

Girls' participation in advanced maths

A factsheet for teachers

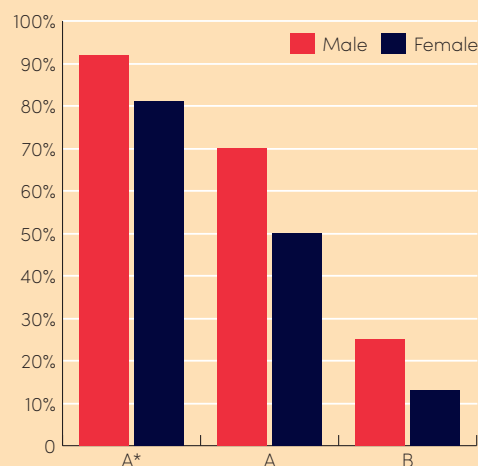


Advanced Mathematics Support Programme®

International comparisons show that post-16 maths participation in England is relatively low¹, with just over a quarter of 16-year-olds who pass their GCSE Mathematics choosing to study for a more advanced maths qualification. The situation is improving – the number of students taking A levels in Mathematics and Further Mathematics in the UK has risen considerably over the last fifteen years and the new Core Maths qualification is growing in popularity; however, the number of girls choosing to study maths beyond GCSE is disproportionately low.

These differences are particularly pronounced for A levels. In 2019, Mathematics was the most popular A level subject for boys, but only the fourth most popular amongst girls, after, Psychology, English and Biology. The proportion of girls taking AS/A level Mathematics is around 40%. For AS/A level Further Mathematics, the proportion is approximately 30%. A better balance has been achieved for Core Maths, with the proportion of girls rising steadily from 34% when it was first examined in 2016, to 45% in 2019.

Proportion of students continuing on to AS/A level Mathematics by GCSE Mathematics attainment²



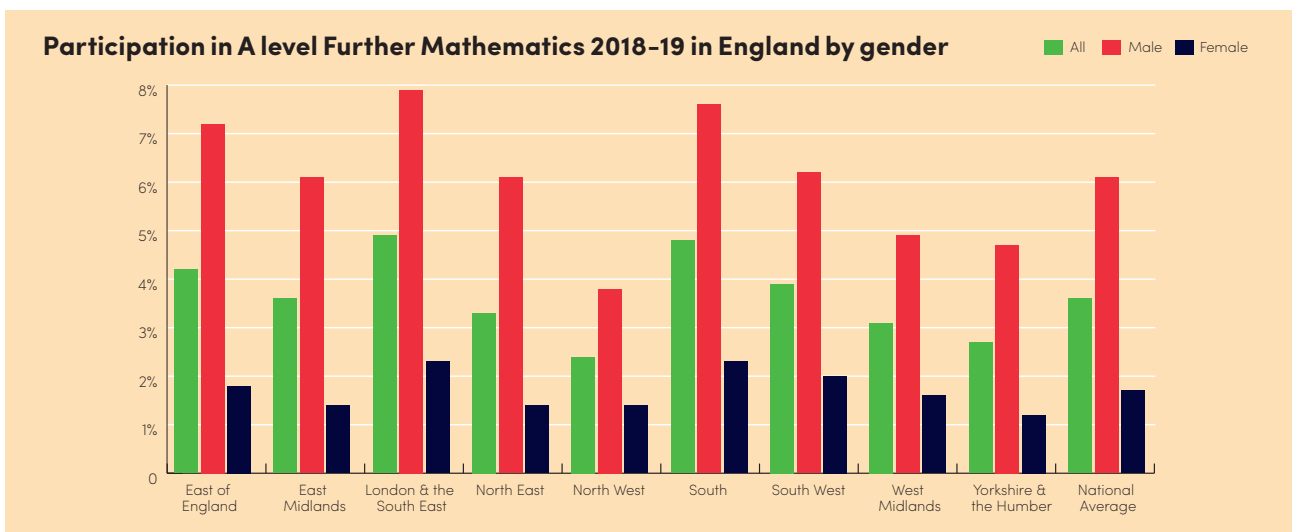
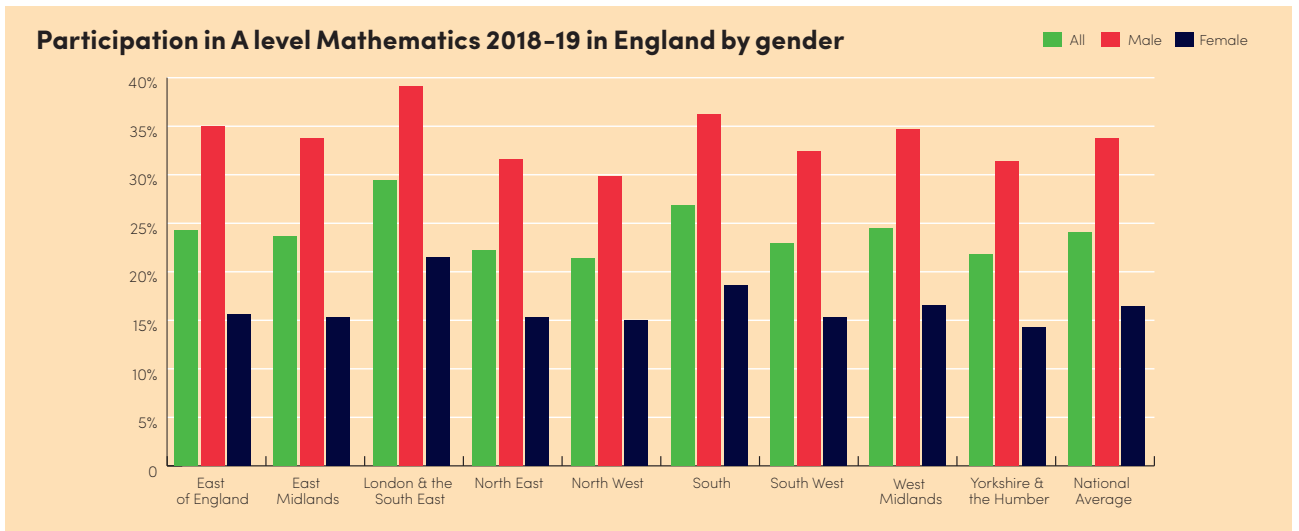
A Core Maths qualification has the same UCAS points as an AS level. It complements a range of academic and technical programmes, by focusing on using and applying maths and statistics to address authentic problems drawn from study, work and life.



The data³

A level Mathematics and Further Mathematics participation rates 2018-19

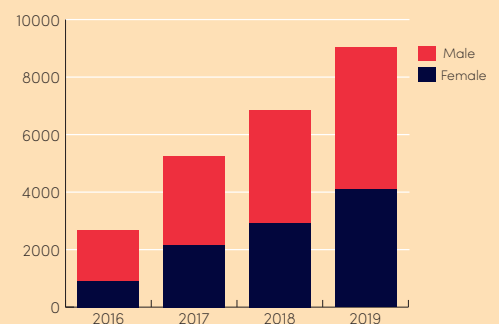
Participation rates are given as a proportion of the number of students, aged 16-18, who entered for at least one A level in the academic year 2018-19



Core Maths participation 2016-2019

Participation is given as an absolute number of students, aged 16-18, who entered for Core Maths in academic years 2016-2019.

Total participation in Core Maths 2016-2019 in England by gender



Key findings from the data:

As well as variation in the uptake of advanced maths between male and female students there is also variation between regions. This data is available by gender at individual school level for you to look at yourself.⁴

Research evidence

One of the most comprehensive reports, in this field on this topic was undertaken in 2015 by the Institute of Education (IoE)⁵; they produced a literature review of national and international findings on participation and performance by girls in post-compulsory maths.

“...When girls feel they do not understand mathematics, this combines with socially-based feelings of exclusion to affect their participation. Teaching that allows group discussion and acknowledges multiple strategies for understanding and solving problems fosters understanding.”

Cathy Smith, UCL Institute of Education

Gender and participation in mathematics and further mathematics A-levels: a literature review for the Further Mathematics Support Programme

“...Students are more likely to take part in mathematics A-level if their mathematics grade was higher than their other GCSE grades...This is relevant to gender differences because more girls than boys gain the top GCSE grades in England so that academic girls’ choice patterns reflect the wider possibilities that are open to them as well as their positioning as all-rounders rather than specialists.”

Cathy Smith, UCL Institute of Education

Gender and participation in mathematics and further mathematics A-levels: a literature review for the Further Mathematics Support Programme

This report found that:

“There are five factors that are widely found to affect students’ intentions to study mathematics at A-level that could be influenced by school practices. These are **prior attainment** in mathematics, **enjoyment**, **perceived competence**, **interest** in mathematics and awareness of the **utility of mathematics** for supporting access to other areas. Student background factors of gender, ethnicity and socioeconomic status interact with these and are also significant in affecting participation.”

Subsequent publications reiterate the results of the IoE research and support the following strategies for increasing girls’ participation in post-16 maths.



Recommended strategies for teachers and senior leaders to promote greater gender balance in advanced maths.

Use data to:

- Consider the gender balance in previous A level cohorts
- Identify the relative participation rate of girls in relation to similar local schools and against the national picture⁴
- Analyse the proportion of girls and boys with different grades (4+) in GCSE Mathematics who progress to a level 3 maths qualification
- Look for trends in progression from Year 11 classes and/or feeder schools
- Identify and support girls who show the potential and/or interest to progress to level 3 study of maths
- Provide guidance to students on the most suitable post-16 pathway for them e.g. Core Maths or AS/A level Mathematics, and potentially AS/A level Further Mathematics

Provide students, particularly girls, with:

- Opportunities to evaluate their interest in the topics they might meet after GCSE and see how they might cope with the more demanding material.
- A school wide culture throughout Key Stages 3 and 4 in which girls aspire to study maths beyond GCSE
- Regular positive feedback on their progress and ability. Praise resilience, discussion and careful work and support students in developing a more accurate match between task performance and maths self-concept.
- Clear messages about the wide range of careers and degree courses for which post-16 study of maths would be beneficial, in order to make students aware of the utility of the subject.
- Advice on the amount of maths and quantitative skills needed within other A level subjects, both STEM and non-STEM.
- Occasions to meet role models including current or previous female students to hear about how studying maths has benefitted them in their degree course or employment
- The general benefits of studying maths. Avoid presenting it as a 'specialist' subject or elitist in any way.
- Images of a range of male and female users of maths, importantly including those across a range of different levels of ability.
- Enrichment opportunities. Universities and employers are keen to work with students and raise aspirations

Also:

- Present a clear message to staff interviewing and enrolling students onto post-16 courses about the possible barriers that may need to be broken down when recruiting to level 3 maths.
- Engage with parents/carers about the importance of promoting a positive message to both boys and girls about progressing to study maths post-16.

The Advanced Maths Support Programme (AMSP) promotes participation in level 3 Mathematics to all students who would benefit from taking the qualifications, especially girls. Our aim is that the insights from data and research as well as the guidance and recommendations listed in this fact

sheet will help to initiate practical action to increase the proportions of girls who progress to advanced maths.

For further information, ideas and resources, please visit amsp.org.uk/teachers/11-16-maths/girls-participation or contact girlsparticipation@amsp.org.uk

¹ Hodgen, J., Pepper, D., Sturman, L., & Ruddock, G. (2010). Is the UK an Outlier? London: Nuffield Foundation

² Department for Education (DFE), corp creator. (2017) Post-16 maths participation in 2015 to 2016: Ad-hoc notice.

³ <https://www.compare-school-performance.service.gov.uk/download-data?currentstep=datatypes®iontype=all&la=0&downloadYear=2018-2019&datatypes=ks5mathsci>

⁴ <https://www.compare-school-performance.service.gov.uk/>

⁵ Smith, C. (2014). Gender and participation in mathematics and further mathematics A-levels: a literature review for the Further Mathematics Support Programme. London: UCL Institute of Education.

The sources and data included in this factsheet, as well as up-to-date data, can be found on our website: amsp.org.uk/11-16-maths/girls-participation.

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