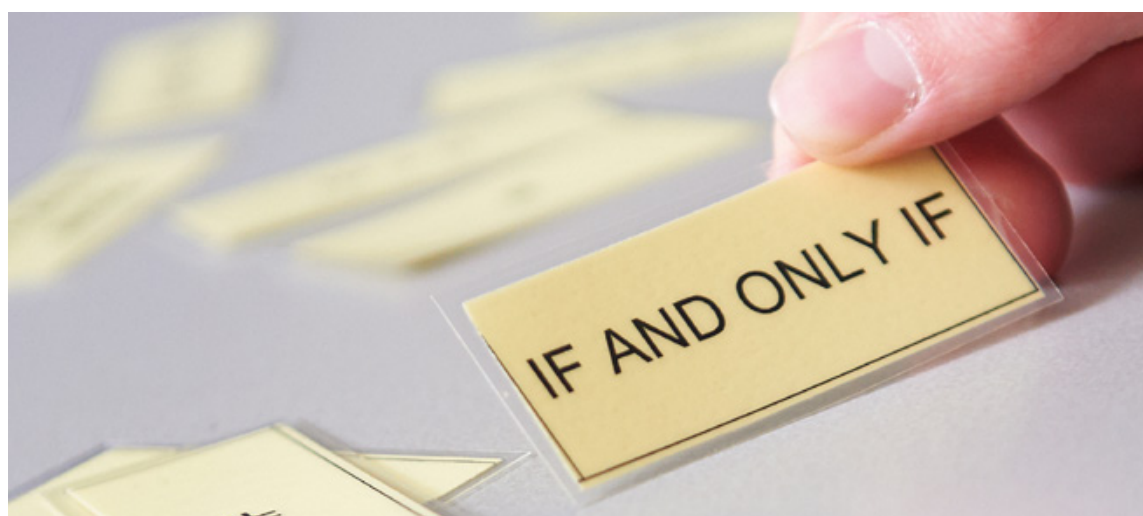
- Most institutions do not offer AS levels

Between academic years 2016-17 and 2017-18

- Institutions have increased the GCSE Mathematics grade they require students to achieve before allowing them to start AS/A level courses in Mathematics and Further Mathematics
- AS/A level Mathematics uptake has reduced
- AS/A level Further Mathematics uptake has remained stable
- Core Maths uptake has increased.

However, caution should be exercised when interpreting the outcomes of the survey. This report is based around student participation soon after the start of the first year of a new situation. It is not possible at this stage to say whether the data will be typical of subsequent years. Nor is it possible to accurately predict the proportion of the students referred to in the report who will go on to enter mathematics examinations in 2018 and 2019. It is also the case that the survey respondents were self-selecting and the survey may have under or over represented different types of institution.

The report includes many of the opinions expressed by respondents. Time will tell whether their hopes or concerns are well founded. This report provides a base line from which judgements about them can be made.



1 | Introduction and methodology

Over the last decade there has been excellent growth in numbers of students taking AS and A level Mathematics and Further Mathematics³. Participation in these qualifications has never been higher.

³ Lord, K & Lee, S (2017) Transition into Higher Education: Universities influence on schools provision for AS/A level Math and Further Maths. Available from: <http://bit.ly/KLordSLee17>

1.1

Background

In recent years, 14-19 education has undergone considerable change to both the content and structure of the curriculum, and to post-16 funding arrangements. For mathematics, the content and structure of GCSE and AS/A level qualifications has changed significantly. The new GCSE Mathematics is more demanding and the new AS/A levels in Mathematics and Further Mathematics have a linear, rather than a modular structure. Concerns have been expressed, including by many mathematics teachers, that these changes, combined with school/college post-16 funding changes and the de-coupling of AS and A level qualifications, would lead to a reduction in the uptake of Level 3 mathematics.

A subset of the first cohort of students that completed the new, more challenging, GCSE Mathematics in summer 2017 now forms the first cohort to start the newly reformed AS/A level Mathematics and Further Mathematics qualifications in academic year 2017-18, so this is a crucial year for Level 3 mathematics.

To try to understand how Level 3 mathematics uptake has been affected by these changes, MEI, with the help of the A level Mathematics Advisory Board (ALMAB), a contact group of the Royal Society, conducted a national survey of schools and colleges offering Level 3 mathematics qualifications.

This report sets out findings from that survey, which was conducted towards the end of the autumn term of the 2017-18 academic year. References to other studies and work in the area are not included in this document; its purpose is to describe the survey's methodology and communicate its results.

This report provides details of the survey content, response rate and a summary of key statistics. Detailed analysis and a set of ten case studies from different schools/colleges, chosen to give a flavour of the range of responses, are also included.



1.2

Survey content and distribution

An extensive online survey with 39 questions across seven sections was created. These sections were:

- **Section 1:** Background information
- **Section 2:** Considering Year 12 intake for AS/A level Mathematics and Further Mathematics
- **Section 3:** Considering the prior attainment of students taking AS/A level Mathematics and Further Mathematics
- **Section 4:** Considering institutional policy on entries for AS and A levels
- **Section 5a:** Considering changes in participation and provision in A levels compared with this time last year
- **Section 5b:** Considering changes in participation / provision in Core Maths compared with this time last year
- **Section 6:** Planned entries for summer 2018 and summer 2019 for Year 12 and 13 students
- **Section 7:** Final comments, contact for follow up and prize draw

A trial of the survey was undertaken with a small number of teachers. Following this some minor

changes were made. The final survey used can be seen in Appendix A.

The survey was sent to over 2500 school contacts on an MEI distribution list at the end of November 2017, with a two-week response period. Completion of the survey was incentivised with respondents able to opt-in to a prize draw for a chance to win one of five £20 vouchers.

The survey was conducted with the support of the A level Mathematics Advisory Board (ALMAB), which acts as a contact group providing input to the Royal Society's Advisory Committee on Mathematics Education (ACME), the London Mathematical Society, the Royal Statistical Society, the Institute of Mathematics and its Applications and the Joint Mathematical Council. There was extensive social media promotion by organisations from across the mathematics education community.

The aim was to seek responses from as many schools and colleges offering Level 3 mathematics as possible. The profile of the respondents was then compared with the national profile of Level 3 mathematics providers, in order to check how representative the respondents were of the national provision.



1.3

Response Rate

Overall 551 responses were received within the two-week period. After data cleaning, 437 responses were taken forward as valid for further analysis. Data cleaning included removing responses that:

- Did not give consent and so the survey ended without any data (3 responses)
- Gave consent but then did not complete any further questions (56 responses)
- Appeared unusable or incomplete beyond the first page of verification questions (32 responses)
- Appeared to be fictitious data that was incomplete (2 responses)
- Were duplicate responses from schools that had already submitted responses – in which case the first response was accepted unless it was incomplete (21 responses)

The first section of the survey sought background information and this was reviewed to see how it compared to the national picture.

One of the primary identifiers was the type of institution. Several options were available to be selected, as well as an 'other (please specify)' option. A breakdown of these can be seen in table 1.

		Institutions	Survey %
State-funded 11-18		274	62.7%
State-funded sixth form/college		46	10.5%
Independent 11-18		78	17.8%
Independent sixth form/college		3	0.7%
Other (please specify)	State	21	4.8%
	Independent	15	3.4%
Total		437	

Table 1 – Type of institution

Those who selected 'other' generally just gave a different age range than was available in the options list, e.g. state-funded 13-18, or independent 4-18. Taking these into account, the overall summary of the responses was:

- 78% state-funded institutions
- 22% independent institutions

The survey was completed by institutions in England that had uptake of AS/A level Mathematics. Accordingly, a population that could reasonably be considered for comparison would be the institutions across England that provide access to A level Mathematics.

At the time of writing, the latest full dataset available from the Department for Education School Performance tables was entries to Summer 2016 A level examinations. This shows entries to A level Mathematics in 2677 institutions (2145 state-funded institutions and 532 independent institutions).

The survey sample size from the population with respect to institutions was approximately 16% (437/2677). This cannot be classed as a high response rate but it is reasonably good for an online survey.

78% of sample responses were from state sector institutions and 22% from independent sector institutions. This compares well with the national proportions of 80% and 20% respectively.

The 'state-funded sixth form/college' category is of particular interest, as institutions in this group tend to have large numbers of students per institution. Additional analysis showed 26 of this sub-group were Sixth Form Colleges and the other 20 were Further Education Colleges. Nationally, there were 90 Sixth Form Colleges and 139 Further Education Colleges that had A level Mathematics entries in 2016 (3.4% and 5.2% respectively of the population). State sector Sixth Form Colleges made up 6.0% of the sample (26 of 437), which means they are over-represented in the responses.

Table 2 shows that the survey responses had a higher percentage of mixed-sex institutions than the national population and a lower percentage of male-only institutions. A further breakdown by state/independent sector showed an over representation of female-only institutions in the independent sector (at the expense of mixed-sex institutions), whereas for the state sector there was an over representation of mixed-sex institutions.

The responses are not a random sample, but their make-up does seem to be reasonably representative of the national population of Level 3 mathematics providers.

	Survey responses [435 institutions]	National [2673 institutions]
Mixed-sex	87.8%	83.8%
Single-sex - female only	10.3%	10.4%
Single-sex - male only	1.8%	5.8%

Table 2 – Type of institution (gender)

1.4

Role of Respondents

The background section also considered who completed the survey. The respondents were provided with a free text box where they could describe their role. Although several indicated that they had more than one responsibility, the summary categories in table 3 cover all those responsibilities given.

Table 3 shows that the most common role was Head of Mathematics, with a further third of respondents having Key Stage 5/Mathematics responsibilities.

	Responses	%
Head of Mathematics	193	44.5%
2nd in Mathematics	30	6.9%
KS5/Mathematics responsibility	137	31.6%
Mathematics teacher	68	15.7%
School Head/Deputy	6	1.4%
Total	434	

Table 3 – Participant role in institution

2 | Key statistics

Analysis of the survey has produced many statistics. The detail and context is in sections 1 and 3, but the key values are collated here for ease of reference and review. These are usually the top one or two most frequent responses from a question.

2.1

Survey methodology key statistics

MEI conducted a national survey that achieved:

- 551 responses of which 437 were suitable for analysis

Type of institutions:

- 341 state sector (78% of 437 responses)
- 96 independent sector (22% of 437 responses)

Type of institutions (detailed level):

- 274 state sector 11-18 (62.7% of 437 responses)
- 78 independent sector 11-18 (17.8% of 437 responses)
- 46 state sector sixth form/college (10.5% of 437 responses)

Participant type:

- 193 Heads of Mathematics (45% of 434 responses)
- 137 responsibility for KS5 Mathematics (31.6% of 434 responses)



2.2

Survey analysis key statistics

The standard offer to A level students across all institutions:

- 3 A levels (45.1% of 426 responses)
- 3 A levels and EPQ, Core Maths, or other course (not AS) (24.2% of 426 responses)

The standard offer to A level students from state sector institutions:

- 3 A levels (52.3% of 331 responses)

The standard offer to A level students from independent sector institutions:

- 3 A levels and EPQ, Core Maths, or other course (not AS) (35.8% of 95 responses)

The standard offer to A level students from state sector sixth form/colleges:

- 3 A levels (62.2% of 45 responses)

Percentages for which AS levels are not offered:

- AS Mathematics is not offered (49% of 425 responses)
- AS Further Mathematics is not offered (50% of 404 responses)

Percentages teaching A level Mathematics and Further Mathematics in 'parallel', i.e. both courses taught alongside each other in Year 12 and Year 13:

- All institutions (67.6% of 407 responses)
- State sector institutions (72.6% of 314 responses)
- Independent sector institutions (45.2% of 93 responses)

Percentages for which both A level Mathematics and Further Mathematics exams will be taken at the end of Year 13:

- All institutions (78.3% of 406 responses)
- State sector institutions (77.3% of 313 responses)
- Independent sector institutions (81.7% of 93 responses)

GCSE Mathematics grade for starting an AS/A level Mathematics course in 2017:

- Grade 6 (45.1% of 432 responses)
- Grade 7 (44.4% of 432 responses)

GCSE Mathematics grade for starting an AS/A level Further Mathematics course in 2017:

- Grade 7 (38.7% of 432 responses)
- Grade 8 (41.4% of 432 responses)

GCSE Mathematics grade for starting an AS/A level Mathematics course in 2016:

- Grade B (59% of 423 responses)
- Grade A (34.5% of 423 responses)

GCSE Mathematics grade for starting an AS/A level Further Mathematics course in 2016:

- Grade A (52.1% of 432 responses)
- Grade A* (29.9% of 432 responses)

GCSE Mathematics grade pairs for starting an AS/A level Mathematics course in 2016 and 2017:

- Grade B in 2016-17, grade 6 in 2017-18 (41.4% - 174 responses from 420)
- Grade A in 2016-17, grade 7 in 2017-18 (30.4% - 128 responses from 420).



GCSE Mathematics grade pairs for starting an AS/A level Further Mathematics in 2016 and 2017:

- Grade A in 2016-17, grade 7 in 2017-18 (38.4% - 146 responses of 380)
- Grade A* in 2016-17, grade 8 in 2017-18 (27.1% - 103 responses of 380).

Uptake of AS/A level Mathematics for 2017-18 when compared to 2016-17:

- Reduced in 48.8% of all institutions (of 416 responses)
- Reduced in 54% of state sector institutions (of 324 responses)
- Reduced in 65.9% of state sector sixth form/colleges (of 44 responses)

Uptake of AS/A level Further Mathematics for 2017-18 when compared to 2016-17:

- Reduced for state sector sixth form/colleges (50% of 44 responses)
- Stayed about the same for independent sector 11-18 institutions (49.3% of 75 responses)
- Stayed about the same for state sector 11-18 institutions (44.6% of 260 responses)

Uptake of AS/A level Mathematics (student numbers)

- Mean students per institution was 48.5 in 2016 (of 409 responses)
- Mean students per institution is 44.5 in 2017 (of 437 responses)

Uptake of AS/A level Further Mathematics (student numbers)

- Mean students per institution was 11.2 in 2016 (of 354 responses)
- Mean students per institution is 11.6 in 2017 (of 359 responses)

Core Maths availability

- 18.6% offered Core Maths in 2015-16 (of 348 responses)
- 27.7% offered Core Maths in 2016-17 (of 372 responses)
- 30.6% offered Core Maths in 2017-18 (of 379 responses)

Uptake of Core Maths for 2017-18 when compared to 2016-17:

- Stayed about the same (61.2% of 227 responses for all institutions)
- Increased (21.1% of 227 responses for all institutions)

Uptake of Core Maths (student numbers)

- Mean students per institution was 13.6 in 2016-17 (of 89 responses)
- Mean students per institution is 17.4 in 2017-18 (of 103 responses)



3 | Survey analysis

The survey sought to gain insight into three major themes. These are reported in this section and are categorised as:

- Institutional policies on entries to AS and A levels
- Entry requirements for students taking AS/A level Mathematics and Further Mathematics
- Changes in participation and provision in AS/A level Mathematics/Further Mathematics/Core Maths from 2016-17 to 2017-18

An overview of responses from an open comments question concludes this section.

The full survey can be seen in Appendix A, and will be referred to within this section.

As reported in section 1, there were responses from 437 institutions, but each question has its own response rate as many questions were not compulsory. It is therefore important when reading the analysis to consider what the response rate was in each case.

3.1

Institution policy on entries to AS and A levels

The responses to this theme are based on questions 18-23 (Section 4) of the survey.

Participants were asked: *What is the “standard” number of courses that A level students can take in academic year 2017-18, in Year 12?* Table 4 shows a summary of the responses, including a breakdown into state/independent sector institutions.

For ‘All’ respondents the most common “standard” offer was 3 A levels (45.1% of 426 responses), followed by 3 A levels and EPQ, Core Maths, or other course (not AS) with 24.2%. However, it was apparent when the responses were broken into state/independent sector that the majority of state sector institutions had a 3 A level offer (52.3% of 331 responses) whereas the most frequent offer in independent sector institutions was 3 A levels and EPQ, Core Maths, or other course (not AS), with 35.8% of 95 responses.

A relatively high percentage of responses fell in the ‘Other’ category (12.9% of all responses). Around one

third of these cited their offer as 4 A levels and the other two thirds indicated that a flexible offer was made.

Responses were also broken down by ‘type of institution’. Table 5 shows this breakdown.

This additional categorisation shows the 3 A levels only option is highly prevalent in state sector sixth form/colleges, at 62.2% of 45 responses, compared to the overall prevalence of 45.1% from 426 responses.

	ALL [426]*	Independent [95]	State [331]
3 A levels	45.1%	20.0%	52.3%
3 A levels and 1 AS level	4.7%	7.4%	3.9%
3 A levels and EPQ, Core Maths, or other course (not AS)	24.2%	35.8%	20.8%
4 AS levels	13.1%	17.9%	11.8%
Other (please specify)	12.9%	18.9%	11.2%

Table 4 – Standard number of courses that A level students can take

	State-funded sixth form/college [45]	State-funded 11-18 [265]	Other (STATE) [21]	Independent sixth form/college [3]	Independent 11-18 [77]	Other (INDEP) [15]	Total/ Overall % [426]
3 A levels	62.2%	51.7%	38.1%	33.3%	22.1%	6.7%	45.1%
3 A levels and 1 AS level	2.2%	4.2%	4.8%	0.0%	7.8%	6.7%	4.7%
3 A levels and EPQ, Core Mathematics, or other course (not AS)	6.7%	22.6%	28.6%	33.3%	40.3%	13.3%	24.2%
4 AS levels	13.3%	12.1%	4.8%	0.0%	15.6%	33.3%	13.1%
Other (please specify)	15.6%	9.4%	23.8%	33.3%	14.3%	40.0%	12.9%

Table 5 – Standard number of courses that A level students can take (by institution type)

The majority of state sector institutions had a 3 A level offer.

* Figures in brackets show the number of responses

	AS Mathematics			AS Further Mathematics		
	ALL [425]*	State [330]	Independent [95]	ALL [404]	State [311]	Independent [93]
Yes - in general all will take AS Mathematics (or Further Mathematics)	22.1%	23.0%	18.9%	21.3%	22.2%	18.3%
Yes - some are intending to only study AS Mathematics (or Further Mathematics)	3.8%	3.0%	6.3%	3.7%	2.9%	6.5%
No - although AS may be taken by a few students	23.8%	24.2%	22.1%	24.0%	24.8%	21.5%
No - AS levels are not offered in general	48.9%	47.9%	52.6%	49.8%	48.6%	53.8%
Undecided	1.4%	1.8%	0.0%	1.2%	1.6%	0.0%

Table 6 – Students who take the AS level examinations

Participants were asked: *Is it the intention that Year 12 AS/A level Mathematics students will take the AS Mathematics examination in June 2018?* A separate question asked the same for AS/A level Further Mathematics. Table 6 shows a summary of the responses for both AS Mathematics and AS Further Mathematics, including a breakdown into state/independent sector institutions.

For both AS Mathematics and AS Further Mathematics almost half of responses (49% and 50% respectively) indicated that 'No - AS levels are not offered in general'. The second highest category, with nearly 24%, was

'No - although AS may be taken by a few students'. Thus in almost 75% of institutions which responded, AS level exams will not be offered, or will only be taken by a few students.

Two questions sought to gain insight into the relationship between the organisation of teaching and, separately, the timing of when students take examinations, for A level Mathematics and Further Mathematics. Tables 7 and 8 show the responses to the question: *For students who are studying AS/A level Mathematics and Further Mathematics, which of the statements best describes how provision is organised?*

For both AS Mathematics and AS Further Mathematics almost three quarters of respondents indicated that AS levels will not be offered, or will only be taken by a few students.

* Figures in brackets show the number of responses

	ALL [407]*	State [314]	Independent [93]
We teach A level Mathematics content in Year 12 and A level Further Mathematics in Year 13	22.1%	15.3%	45.2%
We teach A level Mathematics alongside A level Further Mathematics in Year 12 and Year 13	67.6%	72.6%	50.5%
Other (please specify)	10.3%	12.1%	4.3%

Table 7 – How A level Mathematics/Further Mathematics teaching is organised

	ALL [406]	State [313]	Independent [93]
Students take the A level Mathematics exams at end of Year 12 and Further Mathematics exams at end of Year 13	10.3%	10.2%	10.8%
Students take the A level Mathematics and A level Further Mathematics exams at end of Year 13	78.3%	77.3%	81.7%
Other (please specify)	11.3%	12.5%	7.5%

Table 8 – When students sit A level Mathematics/Further Mathematics examinations

From table 7 it is clear that around two-thirds of all institutions (67.6% of 407 responses) teach A level Mathematics and Further Mathematics in 'parallel'. This way of organising the teaching of Mathematics and Further Mathematics is more common in state sector institutions (72.6% of 314 responses) than in independent sector institutions (50.5% of 93 responses).

Table 8 indicates that almost four-fifths (78.3% of 406 responses) plan to enter students for both A level Mathematics and Further Mathematics at the end of Year 13. There is little difference between state and independent sector institutions overall in when the exams are taken. Further analysis by different types of institution shows that 85.3% (of 75 responses) of independent sector 11-18 institutions plan to enter students for both exams in Year 13, whereas it was much lower for state sector sixth form/colleges, (67.4% of 43 responses).

The section of questions on this theme had an open text box to allow for any further comments/clarification to be made. A few common areas of concern emerged. These are exemplified below.

The most common clarification was with respect to a 3 A level policy, with many stating that Further Mathematics could be seen as an exception to this general rule and could be taken as a 4th A level:

- *Further Maths is an extra, enrichment subject only taken on top of 3 A-Levels (or equivalent).*
- *Further Maths is the only AS course offered. Further Maths is generally a 4th subject.*



* Figures in brackets show the number of responses

- *Generally students are only allowed to study 3 A levels, Further Maths is an exception to this rule where all Further Maths students this year study it as a 4th subject option.*
- *Those taking Further Maths usually do it as part of a 4 A Level package.*
- *Our timetable only allows for 3 A levels, Further Maths has previously been offered outside the timetable, with students doing a lot of independent work.*
- *Further Maths is chosen as an additional 4th A-level. Students cannot opt for mathematics, Further Maths and only 1 other. It is considered an extension. We also review the progress of these students based on A level results at the end of Year 12 as to whether they will take Further Maths AS or retake the entire A level again.*

Specifically in relation to AS level exam entry, a number of respondents commented on a whole-institution policy:

- *Centre policy is that no students take an AS.*
- *It is frowned upon for students to sit AS exams here as the grades count for the school.*
- *No public examinations at the end of Year 12 unless the student is intending to leave the school.*
- *Students sit mock exams in January, and those who look in danger of not passing AS level are entered for the exam to ensure their suitability to continue on the course into Year 13.*
- *AS Further Maths is the only AS which will be offered by this school. I fought to get it allowed so that the students could take it as a 4th option. A level FM is*

taught alongside A level maths so that our brightest students can be distributed amongst the other maths sets, otherwise this can lead to 'sink' groups with no spark.

Some respondents cited a difficulty in co-teaching the new specifications for A level Mathematics and Further Mathematics, and had concerns about university offers if an exam was taken in Year 12:

- *We've found co-teaching maths and further maths very difficult with the new spec. We may change our model for next year.*
- *With the previous specification it was relatively easy to teach these two qualifications side-by-side. We have already found, only three months in to the course, that there are major issues trying to teach the two qualifications in parallel. This may ultimately lead to us being unable to offer Further Maths.*
- *Undecided on exam entry for further maths students, unsure on how university offers would change if students had sat the full A Level paper in year 12.*
- *Until we have a clearer idea of what the new exams are like and whether universities will accept A Level Maths taken in Y12 for Further Maths, we will not enter any students for A Level Maths in Year 12*

With respect to a 3 A level policy, many stated that Further Mathematics could be seen as an exception to this general rule.

3.2

Entry requirements for students taking AS/A level Mathematics and Further Mathematics

The responses to this theme are based on questions 11-17 (Section 3) of the survey.

The first question was a free text box and sought to give respondents an opportunity to describe their standard entry requirements in terms of general GCSE attainment for students starting any AS/A level programme of study in 2017-18.

Over 430 responses were given. The vast majority stated 5 GCSE grades A*-C including English and Mathematics, or equivalent (i.e. 4-9 on the new grading system or other qualifications). A great many responses also gave mathematics-specific requirements, which was the next area of interest in this section.

Those starting AS/A level Mathematics and Further Mathematics in academic year 2017-18 are the first cohort to have taken the new GCSE Mathematics, with its new numerical grading system. *[For reference: Ofqual guidance states that grades 7, 8, 9 are equivalent to the old A/A* grading, and that grades 4, 5, 6 are equivalent to the old C/B grading, i.e. a grade 6 is a 'high' B.]*⁴

A key part of the survey was to consider what the required GCSE Mathematics grade were for entry to AS/A level Mathematics and Further Mathematics in 2016-17 and 2017-18. Chart 1 shows this information for 2016-17 and Chart 2 shows the equivalent information for 2017-18.

Chart 1 shows that the most common requirement for acceptance on to AS/A level Mathematics courses in 2016-17 was a grade B in GCSE Mathematics (59% of 432 responses). Over one-third (34.5%) required a grade A. Grade A was the most common (52.1% of 432 responses) requirement for entry to AS/A level Further Mathematics in 2016. However, over a quarter (28.9%) required an A* grade.

Chart 2 shows that an approximately equal number of institutions require a GCSE Mathematics grade 6 or a grade 7 for entry to AS/A level Mathematics in 2017 (45.1% of 432 responses and 44.4% respectively). For entry to AS/A level Further Mathematics a similar percentage of all institutions require a grade 7 as require a grade 8 (38.7% of 432 responses and 41.4% respectively).

Chart to show the GCSE Mathematics requirements for entry to AS/A level Mathematics/Further Mathematics in 2016-17

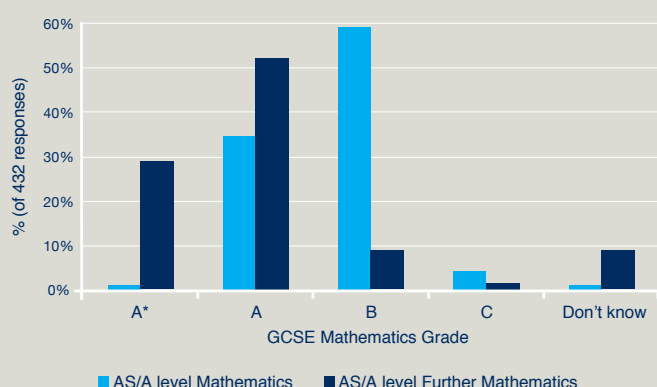


Chart 1 – GCSE Mathematics grade requirements for entry to AS/A level Mathematics/Further Mathematics in 2016-17

Chart to show the GCSE Mathematics requirements for entry to AS/A level Mathematics/Further Mathematics in 2017-18

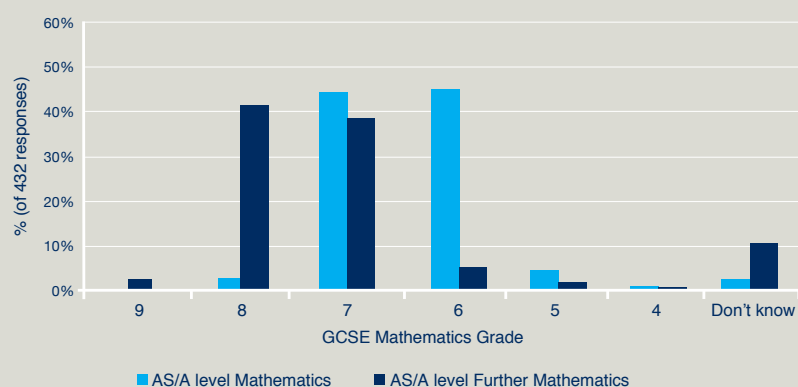


Chart 2 – GCSE Mathematics grade requirements for entry to AS/A level Mathematics/Further Mathematics in 2017-18

⁴ Ofqual guidance on changing of GCSE grades: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/638308/Grading_new_GCSEs_from_2017.pdf

For AS/A level Mathematics, the cumulative percentage requiring grades 7 or 8 in 2017-18 is more than 10 percentage points higher than required A or A* for Mathematics in 2016-17.

The raw data tables, including a breakdown for state sector institutions, as well as additional analysis, can be seen in Appendix B. Additional analysis includes statistics in the following tables:

- Table 18 – Required GCSE Mathematics grade for AS/A level Mathematics (all) in 2016 vs 2017.
- Table 19 – Required GCSE Mathematics grade for AS/A level Mathematics (state sector only) in 2016 vs 2017.
- Table 20 – Required GCSE Mathematics grade for AS/A level Further Mathematics (all) in 2016 vs 2017.

- Table 21 – Required GCSE Mathematics grade for AS/A level Further Mathematics (state sector only) in 2016 vs 2017.
- Table 22 – Required GCSE Mathematics grade for AS/A level Mathematics vs AS/A level Further Mathematics (All) in 2017.
- Table 23 – Required GCSE Mathematics grade for AS/A level Mathematics vs AS/A level Further Mathematics (All) in 2017.

Part of this additional analysis on institutions who gave an entry requirement for both 2016-17 and 2017-18 provided a very interesting finding – many institutions seem to have used the change in GCSE Mathematics to increase their mathematics AS/A level entry requirements.

From table 18 – for AS/A level Mathematics, the cumulative percentage requiring grades 7 or 8 in 2017-18 is more than 10 percentage points higher than required A or A* for Mathematics in 2016-17 (48.6% vs 36.4%). From table 20 – for AS/A level Further Mathematics the cumulative percentage requiring grades 8 or 9 in 2017-18 is nearly 20% higher than required A* in 2016-17 (49.7% vs 31.3%).



Almost half (48.8% of 416 responses) indicated that the uptake of AS/A level Mathematics had reduced for 2017-18 when compared to 2016-17.

3.3

Changes in participation and provision in AS/A level Mathematics and Further Mathematics from 2016-17 to 2017-18

This sub-section contains analysis of the questions which concern any change in the uptake in Level 3 mathematics between 2016-17 and 2017-18.

The responses to this theme are based on questions 8-10 (Section 2), questions 24-29 (Section 5a) and questions 35-36 (Section 6) of the survey.

Participants were asked how the number of Year 12 students studying for AS/A level Mathematics in their institution in November 2017 compared to November 2016, and similarly for Further Mathematics. Chart 3 shows the responses of all institution.

(Note. This question asked participants for a view on how the participation in their institution had changed.)

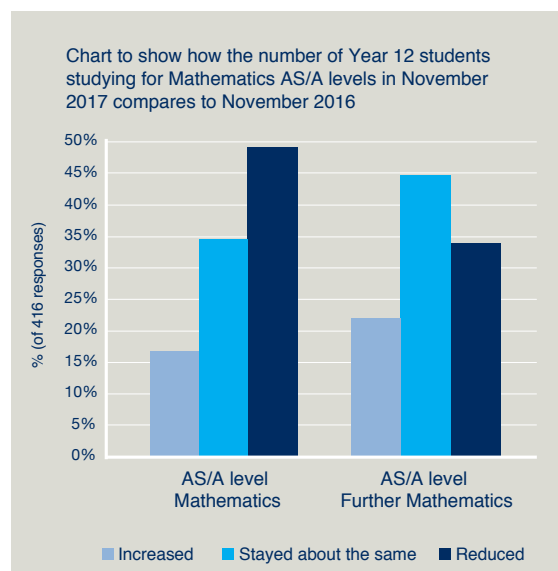


Chart 3 – How Mathematics and Further Mathematics uptake in 2017-18 compares to 2016-17

The mean number of students per institution taking AS/A level Mathematics has decreased by 8.2%, from 48.5 in 2016 to 44.5 in 2017.

There were separate questions which asked for the actual numbers taking AS/A level Mathematics and Further Mathematics.)

Almost half (48.8% of 416 responses) indicated that the uptake of AS/A level Mathematics had reduced for 2017-18 when compared to 2016-17. This was greater for state sector institutions (54.0% of 324 responses – see table 17 in Appendix B). The most common response in respect of AS/A level Further Mathematics was that uptake had 'stayed about the same' (44.5% of 324 responses).

Tables 9 and 10 show further breakdowns of responses by the type of institution for AS/A level Mathematics and AS/A level Further Mathematics, respectively.

Table 9 shows there was a difference in those reporting a reduction in AS/A level Mathematics uptake for different types of institutions with 65.9% of the 44 responses from state sector sixth form/colleges citing a reduction compared with 51.5% of 260 responses from state sector 11-18 and 30.7% of 75 responses from independent sector 11-18. A greater proportion of independent sector institutions than state sector institutions reported an increase in uptake.

	State-funded sixth form college	State-funded 11-18	Other (STATE)	Independent sixth form college	Independent 11-18	Other (INDEP)	Total overall %
Increased	15.9%	15.0%	10.0%	100.0%	18.7%	28.6%	16.6%
Stayed about the same	18.2%	33.5%	30.0%	0.0%	50.7%	35.7%	34.6%
Reduced	65.9%	51.5%	60.0%	0.0%	30.7%	35.7%	48.8%
Total	44	260	20	3	75	14	416

Table 9 – How AS/A level Mathematics uptake in 2017-18 compares to 2016-17 (by institution)

	State-funded sixth form college	State-funded 11-18	Other (STATE)	Independent sixth form college	Independent 11-18	Other (INDEP)	Total/ overall %
Increased	9.1%	21.5%	20.0%	66.7%	28.0%	28.6%	21.9%
Stayed about the same	40.9%	44.2%	35.0%	33.3%	49.3%	50.0%	44.5%
Reduced	50.0%	34.2%	45.0%	0.0%	22.7%	21.4%	33.7%
Total	44	260	20	3	75	14	416

Table 10 – How AS/A level Further Mathematics uptake in 2017-18 compares to 2016-17 (by institution)

Table 10 shows there was also a difference in those reporting a reduction for AS/A level Further Mathematics, 50.0% of state sector sixth form/ colleges, compared with 34.2% of state sector 11-18 and 22.7% of independent sector 11-18. For both state sector 11-18 and independent sector 11-18 institutions the highest percentage was for uptake that 'stayed about the same' (44.2% of 260 responses from state sector 11-18 and 49.3% of 75 responses from independent sector 11-18).

Table 11 shows the paired responses from institutions about changes in their uptake between 2016-17 and 2017-18 for AS/A level Mathematics compared to Further Mathematics.

The most common pair of responses was that both AS/A Mathematics and Further Mathematics uptake have reduced (23.3% of 416 responses). The next most frequent pair was that both subjects have stayed about the same (19.5%). The third most common pair was that AS/A level Mathematics has reduced but Further Mathematics has stayed about the same (18.5%).

Of the total of 91 institutions that stated that uptake for AS/A level Further Mathematics had increased since 2016-17, there were roughly equal proportions of institutions that reported uptake had increased, stayed about the same or had reduced for AS/A level Mathematics.

Participants were also asked to give, to the best of their knowledge, the number of Year 12 students taking mathematics courses in November 2017 and in November 2016. Table 12 shows a summary of the number of students in Year 12 taking AS/A level Mathematics and Further Mathematics. Table 25 in Appendix B provides a further breakdown of these data by gender.

There were different numbers of responses for 2016 and 2017; hence the mean and median values per institution that had entries are shown in the tables. This allows comparisons to be made, rather than looking at the absolute entry numbers, which are less comparable due to the different response rates.

		AS/A level Further Mathematics							
		Increased		Stayed about the same		Reduced		Total / overall %	
AS/A level Mathematics	Increased	32	7.7%	27	6.5%	10	2.4%	69	16.6%
	Stayed about the same	30	7.2%	81	19.5%	33	7.9%	144	34.6%
	Reduced	29	7%	77	18.5%	97	23.3%	203	48.8%
	Total / overall %	91	21.9%	185	44.5%	140	33.7%	416	100.0%

Table 11 – How changes in AS/A level Mathematics uptake compares to changes in Further Mathematics uptake between 2016-17 and 2017-18 [percentages shown are from a total of 416 responses]

	AS/A level Mathematics		AS/A level Further Mathematics	
	2016	2017	2016	2017
Institutions with entries	409	437	354	359
Mean students per institution	48.5	44.5	11.2	11.6
Median students per institution	35	29	7	7
Gender split	43.7% Female	42.3% Female	34.6% Female	34.5% Female

Table 12 – Year 12 AS/A level Mathematics and Further Mathematics uptake in 2016 and 2017

Table 12 shows that the mean number of students per institution taking AS/A level Mathematics has decreased by 8.2%, from 48.5 in 2016 to 44.5 in 2017. The median number of students per institution has fallen by 17.1% from 35 to 29. This agrees with the analysis of chart 3 where a reduction in uptake was the most common response. For AS/A level Further Mathematics the mean students per institution increased by 3.6% from 11.2 in 2016 to 11.6 in 2017 and the median number stayed the same.

The largest absolute difference in mean students per institution were in the 26 state sector Sixth Form Colleges whose average was 208 AS/A level Mathematics students in 2016-17 but which dropped

to 188 in 2017-18. Detailed breakdowns of participation changes by institution type are shown in tables 26 and 27 in Appendix B.

Chart 4 shows the distribution of the size of the increase or decrease in uptake in AS/A level Mathematics from the survey responses. Chart 5 is the equivalent for AS/A level Further Mathematics. Note: The interval widths are not the same. They have been selected so that institutions' responses on uptake of AS/A level Mathematics (and separately AS/A level Further Mathematics) for 2017 compared to 2016 can be grouped appropriately.

Chart 4 shows that for AS/A level Mathematics there has been an overall reduction in uptake, with a reduction of between 1 and 5 students being the most frequent response. The number of responses indicating a reduction is greater than those showing an increase in uptake. Over 40 institutions indicated a reduction of over 21 in the number of students in Year 12 taking AS/A level Mathematics in 2017 compared with 2016.

From chart 5, for AS/A level Further Mathematics, the most frequent response was a reduction of between 1 and 5 students in 2017 compared to 2016. Change in uptake for Further Mathematics was less variable with 0 difference, and an increase of 1 to 5 students also being frequent responses.

These charts, along with table 12, provide a consistent picture of the uptake in 2017 compared with 2016 for those institutions that participated in the survey.

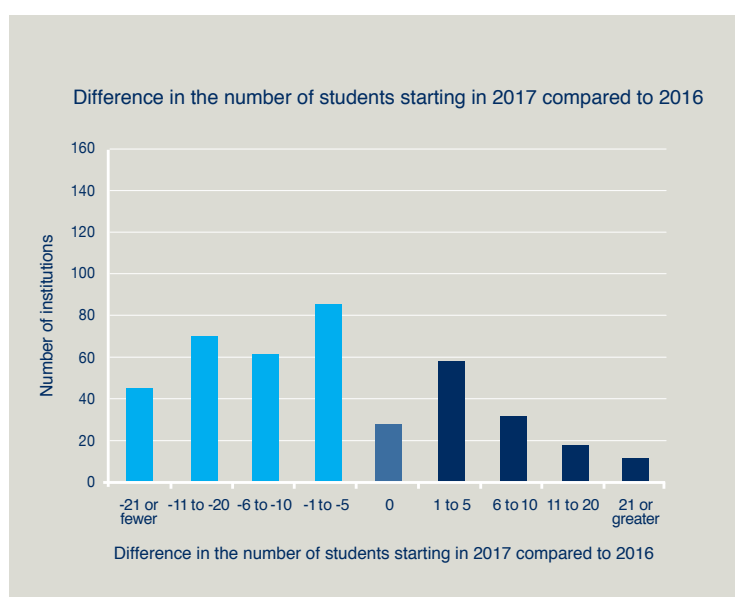


Chart 4 – Distribution of the size of the increase or decrease in uptake in AS/A level Mathematics

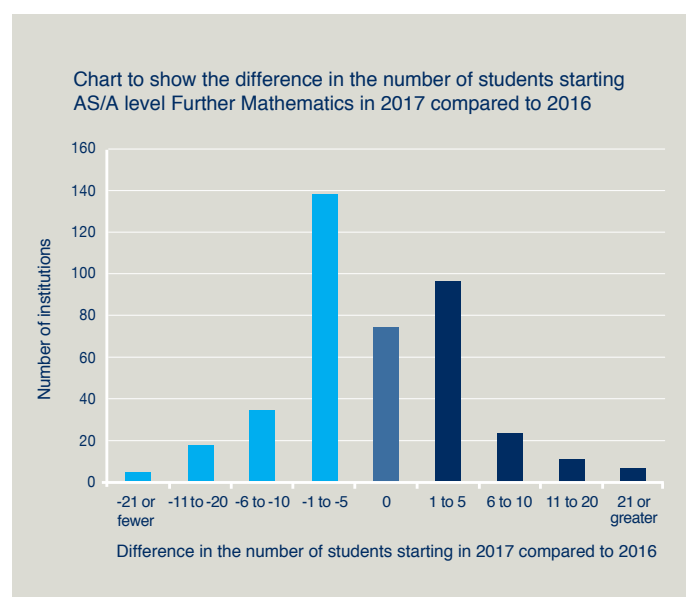


Chart 5 – Distribution of the size of the increase or decrease in uptake in AS/A level Further Mathematics

Participants were also asked to indicate the likely entries for Level 3 mathematics examinations in summer 2018 and summer 2019 in an attempt to find out when students would be examined for the new linear A level courses. However, detailed analysis and comparisons with other data were not straightforward.

At the end of the section an open text box asked: *Reflecting on your answers in this section on the changing uptake and provision, are there any comments or observations you would like to make to clarify why any changes have occurred?*

The most common area for comment was on the new GCSE Mathematics:

- *I believe some students were put off by the new GCSE course grade 6 requirements, by the new GCSE maths course itself (didn't want more of the same) and the fear of another unknown maths course for 2 years following the new GCSE.*
- *A lot of students have been put off because of the uncertainty around GCSE and the likely uncertainty around A level. They didn't like being guinea pigs and the change of goalposts (pass =5 to "standard pass"=4) was ridiculous.*
- *Changes due to more difficult GCSE. Capable students felt they would perform better by avoiding maths A level.*
- *I think students who have sat the new GCSE in maths found it hard and several students who got 7s decided not to take up their A level maths place. This is bizarre, because they were probably better equipped to deal with the new A level than A grade students in the past.*
- *I think the GCSE made a lot of students not want to carry on studying mathematics.*
- *Most of the change seems to be due to a loss of mathematical confidence triggered by the new GCSE.*
- *Students found the new GCSE a very demoralising experience and very hard and so decided not to continue to A level.*

- *I do not believe it is the new A Level that is putting students off but instead the GCSE that has affected student motivation to study maths. With only 52% required for a grade 7 it may be the case that students who would feel confident and capable of studying maths with a grade A in the past may no longer feel as confident and therefore as motivated to study the subject.*
- *The new GCSE appeared to 'put off' a lot of our would-be A level students. They felt that a grade 7 would not be good enough. However, those that have taken AS maths are finding the 'jump' is far less than students have felt in previous years. As teachers we feel our students are better prepared having studied the new GCSE course.*
- *Difficulty of GCSE has put many off. Many used to do AS only to support their other subjects; and drop at end of year 12. We get none of these now.*

Others commented upon issues with general policy on allowing only three subjects:

- *Changes have probably occurred due to the ending of the 'take four AS courses and drop one' which allowed students to try a course, but still have the ability to change direction if they wanted. Now they have to get their choices right first time.*
- *Despite students being able to study 4 A levels, the linear courses seems to have encouraged students to opt for 3 A levels, which I think has meant less students for Further Maths...I think Further Maths is only sustainable at our school as 4th A level.*
- *Further Maths was the only subject at college students were allowed to take as a 4th subject. We promoted this heavily at taster days and reaped the rewards.*
- *The abolishment of AS levels and consequent reduction to 3 options only has reduced intake drastically. We do offer the possibility of Core Maths as a 4th option.*

The most common area for comment was on the new GCSE Mathematics.

Between 2015-16 and 2017-18 there has been a substantial increase in the proportion of institutions offering Core Maths.

3.4

Changes in participation and provision in Core Maths from 2016-17 to 2017-18

The responses to this theme are based on questions 30-34 (Section 5b) of the survey.

Participants were asked a similar set of questions on Core Maths to those previously asked about AS/A level Mathematics and Further Mathematics.

Core Maths qualifications are relatively new qualifications and were first examined in 2016. Participants were asked about whether Core Maths was offered in their school/college and to indicate the academic years that it had been taught. Table 13 provides summary data of how many institutions offered the qualifications in the past three years.

	2015-16 % [348]*	2016-17 % [372]	2017-18 % [379]
Core Maths offered in both Year 12 and Year 13	8.3%	15.6%	18.2%
Core Maths offered in one of Year 12 or Year 13, but not both	10.3%	12.1%	12.4%
Core Maths is not offered	81.3%	72.3%	69.4%

Table 13 – Availability of Core Maths in institutions in the past three years

Between 2015-16 and 2017-18 there has been a substantial increase in the proportion of institutions offering Core Maths in Year 12 and Year 13, from 8.3% (of 348 responses) in 2015-16 to 18.2% (of 379 responses) in 2017-18. The proportion of institution where Core Maths is not offered has decreased from 81.3% (of 348 responses) in 2015-16 to 69.4% (of 379 responses) in 2017-18.

Participants were asked how the number of Year 12 students studying Core Maths in November 2017 compared to November 2016 for their institution. Table 14 shows their responses with a breakdown for state sector institutions only shown. The response rates here are lower reflecting that fewer institutions offer Core Maths.

	ALL [227]	State [183]
Increased	21.1%	23.5%
Stayed about the same	61.2%	56.8%
Reduced	17.6%	19.7%

Table 14 – How Core Maths uptake in 2017-18 compares to 2016-17

The majority of respondents indicated that between 2016-17 and 2017-18 the uptake of Core Maths stayed about the same (61.2% of 227 responses). A slightly higher percentage selected an increase had been seen (21.1% of 227 responses), than selected that a decrease had been seen (17.6% of 227 responses). A similar pattern of responses was observed for state sector institutions only.

Table 15 illustrates data from respondents who were asked for specific numbers of Year 12 students taking Core Maths in November 2017 and 2016. Note that the response rates are lower than before as the table shows data only from those institutions which offered Core Maths in either 2016 or 2017.

Table 15 illustrates that the number of institutions with Core Maths entries had risen between 2016-17 and 2017-18. The total number of students studying Core Maths had also risen considerably. The mean number of students per institution increased by 27.9%, from

	ALL		State	
	Year 12 Core Maths 2016-17	Year 12 Core Maths 2017-18	Year 12 Core Maths 2016-17	Year 12 Core Maths 2017-18
Institutions that had some Core Maths uptake	89	103	82	93
Total students	1213	1796	1091	1606
Mean students per institution	13.6	17.4	13.3	17.3
Gender	45.2% Female	48.7% Female	45.7% Female	50% Female

Table 15 – Core Maths uptake in November 2016 and November 2017

* Figures in brackets show the number of responses

13.6 (from 89 responses) in 2016-17, to 17.4 (from 103 responses) in 2017-18. The proportion of female students taking Core Maths increased from 45.2% in 2016-17 to 48.7% in 2017-18.

At the end of the section participants were asked if there were any comments or observations they would like to make with respect to the provision of Core Maths in their institution. Some of the 180 comments that were made have been reproduced here, to illustrate the different areas of interest given by respondents – not all comments are included.

There were several comments by teachers indicating a lack of understanding of the qualification:

- *Don't understand what you mean by Core Maths. We don't do a separate Core Maths course, they all study core maths in the AS/A level Maths*
- *I don't really understand this section, all students study Core Maths as part of their A-level so do you mean something else by Core Maths?*
- *I don't really understand what is meant by Core Mathematics. Is this the constituent of A level or something else?*
- *What is core maths?*

A few teachers cited an 'image' problem for the subject with it having a lack of currency, specifically with respect to universities:

- *We still need to work on the image of Core Maths as a supportive qualification - not a "not good enough for A Level" qualification*
- *No demand from students due to not being worth anything for university*
- *Due to the lowest UCAS points students are not choosing it as an option. An EPQ can reduce a student's offer but this is not the case as far as I am aware with Core maths.*

There were more responses about issues with funding and/or decisions made by senior leadership which meant the qualification wasn't offered:

- *I really want to offer Core maths and had students wanting to do it (both in year 12 and year 13) but the Senior leadership could not see how to fit it in the timetabling as it is only an AS qualification. So despite seeing the benefit it has not run.*
- *I'm still working on SLT to offer Core Maths instead of EPQ as an option.*
- *We have the ability and will to offer it. Management won't let us.*

- *No funding, SLT see it as not a priority, not enough Maths teachers in area to successfully do this anyway*
- *The Maths team are keen to offer Core Maths in the 6th form, but financial constraints means that at the moment it is not possible.*
- *A popular subject when we offered it. Course cut for financial reasons*

There were also many responses that indicated good support for Core Maths and in many cases it was part of a comprehensive subject offer:

- *Core maths is compulsory for any pupil taking the Technical Baccalaureate route.*
- *We have doubled our intake this year and Core Maths is a compulsory course for students who have a GCSE and do not opt for an additional A level.*
- *Core Maths is now a part of a conditional offer for some A levels especially in Psychology, this has seen a significant increase in the number of girls taking it up*
- *Core Maths has only been offered so far as an alternative course for students who were likely to not pass A Level Maths. As of next academic year a Level 3 Maths qualification (for those who have passed GCSE Maths) will be compulsory for every student in Sixth Form, whether that be A Level Maths, Core Maths, or an alternative such as Financial Maths, therefore we are likely to see a significant increase in the uptake next year.*
- *It is offered as an enrichment option on top of 3 A Level choices*
- *Enjoyed by students and staff*

Some respondents saw flexibility in the subject, whilst others didn't:

- *We offer as a one year course to year 13 students only. The student numbers have grown each year from 18, 28 to 50 this year.*
- *We have only just started the provision so is offered instead of an EPQ. Students are not liking the fact that we do it over 2 years, where the EPQ can be done over 1 year*

Some respondents felt that an increase in Core Maths was affecting A level numbers:

- *Class size likely to increase next year but at the expense of A level maths. Students are viewing it as a less difficult way to continue maths alongside their other subjects.*

3.5

Open comments: major themes

The final section of the survey gave participants the opportunity to add any additional “comments, observations, or suggestions” they wished to make about the uptake of Level 3 mathematics.

A free text box was given. However, to encourage responses, a list of ‘possible’ areas for comment was given as a prompt. To try to alleviate comment on a small number of points, the list was quite long and wide-ranging, with the following text used:

For example consideration could be given to passing comment on - Post-16 funding, teacher capacity/CPD, teaching time allocation/timetabling, teaching resources, new AS/A level specifications/subject content, new GCSE Maths, etc.

Over 150 comments were received, some being quite long. Many of the topics in the suggested list were mentioned. Some have been reproduced here, to illustrate the different areas of interest given by respondents – not all comments are included.

New GCSE Mathematics

The most commented upon area was that of the new GCSE Mathematics, particularly with respect to how it was affecting uptake of post-16 mathematics. Positive comments made included:

- *The teaching of new GCSE mathematics I have done has been positive - it seems more interesting and more beneficial to the students.*
- *The new GCSE with the accompanying change to 4 hours per week appears to have equipped students better for the demands of A level.*
- *I feel the new style GCSE prepared the students better for the new A level than expected - they are more used to the problem solving approach.*

These were far outweighed by comments citing concern that post-16 uptake was negatively affected by the new GCSE Mathematics:

- *I feel that the difficulty of the new GCSE put students off applying for AS Mathematics.*
- *I think the number of students doing A level Maths has decreased because GCSE Maths has got harder and thus scared off students.*
- *There is definitely more negativity since the changes to GCSE.*
- *Definitely decreased after new GCSE*
- *The new GCSE discourages a lot of students who would previously have considered A Level Maths due to perceived difficulty, despite reassurance from teachers.*
- *The change to the GCSE definitely scared some students off as this is our smallest cohort for several years.*
- *A level maths and further maths have been badly harmed by GCSE reform. We are hoping that numbers will recover over time. It does look like Core Maths will become well established as we move forward though.*
- *Post 16 maths classes getting bigger. Recruitment reduced because current GCSE students think A Level maths will be too hard.*
- *The new GCSE has wiped us out. It has been a miserable experience for most students.*
- *The uncertainty of the new 9-1 GCSE led local schools to paint the picture of GCSE Maths as being 'very hard' with few expecting grade 9 - we feel this put them off considering A-level Maths. Hopefully their relative success will lead to more to AS Maths next year.*

The most commented upon area was that of the new GCSE Mathematics, particularly with respect to how it was affecting uptake of post-16 mathematics.

“The drive to reduce all students to 3 A-Levels will have a long term impact, especially on Further Maths, unless the universities make this a more beneficial choice.”

There was also specific comment about the preparation the new GCSE Mathematics gave for mathematics post-16:

- *GCSE 9-1 intention was to build fluency and develop overall understanding of mathematical concepts. I have not seen this within 2017-18 cohort. Learners are still taught to exam and a large number of my learners beginning AS level mathematics were unable to work with fractions comfortably without us undertaking activities to develop this knowledge/ understanding.*
- *The new GCSE has prepared good students well for the new A-level. I am not sure about how student getting a 5 or 6 feel about their abilities in Maths.*
- *The style of the new GCSE does not seem to prepare student well for A level Maths - most students at this school are aiming for a grade 7, which means they can begin A level with only around 50% of the GCSE Higher content really understood. The A level does not assume complete GCSE prior knowledge, but more than 50-60% would be nice!*

Post-16 funding

The second most commented upon theme was that of post-16 funding. As shown earlier in table 4, there appears to be a move towards 3 A levels being the ‘standard’ offer, and here the comments align that to funding:

- *Current funding does not encourage colleges to offer more than 3 A levels.*
- *The drive to reduce all students to 3 A-Levels will have a long term impact, especially on Further Maths unless the universities make this a more beneficial choice, e.g. lower offers if studying Further Maths.*
- *I think our uptake of A level further maths will decrease in the future as students are more restricted to studying 3 A levels. We are considering how to become more flexible in our teaching to be able to offer AS and A level alongside each other.*
- *I have no concerns for our school but I do have concerns that Further Mathematics could become squeezed out of other schools due to only 3 A-levels being offered.*
- *Small number of students taking Further Maths might cause the school to decide not to provide it as an option in future.*

Numerous comments were made on the Autumn 2017 Budget announcement by the Government of an additional £600 for those who study

A level Mathematics/Further Mathematics or Core Maths. However, with no actual detail on the policy available at the time of the survey, teachers’ responses varied. Some thought it positive, but the majority who commented suggested it wouldn’t make a difference or that it could penalise their school:

- *I was encouraged by the offer of £600 per additional student studying maths at level 3 in the budget and hope that my institution will now offer core maths as well as the EPQ*
- *New £600 per extra maths student announced in budget seems unlikely to make a significant difference in our school since we already encourage all of those qualified to do so to study maths at some level and we are unlikely to reduce entry requirements.*
- *Funding both on a school wide and a Maths Department Level. Rather than nationwide initiatives, give departments the money! The £600 per new Maths student initiative does nothing to help successful departments.*
- *New plans for £600 per ‘extra’ Maths student could punish those who were early adopters of Core Maths. Those who already have good numbers, could not get any extra cash.*

New AS/A level specifications/subject content

Respondents had some specific points to raise about the new mathematics AS/A level specifications. These included the AS content and the co-teaching of Mathematics and Further Mathematics:

- *The spec is content heavy if you are hoping to enter students for AS in year 12.*
- *I think there is too much content in the new AS Maths for the recommended delivery time to students.*
- *I feel now more than ever that for those studying further maths, they should do A level maths in year 12 and A level further maths in year 13*
- *I think it is harder to teach the Further Maths alongside the Maths compared with the previous spec. Again this disadvantages state school students whose maths provision has to be organised in this way because of numbers on courses.*
- *It is very hard doing further maths in parallel to maths. Even harder than before.*

“I feel the transition into A Level should be made smoother with the new GCSE and am therefore optimistic regarding the reforms so far.”

More general comments were also made on how the subject content could affect uptake of the subject nationally:

- *The subject content for the new Maths A-level is both harder and greater in content, contrary to assertion, but the students have faced harder GCSEs. This means that fewer want to take A-level Maths, but have been prepared to a higher level. This increased difficulty will be found out by the student body nationally, and numbers will fall further than they have already.*
- *The new Further Maths content makes all the hardest content compulsory and is significantly more challenging. If I as a teacher find the new content entertainingly interesting, it's too hard for ordinary students. We have consciously curbed numbers on AS Further Maths in order to compensate for this change. I expect a shrinking of national uptake of Further Maths, despite the government's recently announced additional money.*
- *I think that the move to a linear course is an enormous mistake and will lead to the serious decline in the up-take of mathematics in schools. To put my comments in context, I have been teaching since 1982, so I have experience of linear and modular versions of the maths suite of A Levels.*

Teaching time allocation, timetabling and teaching resources

This theme covered several ideas, including the timetabling of the subject:

- *We have to really fight to get enough hours on the timetable, specifically for our group doing A level in a year, who only have 11 hours a fortnight. We are having to change plans for them as we don't feel we have long enough to get through both full A levels*
- *I feel the transition into A Level should be made smoother with the new GCSE and am therefore optimistic regarding the reforms so far. However I am very apprehensive about the new A Level given the minimal resources and sample assessment materials that have been released so far. We are in a very fortunate position to have 4 A Level Maths and 3 A Level Further Maths teachers in our department, but given the big push of Level 3 Mathematics nationally it is a concern to me as to how this will be staffed long-term, given the shortage of Maths teachers, particularly those qualified and experienced at Level 3.*

- *We teach 4.5 hours per week, and I would like to see some funding to go to increase it to 6 hours per week, which will allow us to have more students with a GCSE level 6 grade. At the end of the day, it's about added value. I rather have an E grade getting a C than an A* getting an A**
- *We are also introducing Core Maths next year. A new concern is that recruitment into Core Maths will negatively influence recruitment for A-level Maths.*

A number of comments were made about the teaching materials for the new specifications and the quality of these materials:

- *New textbooks should have been produced in plenty of time - we were teaching for 2 months without a textbook.*
- *CPD and resources - Especially Further Maths - launched without adequate text books. Utterly ridiculous for a subject like Maths that relies on content and questioning.*
- *It seems ludicrous that no textbooks were written PRIOR to the start of teaching for A level Further Maths.*
- *I have found inconsistencies between XYZ Syllabus and their course textbook.*
- *New XYZ textbook has been pitched at a very high level.*
- *We are very disappointed with XYZ in terms of available textbooks and online resources - they have missed several deadlines now and we'll have taught the content before what they promised is actually available. If they'd given us an honest/accurate view we would have made a different choice.*

Comments covering several themes, including CPD

Though it would be possible to assign each comment to a specific theme, many replies covered several topics and so it is useful to consider them in their entirety. Some examples include:

- *We feel numbers have reduced due to a variety of reasons: - only allowing students to take 3 subjects generally - increasing offer of Core maths - 'harder' GCSE has put students off - although we don't feel that the students we do have are any better than previous years. The lack of information and resources for the new A levels has made it difficult to really sell it this year as we were unsure which board/options etc for a while. Squeeze on funding has threatened subjects with low uptake (fortunately we*

will be allowed to keep running Further Maths) and decreased our teaching time.

- *There are just not enough good quality maths teachers out there and I am very lucky with my department. Students seem better prepared for A level following the new GCSE. Still no Further Maths mechanics and stats books published in December -this is proving very, very difficult for the teachers.*
- *We do not have enough qualified Maths teachers, budgets are tight so there is a lack of resources. Students are not being given enough support because their teachers are stretched to the maximum.*
- *Very little (or no) directed time is given by the school to allow teachers to improve their subject knowledge at A level which has made the transition to the new specification difficult*
- *The new GCSE has wiped us out. It has been a miserable experience for most students. Staffing is also going to be increasing issue - I am struggling to find teachers who are actually competent/confident to take the top sets. We start the GCSE in year 9 - I therefore need 6 staff for my three top sets. We run 3 A level groups and a Double Maths group. We are in danger of not being able to cover our A level/top sets.*

// Very little (or no) directed time is given by the school to allow teachers to improve their subject knowledge at A level which has made the transition to the new specification difficult.”



4 | Case studies

To understand more clearly what is happening in different types of institution, it is useful to consider complete submissions from schools/colleges. This section provides ten case studies. The types of institution chosen are in roughly the same proportion as the overall response rate, but institution size, location, Level 3 mathematics provision and uptake levels (including examples with increases, decreases and ones that have stayed about the same) were also considered, in order to select a range of case studies.

4.1

State-funded Sixth Form College

Respondent's Role:	Head of Mathematics
Type of Institution:	Mixed-sex state-funded sixth form college
Standard offer for A levels:	3 A levels

Mathematics/Further Mathematics teaching and examining:

- A level Further Mathematics content taught alongside A level Mathematics in Year 12 and Year 13
- A level Mathematics and A level Further Mathematics exams taken at end of Year 13
- In general AS Mathematics examinations will not be taken in summer 2018, though they may be taken by a few students
- All Further Mathematics students will take AS Further Mathematics examinations in summer 2018.

Student grade requirements and uptake of Mathematics AS/A levels:

AS/A level	2016-17		2017-18	
	Mathematics	Further Mathematics	Mathematics	Further Mathematics
GCSE Mathematics Grade required for course	B	A	6	7
Student uptake [Mathematics - REDUCTION] [FM - REDUCTION]	328 (193 Male, 135 Female)	75 (50 Male, 25 Female)	228 (128 Male, 100 Female)	50 (26 Male, 24 Female)

Comments/quotes:

AS/A level Mathematics and Further Mathematics uptake in 2017, when compared to 2016 had reduced. In an open comments box it was stated that:

"Numbers are definitely down, they have been affected by the difficulty of the new GCSE."

The institution has offered Core Maths for the past two years. The current uptake, 12 students, is a reduction on the 20 students who studied the qualification in the last academic year. Considerably more females are taking the course than males. They commented:

"More Year 13 students have taken up Core Maths as a 1 year course, ... less Year 12 students are taking it this year."

The following remark was given when asked at the end of the survey for any further comment:

"Funding at 6th forms is a massive issue and increased workload is impacting quality of delivery and support. New content for A level Maths has not been properly thought out and there is a real

lack of quality resources. At Further Maths this is even worse, I have had to contact exam boards to highlight errors and discrepancies in specimen content in relation to their specifications."



4.2

State-funded Sixth Form College

Respondent's Role:	Curriculum Manager for Mathematics
Type of Institution:	Mixed-sex state-funded sixth form college
Standard offer for A levels:	3 A levels

Mathematics/Further Mathematics teaching and examining:

- A level Mathematics content taught in Year 12, A level Further Mathematics in Year 13
- A level Mathematics and A level Further Mathematics exams taken at end of Year 13
- In general AS Mathematics or AS Further Mathematics examinations will not be taken in summer 2018, though they may be taken by a few students

Student grade requirements and uptake of Mathematics AS/A levels:

	2016-17		2017-18	
AS/A level	Mathematics	Further Mathematics	Mathematics	Further Mathematics
GCSE Mathematics Grade required for course	B	A	6	7
Student uptake [Mathematics - REDUCTION] [FM - REDUCTION]	168 (109 Male, 59 Female)	36 (26 Male, 10 Female)	107 (71 Male, 36 Female)	24 (17 Male, 7 Female)

Comments/quotes:

There is a general policy of students needing 5 GCSE's at grade C/4 or above, including at least one of Mathematics or English. It was noted that students generally have higher grades in GCSE Mathematics than the minimum requirements. In respect to uptake they commented:

"Whilst the total number of year 12 students in our college has gone down compared to last year, the drop in Maths numbers is significantly larger. I put this down to the new GCSE Maths specs frightening year 11 students."

"Students will only take AS Maths in year 12 if they don't want to take the full A-level, or if we don't think they will be successful in the full A-level. Hopefully this will only be a handful."

The institution hasn't had any entries to Core Maths in the past three years and indicated that there are unlikely to be any in the coming few years, stating:

"We have never offered Core Maths. This is simply because there isn't any funding available for a course that would be extra hours on top of those needed for a full-time student."

They made the following remark when asked at the end of the survey for any further comment:

"I think the number of students doing A-level Maths (& Further Maths) has decreased for two main reasons. Firstly, students now do 3 A-levels by default (or possibly 4 if doing Further), rather than 4 AS-levels and then 3 A-levels (possibly 5, then 4 if doing Further). Students who would have picked Maths as their 4th subject will no longer be studying it. And students will be reluctant to have Maths as two-thirds of their programme. But this issue would have already affected 1st year numbers last year."

I therefore feel the main reason for the drop in numbers is because GCSE Maths has got harder, and thus scared off students. Students will be reluctant to study a subject in which they were consistently getting in the 40%'s in tests – which says they don't know much Maths – even if this did turn out to be worth a grade 6 in the final exam. Similarly, getting 50% - which is about a grade 7 – does not fill students with confidence, so why on Earth would they want to do 2 A-levels in Maths? Even if their eventual grade says they are good enough to do Maths A-level(s), their confidence might have been dented to an extent that they wouldn't even have applied to do the course."

4.3

Independent 11-18 school

Respondent's Role:	Deputy Head of Mathematics
Type of Institution:	Mixed-sex independent school
Standard offer for A levels:	3 A levels and EPQ, Core Maths, or other course (not AS)

Mathematics/Further Mathematics teaching and examining:

- A level Further Mathematics content taught alongside A level Mathematics in Year 12 and Year 13
- A level Mathematics and A level Further Mathematics exams taken at end of Year 13
- In general AS Mathematics or AS Further Mathematics examinations will not be taken in summer 2018, though they may be taken by a few students

Student grade requirements and uptake of Mathematics AS/A levels:

AS/A level	2016-17		2017-18	
	Mathematics	Further Mathematics	Mathematics	Further Mathematics
GCSE Mathematics Grade required for course	A	A*	6	7
Student uptake [Mathematics REDUCTION [FM - REDUCTION]]	48 (25 Male, 23 Female)	20 (12 Male, 8 Female)	28 (19 Male, 9 Female)	4 (2 Male, 2 Female)

Comments/quotes:

Most students met the entry criteria comfortably. There were a small group who did not meet the criteria, but were allowed to continue as they expressed a strong desire to attempt the course. It was also noted that:

"as we have a lot of international students we have to be fairly flexible. We have made our requirements more clearly stated for the coming year."

The school is considering a switch to a model in which Mathematics is taught in Year 12 and Further Mathematics in Year 13, as they have concern over 'clashing topics' when teaching the new A levels in parallel. They also stated:

"The decoupling of AS exams has meant that students are now encouraged to only take 3 A levels as standard from the beginning. This will naturally reduce the numbers starting courses in all subjects, Maths and Further Maths included. What's worse is it traps students in their chosen subjects for the two years."

The institution hasn't had any entries to Core Maths in the past three years and indicated that there are unlikely to be any in the coming few years. Those who started on the legacy AS/A level Mathematics/

Further Mathematics qualifications would be sitting the examinations in 2018 and those on the new specifications (entry September 2017) would sit their examinations in Summer 2019.

The following remark was made in the open comments text box at the end of the survey:

"The FMSP is crucial to schools being able to offer Further Maths - the rumours around funding are deeply troubling. We should be proud that we have a body which produces such high quality resources and training, not looking to penny pinch and undermine the ability of students to access lessons taught by people who are up to date and well trained."

4.4

Independent 11-18 school

Respondent's Role:	Head of Mathematics
Type of Institution:	Single-sex (female only) independent school
Standard offer for A levels:	3 A levels and EPQ, Core Maths, or other course (not AS)

Mathematics/Further Mathematics teaching and examining:

- A level Mathematics content taught in Year 12, A level Further Mathematics in Year 13
- A level Mathematics and A level Further Mathematics exams taken at end of Year 13
- In general AS Mathematics examinations will not be taken in summer 2018
- In general AS Further Mathematics examinations will not be taken in summer 2018, though they may be taken by a few students

Student grade requirements and uptake of Mathematics AS/A levels:

AS/A level	2016-17		2017-18	
	Mathematics	Further Mathematics	Mathematics	Further Mathematics
GCSE Mathematics Grade required for course	A*	A*	8	8
Student uptake [Mathematics - INCREASED] [FM – ABOUT THE SAME]	36 (36 Female)	4 (4 Female)	50 (50 Female)	8 (8 Female)

Comments/quotes:

The institution hasn't offered Core Maths in the past three years.

Those who started on the legacy AS/A level Mathematics/Further Mathematics qualifications would be sitting the examinations in 2018 and those on the new specifications (entry September 2017) would sit their examinations in Summer 2019.

The following remark was made in the open comments text box at the end of the survey:

"We are looking to change from offering AS Maths over two years which has been a 4th option for girls after 3 A Levels to Further Maths AS to target more A Level Mathematicians who might need Further Maths for economics or any of the sciences but don't want a full A Level. It is disappointing to see the back door route some institutions are making e.g. in economics where students must have further maths plus two other a levels not maths meaning a 4 A level offer."

4.5

State-funded 11-18 school

Respondent's Role:	Key Stage 5 Mathematics Coordinator
Type of Institution:	Mixed-sex state-funded 11-18 school
Standard offer for A levels:	3 A levels and EPQ, Core Maths, or other course (not AS)

Mathematics/Further Mathematics teaching and examining:

- A level Further Mathematics content taught alongside A level Mathematics in Year 12 and Year 13
- A level Mathematics and A level Further Mathematics exams taken at end of Year 13
- In general AS Mathematics or AS Further Mathematics examinations will not be taken in summer 2018

Student grade requirements and uptake of Mathematics AS/A levels:

AS/A level	2016-17		2017-18	
	Mathematics	Further Mathematics	Mathematics	Further Mathematics
GCSE Mathematics Grade required for course	A	A*	7	8
Student uptake [Mathematics – ABOUT THE SAME] [FM - REDUCTION]	15	5	15	0

Comments/quotes:

Comment was made on there being no Further Mathematics uptake in 2017-18:

"The lack of AS exams, and subsequent reduction in students' options to 3 A-Levels without an AS has put people off studying Further Maths at A Level."

The institution has offered Core Maths for the past two years and numbers have stayed about the same at around 13 to 14 students with an equal gender split. They commented:

"Core Maths is seen as the poor cousin of the EPQ, for the less academically able. It is not given the air time or promotion or priority that the EPQ receives."

Those who started on the legacy AS/A level Mathematics/Further Mathematics qualifications would be sitting the examinations in 2018 and those on the new specifications (entry September 2017) would sit their examinations in Summer 2019.

The following remark was made in the open comments text box at the end of the survey:

"Teacher capacity is not the limiting factor: numbers of students and funding is. Timetabling is an issue, as if we could timetable Further Maths AS or AS Maths as a 4th option this would be great. But we can't. New GCSE has discouraged some of our more able students from doing A-level as the content feels like it's got significantly more difficult and so students are feeling less confident about their ability in the subject."

4.6

State-funded 11-18 school

Respondent's Role:	Key Stage 5 Mathematics Coordinator
Type of Institution:	Mixed-sex state-funded 11-18 school
Standard offer for A levels:	3 or 4 A levels, usually starting with 4 and dropping 1

Mathematics/Further Mathematics teaching and examining:

- A level Further Mathematics content taught alongside A level Mathematics in Year 12 and Year 13
- A level Mathematics and A level Further Mathematics exams taken at end of Year 13
- In general AS Mathematics/Further Mathematics examinations will not be taken in summer 2018

Student grade requirements and uptake of Mathematics AS/A levels:

AS/A level	2016-17		2017-18	
	Mathematics	Further Mathematics	Mathematics	Further Mathematics
GCSE Mathematics Grade required for course	A	A	7	8
Student uptake [Mathematics – INCREASED] [FM - INCREASED]	37 (18 Male, 19 Female)	6 (4 Male, 2 Female)	49 (26 Male, 23 Female)	11 (9 Male, 2 Female)

Comments/quotes:

A comment made on the increase in uptake was:

"1. Entry requirements changed as the grade labelling changed.

2. Less of an issue of fitting in modules with the expectation that some would only do AS.

Part of the reason for the big increase in take-up is that the current year 12 cohort always had a very good culture of learning and embraced the challenge of problem-solving in the new GCSE, whereas the previous cohort were not as positive. The numbers are similar to 2 years ago, when we had a similar cohort of year 12s. Previous years' success in Maths and Further Maths, together with a mentoring programme where 6th formers supported the younger years helped to encourage students to take Mathematical subjects."

The institution has not offered Core Maths, but indicated in the open comment box that they intend to in the future:

"We have offered Core Maths to students for next year and are hoping to have the numbers to introduce the course for 2018-19."

The following remark was made in the open comments text box at the end of the survey:

"It is helpful that our Further Mathematics course has been fully timetabled. We think the new GCSE problem-solving emphasis, together with our participation in the AQA level 2 Further Mathematics course has helped prepare students for A level. It has been particularly helpful that we are a stable fully staffed department which has taken the trouble to expose all of our teachers to some A level teaching, included work on the new A level in meeting/ CPD time and tried to send teachers on relevant training. This, together with a large amount of after school volunteering support has engendered a real confidence in the students that they can succeed and will enjoy Maths."

4.7

State-funded 11-18 school

Respondent's Role:	Head of Key Stage 5 Mathematics
Type of Institution:	Mixed-sex state-funded 11-18 school
Standard offer for A levels:	3 A levels and EPQ, Core Maths, or other course (not AS)

Mathematics/Further Mathematics teaching and examining:

- A level Mathematics content taught in Year 12, A level Further Mathematics in Year 13
- In general AS Mathematics/Further Mathematics examinations will not be taken in summer 2018
- A level Mathematics and A level Further Mathematics exams taken at end of Year 13

Student grade requirements and uptake of Mathematics AS/A levels:

AS/A level	2016-17		2017-18	
	Mathematics	Further Mathematics	Mathematics	Further Mathematics
GCSE Mathematics Grade required for course	A	A	7	8
Student uptake [Mathematics - REDUCED] [FM – REDUCED]	50 (30 Male, 20 Female)	17 (10 Male, 7 Female)	43 (28 Male, 15 Female)	11 (9 Male, 2 Female)

Comments/quotes:

The grade profile for the 43 students studying AS/A level Mathematics in 2017-18 was: twelve students with grade 7, fourteen students with grade 8, ten students with grade 9, the rest with other - either international equivalents or are resitting Year 12 so have an A grade. For AS/A level Further Mathematics there were five with a grade 8, five with a grade 9 and one with an international equivalent.

On the reduction in AS/A level Mathematics/Further Mathematics uptake they commented:

"We no longer offer A-Level Mathematics taught in parallel with A-Level Further Mathematics. We now only offer Double Maths (A-Level Maths and Further Maths), where students are taught separately and taught A-Level Maths in Year 12 and A-Level Further Maths in Year 13. I feel as though the reduction in numbers is slight. However, I believe this is predominantly because my sixth form has changed from 4 AS Levels as a default to 3 AS Levels plus EPQ, Core Maths or other equivalent."

The institution has offered Core Maths to its Year 12 and Year 13 students in the past two years. It has seen

a large increase from 17 (12 males/5 females) students in 2016 to 48 (27 males/21 females) in 2017. They commented that:

"It has been a great success. Partially in response to the default in my school now being 3 A-Levels plus EPQ, Core Maths."

The following remarks were made in the open comments text box at the end of the survey:

"Core Maths has been a great success story, partially because we have had a teacher who has been willing to lead on it and we have been supported by Sixth Form leadership as well as colleagues in other departments who do most of the "sales" for us. The other significant factor is that my sixth form has changed from offer 4 AS Levels in Year 12 to now offering 3 A-Levels plus EPQ, Core Maths etc. Overall, our post-16 maths uptake is up to 45% of the sixth which is excellent. Although A-Level numbers are slightly reduced I believe this is predominantly due to the changes in the number of options offered to students."

4.8

State-funded 11-18 school

Respondent's Role:	Key Stage 5 Coordinator
Type of Institution:	Mixed-sex state-funded 11-18 school
Standard offer for A levels:	3 A levels

Mathematics/Further Mathematics teaching and examining:

- A level Further Mathematics content taught alongside A level Mathematics in Year 12 and Year 13
- A level Mathematics and A level Further Mathematics exams taken at end of Year 13
- In general AS Mathematics examinations will not be taken in summer 2018, but they are undecided about AS Further Mathematics

Student grade requirements and uptake of Mathematics AS/A levels:

AS/A level	2016-17		2017-18	
	Mathematics	Further Mathematics	Mathematics	Further Mathematics
GCSE Mathematics Grade required for course	A	A	7	8
Student uptake [Mathematics – ABOUT THE SAME] [FM – ABOUT THE SAME]	25 (20 Male, 5 Female)	7 (6 Male, 1 Female)	19 (12 Male, 7 Female)	8 (7 Male, 1 Female)

Comments/quotes:

A general comment given about entry requirements and more detail on entry for AS Further Mathematics were:

"We were very aware of the changing conditions and have worked hard to promote maths and further maths against this backdrop. We also had high entry requirements before the changes, so were impacted less by changes at GCSE."

"We have planned for the AS exams in Further Maths and have been explicit about offering this, but will base our exam entry decisions on the needs of the students, most of whom intend to study the full A level."

The institution has offered Core Maths to its students in the past three years. It has seen an increase from 3 (2 males/1 females) students in 2016 to 8 (6 males/2 females) in 2017. They commented that:

"We were an Early Developer school, so had funding to get it started. We start with about 15-20 students each year but drop down considerably as they find other "enrichment" options with no exam

and no homework or which they feel are better recognised (e.g. finance). It is very difficult to sell an AS sized option in a world where AS qualifications are largely dismissed."

The following remark was made in the open comments text box at the end of the survey:

"Teaching time has gone down this year and it will take the full two years to see if this is genuinely sufficient still. It will also take time to see how the new GCSE and new A level mesh as they become familiar to teachers. Further Maths in parallel to AS/ Yr1 maths certainly feels harder to manage than previously- thank goodness for decision/discrete!"

4.9

State-funded 11-18 school

Respondent's Role:	Mathematics teacher
Type of Institution:	Mixed-sex state-funded 11-18 school
Standard offer for A levels:	3 A levels

Mathematics/Further Mathematics teaching and examining:

- A level Further Mathematics content taught alongside A level Mathematics in Year 12 and Year 13
- A level Mathematics and A level Further Mathematics exams taken at end of Year 13
- In general AS Mathematics examinations will not be taken in summer 2018
- In general AS Further Mathematics examinations will not be taken in summer 2018

Student grade requirements and uptake of Mathematics AS/A levels:

AS/A level	2016-17		2017-18	
	Mathematics	Further Mathematics	Mathematics	Further Mathematics
GCSE Mathematics Grade required for course	C	C	5	5
Student uptake [Mathematics - REDUCTION] [FM - REDUCTION]	45 (30 Male, 15 Female)	8 (6 Male, 2 Female)	33 (20 Male, 13 Female)	3 (2 Male, 1 Female)

Comments/quotes:

They commented that in general, although the school wide policy for entry is Grade 5, in the mathematics department:

"All are well above minimum required as we recommended at least a 7 for maths. Further Maths are well above with 8+."

They commented:

"No option of taking 4 subjects and then reducing to 3 in Yr13 depending upon their Yr12 module results. Therefore, students were reluctant to tie themselves in to Further Maths as it was two thirds of their subjects. For all Further Maths and A-level Maths it was no longer possible to 'see how they got on' - they felt they were taking a 'risk' if they were not 100% certain they wanted to take maths through to Yr13"

The institution has not offered Core Maths. They commented issues being:

"Funding and staffing."



4.10

State-funded 11-18 school

Respondent's Role:	Curriculum Leader for Mathematics
Type of Institution:	Mixed-sex state-funded 11-18 school
Standard offer for A levels:	3 A levels and EPQ, Core Maths, or other course (not AS)

Mathematics/Further Mathematics teaching and examining:

- A level Further Mathematics content taught alongside A level Mathematics in Year 12 and Year 13
- A level Mathematics and A level Further Mathematics exams taken at end of Year 13
- In general AS Mathematics/Further Mathematics examinations will not be taken in summer 2018, though they may be taken by a few students

Student grade requirements and uptake of Mathematics AS/A levels:

AS/A level	2016-17		2017-18	
	Mathematics	Further Mathematics	Mathematics	Further Mathematics
GCSE Mathematics Grade required for course	C	B	5	6
Student uptake [Mathematics - INCREASED] [FM - INCREASED]	35 (21 Male, 14 Female)	4 (2 Male, 2 Female)	65 (44 Male, 21 Female)	14 (7 Male, 7 Female)

Comments/quotes:

Though the entry requirements look low at Grade 5 and Grade 6 for AS/A level Mathematics and Further Mathematics respectively, they commented that the actual uptake had:

"Vast majority of (AS/A level Maths) students have at least a grade 7 at GCSE. Only one student on the course has a grade 5. For AS/A level Further Maths one student has a grade 7, one a grade 8, the remaining twelve have grade 9's."

In respect to an increase in the uptake they commented:

"4 years of planning and prep for the new GCSE exams, with a focus on increasing the uptake post 16, to buck the predicted trend nationally."

Core Maths was not made available in 2015-16 but was then offered to Year 12 and Year 13 students in 2016-17 and 2017-18. The numbers in 2016 and 2017 have stayed about the same at 8 students (4 males/4 females). They commented:

"Core Maths is offered within an 'enrichment' slot, which means that not all students take an exam at the end of the course."

The following remark was made in the open comments text box at the end of the survey:

"Teaching time has increased from 9 hours per fortnight per subject, to 12 hours per fortnight. Subjects studied has dropped from 4 in year 12 to just 3, with the exception of A Level FM which can be studied as a fourth exam."

5 | Appendices



Appendix A

Copy of the online survey



Mathematics A levels Uptake Survey 2017/18

Introduction

This survey is being conducted by education charity **Mathematics in Education and Industry** (MEI), which has managed the national Further Mathematics Support Programme and its predecessors, since 2005. The survey is being conducted with the support of the A level Mathematics Advisory Board (ALMAB[^]), acting as a contact group providing input to the Advisory Committee on Mathematics Education (ACME), the London Mathematical Society, the Royal Statistical Society, the Institute of Mathematics and its Applications and the Joint Mathematics Council.

The aim of this survey is to consider how the uptake of AS/A level Mathematics and Further Mathematics is being affected by recent changes to these qualifications, changes to GCSE Mathematics, and changes to post-16 funding. It would be helpful if, before you start, you are aware of the number of students who studied maths A levels and Core Maths in your institution last year and this year.

[Note. If your institution does not offer post-16 qualifications then thank you for your interest, but this survey is not applicable to you.]

The survey should take around 20 minutes to complete. **The closing date for responding is Wednesday 13th December.** To thank you for taking the time to complete the survey you will be given the chance to enter contact details to opt-in to a random prize draw. There will be **five** prizes available, each being a **£20** Amazon Voucher.

MEI will be the data processor. MEI hold an up-to-date registration with the Information Commissioner's Office (#Z9140194). Accordingly, MEI will act in line with current data regulations, presently the Data Protection Act 1998 and, from May 2018, the General Data Protection Regulation. MEI will never sell your personal information and will never pass your personal information to organisations for marketing or sales purposes.

You can complete this survey on a mobile phone device, but it will be more comfortable to complete the larger the screen size you have, due to the textboxes used.

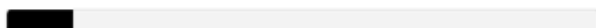
If you have any questions about this survey then please direct them to Dr Stephen Lee, MEI Research and Evaluation Manager, at stephen.lee@mei.org.uk

^{*} *[Indicates a response is required to the question]*

[^] *[ALMAB - The A level Mathematics Advisory Board is a follow up to the A level Content Advisory Board which advised on the content of Mathematics A levels.]*

*** 1. Please indicate below that you consent to participating in the survey:**

- ☐ Yes, I consent to participating in this survey
- ☐ No, I do not consent to participating in this survey (clicking next will end this survey)

 11%

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Section 1: Background information

* 2. Name of school/college:

3. School/college postcode:

4. Type of institution:

- ☐ State funded 11-18
- ☐ State funded Sixth Form/College
- ☐ Independent 11-18
- ☐ Independent Sixth Form/College
- ☐ Other (please specify)

5. For post-16 provision - Is your institution:

- ☐ Mixed sexed
- ☐ Single sexed - **FEMALE** only
- ☐ Single sexed - **MALE** only

6. Your name:

7. Your role:

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Section 2: Considering your new Year 12 intake for AS/A level Maths and Further Maths

The primary concern of this survey is to review what the uptake of AS and A level Mathematics and Further Mathematics qualification is likely to be in the future (2017/18 onwards).

*** 8. How many students in your current Year 12 are studying:**
(Include all students in Year 12 taking either AS or A level, even if their final level of entry, A or AS, is not yet decided.)

AS/A level Mathematics [TOTAL]	
AS/A level Further Mathematics [TOTAL]	

9. To the best of your knowledge what is the gender breakdown for these totals - how many male and female students in your current Year 12 are studying:

AS/A level Mathematics [MALE]	
AS/A level Mathematics [FEMALE]	
AS/A level Further Mathematics [MALE]	
AS/A level Further Mathematics [FEMALE]	

10. Please comment here if you wish to clarify the information you have provided in this section.

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Section 3: Considering the prior attainment of students taking AS/A level Maths and Further Maths

- * 11. Please briefly outline your institution's standard entry requirements in terms of GCSE attainment for **any** students starting **any** AS/A level programme of study in 2017.

- * 12. For your institution **this year**, what is typically the **minimum GCSE Mathematics grade** that students must achieve to be accepted on to:

	9	8	7	6	5	4	Don't know
AS/A level Mathematics?	☐	☐	☐	☐	☐	☐	☐

- * 13. For your institution **this year**, what is typically the **minimum GCSE Mathematics grade** that students must achieve to be accepted on to:

	9	8	7	6	5	4	Don't know
AS/A level Further Mathematics?	☐	☐	☐	☐	☐	☐	☐

- * 14. For your institution **last year**, what was typically the minimum GCSE Mathematics grade that students needed to achieve to be accepted on to:

	A*	A	B	C	Don't know
AS/A level Mathematics?	☐	☐	☐	☐	☐

- * 15. For your institution **last year**, what was typically the minimum GCSE Mathematics grade that students needed to achieve to be accepted on to:

	A*	A	B	C	Don't know
AS/A level Further Mathematics?	☐	☐	☐	☐	☐

16. Briefly describe how the prior attainment of the **current cohort of Year 12 students studying AS/A level Maths** compares with the minimum GCSE Maths grade required.

17. Briefly describe how the prior attainment of the **current cohort of Year 12 students studying AS/A level Further Maths** compares with the minimum GCSE Maths grade required.

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Section 4: Considering your institution's policy on entries for AS and A levels

*** 18. What is the "standard" number of courses that A level students can take in academic year 2017/18, in Year 12?**

- ☐ 3 A levels
- ☐ 3 A levels and EPQ, Core Maths, or other course (not AS)
- ☐ 3 A levels and 1 AS level
- ☐ 4 AS levels
- ☐ Other (please specify)

19. Is the intention that Year 12 AS/A level Maths students will take the AS Maths examination in June 2018

- ☐ Yes - in general all will take AS Maths
- ☐ Yes - some are intending to only study AS Maths
- ☐ No - although AS may be taken by a few students
- ☐ No - AS levels are not offered in general
- ☐ Undecided

20. Is the intention that Year 12 AS/A level Further Mathematics students will take the AS level Further Maths examination in June 2018

- ☐ Yes - in general all will take AS Further Maths
- ☐ Yes - some are intending to only study AS Further Maths
- ☐ No - although AS may be taken by a few students
- ☐ No - AS levels are not offered in general
- ☐ Undecided

21. For students who are studying AS/A level Maths AND Further Maths, which of the statements best describes how provision is organised

- ☐ We teach A level Maths content in Year 12 and A level Further Maths in Year 13
- ☐ We teach A level Maths alongside A level Further Maths in Year 12 and Year 13
- ☐ Other (please specify)

22. For students who are studying AS/A level Maths AND Further Maths, which of the statements best describes how provision is organised

- ☐ Students take the A level Maths exam at end of Year 12 and Further Maths exam at end of Year 13
- ☐ Students take the A level Maths and A level Further Maths exams at end of Year 13
- ☐ Other (please specify)

23. Please comment here to clarify anything about how your institution organises its mathematics AS/A level provision.

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5a: Considering changes in participation and provision in A levels compared with this time last year

*** 24. [Compared with November 2016]**

Have the number of Year 12 students studying for **AS/A level Mathematics** in your institution in November 2017:

- ☐ Increased
- ☐ Stayed about the same
- ☐ Reduced

*** 25. [Compared with November 2016]**

Have the number of Year 12 students studying for **AS/A level Further Mathematics** in your institution in November 2017:

- ☐ Increased
- ☐ Stayed about the same
- ☐ Reduced

Section 2 asked about the current Year 12 students, the following questions ask about the numbers for this time last year.

26. To the best of your knowledge, please give the number of Year 12 students taking the following courses at this time last year:

AS/A level Mathematics
[TOTAL]

AS/A level Further
Mathematics [TOTAL]

27. To the best of your knowledge, what is the gender breakdown for these totals - how many male and female students were taking the following courses at this time last year:

AS/A level Mathematics
[MALE]

AS/A level Mathematics
[FEMALE]

AS/A level Further
Mathematics [MALE]

AS/A level Further
Mathematics [FEMALE]

28. Please describe any changes to your AS/A level Mathematics and Further Mathematics offer to current Year 12 students compared with 2016/17?

29. Reflecting on your answers in this section on the changing uptake and provision, are there any comments or observations you would like to make to clarify why any changes have occurred?

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5b: Considering changes in participation / provision in Core Maths compared with this time last year

30. In which academic years has Core Maths been offered to Year 12 and 13 students? Please select **each of the academic years** in the table below to indicate the provision for **Core Maths** in your institution:

	2017-18	2016-17	2015-16
Core Maths offered in Year 12	☐	☐	☐
Core Maths offered in Year 13	☐	☐	☐
Core Maths is not offered	☐	☐	☐

31. *[Compared with November 2016]*

Have the number of **Year 12** students studying for **Core Maths** in your institution in November 2017:

- ☐ Increased
☐ Stayed about the same
☐ Reduced

* 32. How many students in Year 12 are studying Core Maths this year and last year:

Year 12 Core Maths 2017

[TOTAL]

Year 12 Core Maths 2016

[TOTAL]

33. To the best of your knowledge, what is the gender breakdown for these totals - how many **male** and **female** students in Year 12 are taking Core Maths this year and last year

Year 12 Core Maths 2017

[MALE]

Year 12 Core Maths 2017

[FEMALE]

Year 12 Core Maths 2016

[MALE]

Year 12 Core Maths 2016

[FEMALE]

34. Are there any comments or observations you would like to make in respect to the provision of Core Maths in your institution?

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Section 6: Planned entries for summer 2018 and summer 2019 for Year 12 and 13 students

35. To the best of your knowledge please could you give the likely number of entries for level 3 mathematics qualifications in Summer 2018

Year 12 AS Mathematics	
Year 13 AS Mathematics	
Year 12 A level Mathematics	
Year 13 A level Mathematics	
Year 12 AS Further Mathematics	
Year 13 AS Further Mathematics	
Year 13 A level Further Mathematics	
Year 12 Core Maths	
Year 13 Core Maths	
Other (please specify)	

36. To the best of your knowledge please could you give the likely number of entries for level 3 mathematics qualifications in Summer 2019

Year 12 AS Mathematics	
Year 13 AS Mathematics	
Year 12 A level Mathematics	
Year 13 A level Mathematics	
Year 12 AS Further Mathematics	
Year 13 AS Further Mathematics	
Year 13 A level Further Mathematics	
Year 12 Core Maths	
Year 13 Core Maths	
Other (please specify)	

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Section 7: Final comments, contact for follow up and prize draw

37. Do you have any comments, observations, or suggestions you wish to make in respect to the uptake of post-16 mathematics, which you have not already made? **Please use this opportunity to make any final remarks:**

[For example consideration could be given to passing comment on - Post-16 funding, teacher capacity/CPD, teaching time allocation/timetabling, teaching resources, new AS/A level specifications/subject content, new GCSE Mathematics, etc]

* 38. Would you be happy to be contacted about the answers you have given in this survey?

- ☐ No, please do not contact me about the answers I have given
- ☐ Yes, I would be happy to be contacted to discuss the answers I have given
(please enter your contact details in question 37, below)

=====

Thank you very much indeed for your time, and the thoughts you have shared in this survey.

If you would like to be entered for the prize draw with a chance to win one of five £20 Amazon vouchers, please indicate that here by inserting your name and e-mail address.

Entering your details here will allow us to contact you should you win a prize and will not be used for any other purpose, unless you have given permission as set out in question 36.

39. Contact details:

Name:

Email address:

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Done

Appendix B

Additional analysis of survey responses

Additional analysis of AS/A level Mathematics/ Further Mathematics entry requirements

Participants were asked: *For your institution this year, what is typically the minimum GCSE Mathematics grade that students must achieve to be accepted on to AS/A level Mathematics?* A similar question was then asked about acceptance on to the AS/A level Further Mathematics course.

Table 16 shows the typical minimum grades for both AS/A level Mathematics and Further Mathematics for all respondents, and separately for state sector institutions only.

Table 16 shows that an approximately equal number of institutions require a GCSE Mathematics grade 6 or a grade 7 for entry to AS/A level Mathematics in 2017 (45.1% of 432 responses and 44.4% respectively). A slightly higher percentage of state sector institutions require a grade 6 (52.7% of 336 responses). For entry to AS/A level Further Mathematics a similar percentage of all institutions require a grade 7 as require a grade 8 (38.7% of 432 responses and 41.4% respectively). Again, for state sector institutions only there was a slightly higher percentage that require a grade 7 (44.9% of 336 responses), rather than a grade 8 (37.2%).

Those starting AS/A level Mathematics and Further Mathematics in academic year 2017-18 are the first cohort to have taken the new GCSE Mathematics, with its new numerical grading system. *[Ofqual guidance states that grades 7, 8, 9 are equivalent to the A, A* grading, and that grades 4, 5, 6 are equivalent to the C, B grading, i.e. a grade 6 is a 'high' B.]*⁵ Participants were asked a similar pair of questions about their GCSE Mathematics grade requirements for entry on to AS/A level courses in 2016-17. Table 17 shows the summary of responses.

Table 17 shows that the most common requirement for acceptance on to AS/A level Mathematics courses in 2016 was a grade B in GCSE Mathematics (59% of 423 responses). Over one-third (34.5%) required a grade A. Grade A was the most common (52.1% of 432 responses) requirement for entry to AS/A level Further Mathematics in 2016. However, over a quarter (28.9%) required an A* grade.

As with the grade requirements for 2017, a greater percentage of state sector institutions required the 'lower' of the two most common grades – 65.5% of 336 responses for GCSE Mathematics grade B for acceptance to AS/A level Mathematics, compared with 59% for all, and 58.6% of 336 responses for

GCSE Mathematics Grade	ALL [432]		State only [336]	
	AS/A level Mathematics [%]	AS/A level Further Mathematics [%]	AS/A level Mathematics [%]	AS/A level Further Mathematics [%]
9	0.0%	2.8%	0.0%	1.5%
8	3.0%	41.4%	1.5%	37.2%
7	44.4%	38.7%	40.2%	44.9%
6	45.1%	4.9%	52.7%	5.4%
5	4.2%	1.6%	3.9%	0.9%
4	0.9%	0.2%	0.3%	0.0%
Don't know	2.3%	10.4%	1.5%	10.1%

Table 16 – Typical minimum GCSE Mathematics grade for entry to AS/A level Mathematics/Further Mathematics in 2017-18

⁵ Ofqual guidance on changing of GCSE grades: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/638308/Grading_new_GCSEs_from_2017.pdf

GCSE Mathematics Grade	ALL [432]		State only [336]	
	AS/A level Mathematics [%]	AS/A level Further Mathematics [%]	AS/A level Mathematics [%]	AS/A level Further Mathematics [%]
A*	1.2%	28.9%	0.3%	21.4%
A	34.5%	52.1%	30.1%	58.6%
B	59.0%	8.8%	65.5%	9.8%
C	4.2%	1.4%	3.0%	0.6%
Don't know	1.2%	8.8%	1.2%	9.5%

Table 17 – Typical minimum GCSE Mathematics grade for entry to AS/A level Mathematics/Further Mathematics in 2016-17

GCSE Mathematics grade A for acceptance to AS/A level Further Mathematics, compared with 52.1% for all. Thus a greater percentage of independent sector institutions (not shown in the table) require higher GCSE Mathematics grades for acceptance on to AS/A level Mathematics and Further Mathematics courses.

A comparison of the grade requirements for AS/A level Mathematics in 2016 and 2017 is shown in tables 18 and 19. Table 18 shows the comparison for all institutions. Table 19 shows state sector institutions only. Note these are 'paired' grades, i.e. only institutions that gave an entry grade for both years are included in the analysis.

Table 18 shows that the most frequently required grades in GCSE Mathematics for acceptance to AS/A level Mathematics were B in 2016 and 6 in 2017 (174

responses). Based on the equivalence of "old" letter grades and "new" numerical grades, table 18 indicates that there has been an overall increase in the GCSE Mathematics grade required for acceptance on to AS/A level Mathematics (at least 78 requiring a higher grade in 2017 compared with 28 requiring a lower grade). The most frequent increase is from requiring a grade B in 2016 to requiring a 7 (equivalent to an A grade) in 2017.

The same pair of grades was also the same for state sector institutions only (table 19), though the percentages were 48.6% and 26.7% (of 329 responses) respectively.

Tables 20 and 21 show the equivalent data shown in tables 18 and 19 for acceptance on to AS/A level Further Mathematics courses.

AS/A level Mathematics (All)	GCSE Mathematics required grade 2016				
	A*	A	B	C	Total
GCSE Mathematics required grade 2017					
8	5	7	1		13
7		128	62	1	191
6		13	174	7	194
5			11	7	18
4			1	3	4
Total	5	148	249	18	420

Table 18 – Required GCSE Mathematics grade for AS/A level Mathematics (all) in 2016 vs 2017

AS/A level Mathematics (State)	GCSE Mathematics required grade 2016				
	A*	A	B	C	Total
GCSE Mathematics required grade 2017					
8	1	3	1		5
7		88	46		134
6		10	160	6	176
5			9	4	13
4			1		1
Total	1	101	217	10	329

Table 19 – Required GCSE Mathematics grade for AS/A level Mathematics (state sector only) in 2016 vs 2017

AS/A level Further Mathematics (All)	GCSE Mathematics required grade 2016				
GCSE Mathematics required grade 2017	A*	A	B	C	Total
9	11	1			12
8	103	71	2	1	177
7	5	146	12		163
6		3	17		20
5		1	2	4	7
4				1	1
Total	119	222	33	6	380

Table 20 – Required GCSE Mathematics grade for AS/A level Further Mathematics (all) in 2016 vs 2017

The most frequent pattern in table 20 was to require a grade A in 2016-17 and then a grade 7 in 2017-18 (38.4% - 146 responses from 380). This was followed by a grade A* in 2016-17 and a grade 8 in 2017-18 (27.1% - 103 responses from 380). Table 21 shows similar requirements for state sector institutions only, with 44.9% (of 296 responses) requiring a grade 7 (from grade A in 2016) and 21.3% now requiring a grade 8 (from a grade A* in 2016). However, for state sector institutions only, the combination of requiring a grade A in 2016 and now requiring a grade 8 was

AS/A level Further Mathematics (state)	GCSE Mathematics required grade 2016				
GCSE Mathematics required grade 2017	A*	A	B	C	Total
9	4	1			5
8	63	59	2		124
7	3	133	11		147
6		2	15		17
5			1	2	3
Total	70	195	29	2	296

Table 21 – Required GCSE Mathematics grade for AS/A level Further Mathematics (state sector only) in 2016 vs 2017

almost as common as the combination of A* and 8 (20% of 296 responses).

Further analysis of required GCSE grades compares the GCSE Mathematics grade required for AS/A level Mathematics with the grade required for AS/A level Further Mathematics in 2017 (table 22) and 2016 (table 23).

Table 22 shows that the two most common requirements in 2017 are a combination of Grade 7 for taking AS/A level Mathematics and Grade 8 for taking AS/A level Further Mathematics (34.3% or 133

GCSE Grade required in 2017	For AS/A level Further Mathematics						
For AS/A level Mathematics	9	8	7	6	5	4	Total
8	5	8					13
7	5	133	41				179
6	2	38	122	15			177
5			4	5	6		15
4				1	1	1	3
Total	12	179	167	21	7	1	387

Table 22 – Required GCSE Mathematics grade for AS/A level Mathematics vs AS/A level Further Mathematics (all) in 2017

GCSE Grade required in 2016	For AS/A level Further Mathematics				
For AS/A level Mathematics	A*	A	B	C	Total
A*	5				5
A	94	48			142
B	26	172	33		231
C		5	5	6	16
Total	125	225	38	6	394

Table 23 – Required GCSE Mathematics grade for AS/A level Mathematics vs AS/A level Further Mathematics (all) in 2017

of 387 responses), and Grade 6 for taking AS/A level Mathematics and Grade 7 for taking AS/A level Further Mathematics (31.5% or 122 of 387 responses).

Table 23 shows that in 2016 the most common requirements were a combination of Grade B for AS/A level Mathematics and a Grade A for AS/A level Further Mathematics (43.7% or 172 of 394 responses).

Additional analysis of the uptake of AS/A level Mathematics/Further Mathematics

Participants were asked how the number of Year 12 students studying for AS/A level Mathematics in their institution in November 2017 compared to November 2016, and similarly for Further Mathematics. Table 24 shows the values that formed Chart 3.

Participants were asked to give, to the best of their knowledge, the number of Year 12 students taking mathematics courses in November 2017 and in November 2016. Table 25 shows a summary of the number of students in Year 12 taking AS/A level Mathematics and Further Mathematics broken down by gender

Table 25 shows a greater proportion of males than females studying AS/A level Mathematics in 2016 and 2017, and an even higher proportion of males studying AS/A level Further Mathematics. The proportions of female students studying AS/A level Mathematics (42.3%) and Further Mathematics (34.5%) in 2017, shown in table 12 are a little higher than proportion of females who sat the A level Mathematics and Further Mathematics examinations in summer 2017. For AS/A level Mathematics, table 25 shows that the mean

	ALL [416]		State [324]	
	AS/A level Mathematics	AS/A level Further Mathematics	AS/A level Mathematics	AS/A level Further Mathematics
Increased	16.6%	21.9%	14.8%	19.8%
Stayed about the same	34.6%	44.5%	31.2%	43.2%
Reduced	48.8%	33.7%	54.0%	37.0%

Table 24 – How Mathematics and Further Mathematics uptake in 2017-18 compared to 2016-17

	AS/A level Mathematics [MALE]		AS/A level Mathematics [FEMALE]		AS/A level Further Mathematics [MALE]		AS/A level Further Mathematics [FEMALE]	
	2016	2017	2016	2017	2016	2017	2016	2017
Institutions with entries	345	378	380	414	296	310	273	272
Mean students per institution	30.5	28.4	21.5	19.0	8.3	8.6	4.8	5.2
Median students per institution	20	18	13.5	11	5	5	3	3

Table 25 – Year 12 AS/A level Mathematics and Further Mathematics uptake in 2016 and 2017 (by gender)

number of male students per institution decreased by 6.9% from 30.5 in 2016 to 28.4 in 2017, and the mean number of female students decreased by 11.6% from 21.5 in 2016 to 19.0 in 2017. For AS/A level Further Mathematics there were increases of 3.6% for males and 8.3% for females.

Table 26 shows that the overall mean number of students per institution starting AS/A level Mathematics is masking some differences that become more apparent with the more detailed breakdown by type of institution. In each of the sub-types for independent institutions the mean numbers have increased between 2016-17 and 2017-18. For the state sector

all types of institutions showed an overall decrease in the mean between 2016-17 and 2017-18, with the largest being observed for state sector Sixth Form/FE colleges.

Table 27 shows that the overall mean number of students per institution starting AS/A level Further Mathematics is masking some differences that become more apparent with the more detailed breakdown by type of institution. In all sub-categories except state sector Sixth Form/FE colleges there has been a rise in the mean numbers between 2016-17 and 2017-18.

	2016		2017	
	Number of institutions	Mean students per institution	Number of institutions	Mean students per institution
State-funded 11-18	256	39.2	274	34.6
State-funded Sixth Form/College	43	146.2	46	134.1
Independent 11-18	73	33.8	78	34.2
Independent Sixth Form/College	3	30.0	3	41.7
Other (please specify) STATE	20	33.5	21	29.2
Other (please specify) INDEP	14	22.1	15	25.0
Total	409	48.5	437	44.5

Table 26 – Year 12 AS/A level Mathematics uptake in 2016 and 2017 (by institution type)

	2016		2017	
	Number of institutions	Mean students per institution	Number of institutions	Mean students per institution
State-funded 11-18	218	9.4	217	9.6
State-funded Sixth Form/College	40	28.9	42	26.5
Independent 11-18	67	8.8	71	10.2
Independent Sixth Form/College	2	4.0	3	15.3
Other (please specify) STATE	16	7.1	15	7.7
Other (please specify) INDEP	11	4.5	11	8.4
Total	354	11.2	359	11.6

Table 27 – Year 12 AS/A level Further Mathematics uptake in 2016 and 2017 (by institution type)

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www.youtube.com/MEIMaths



Company registration number: 3265490
Charity number: 1058911