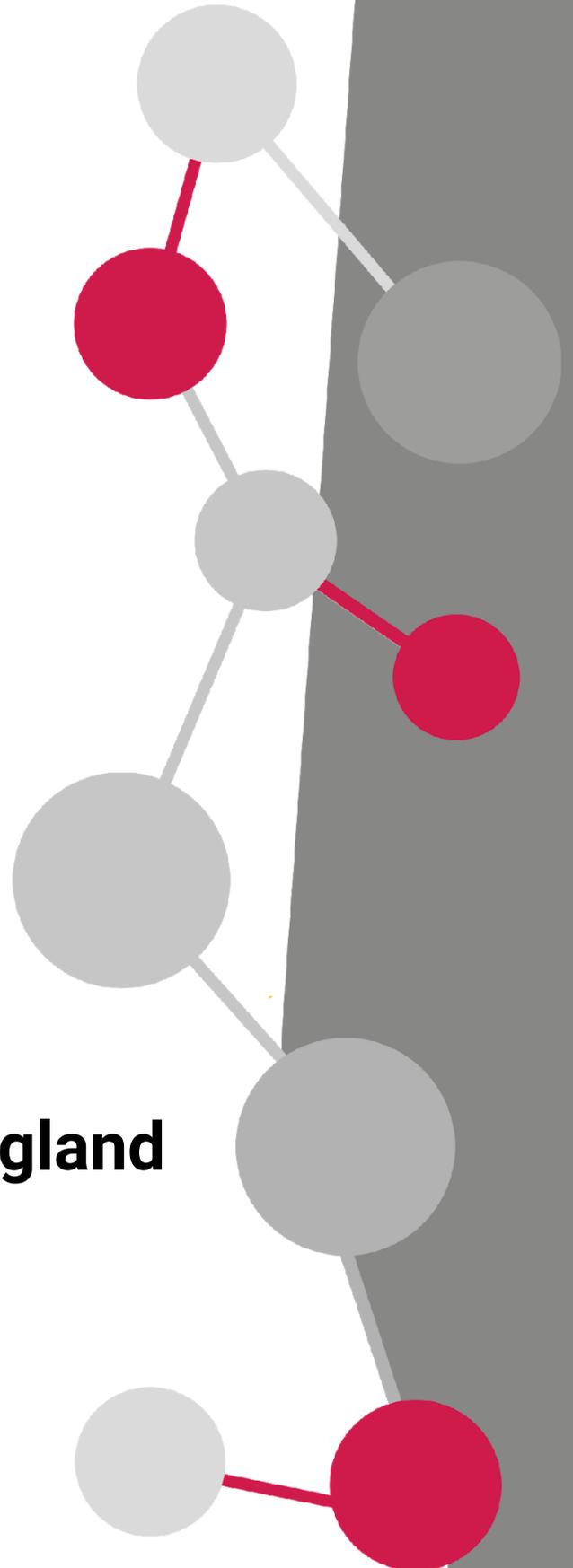
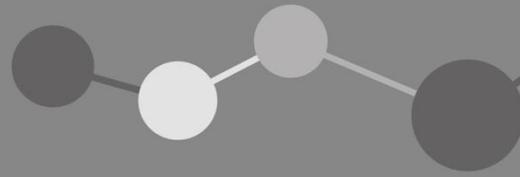


# Science Education in England

## Methodology





## Introduction

Since 2005, STEM Learning has supported schools in improving outcomes for young people. This report takes a detailed look at student entries and attainment in science subjects across England between 2017 and 2019, and aims to answer a number of questions regarding science education. Specifically, the analysis presents trends in science education at key stage 2, key stage 4 (GCSE) and key stage 5 (A level). This data is segmented by student gender, to help better understand differences in science entries and attainment between male and female students.

## Methodology

The analysis uses data from the Department for Education's National Pupil Database (NPD) to explore the effects of gender, disadvantage and ethnicity on entries and attainment in science subjects at GCSE (key stage 4) and A level (key stage 5) in 2019.

At GCSE, the report shows entries and attainment in science, including the separate science, Combined Science and Computer Science. For comparison, the report also shows data from English and Mathematics GCSEs.

At A Level, the report shows entries and attainment in science, as well as Computing. For comparison, the report also shows data from Mathematics, as the subject with the highest number of student entries.

### Measuring disadvantage

At GCSE, the analysis identifies students as being from a disadvantaged background by using the KS4\_FSM6CLA1A measure within the NPD. This measure uses the Department for Education definition of disadvantage, defined as students who have ever been eligible for free school meals in the last 6 years, or have been looked after for a day or more, or have been adopted from care.

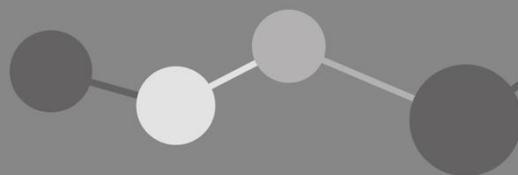
There is no equivalent variable for disadvantage at A level, however students are identified as being from a disadvantaged background if they were disadvantaged at KS4, based on the KS4\_FSM6CLA1A measure.

### Calculating cohort sizes

To explore trends in entries and attainment, the percentage of students eligible to sit GCSEs or A levels, and those achieving each grade in each subject, was calculated.

At GCSE, the cohort includes all young people at the end of their key stage 4 studies from maintained schools - approximately 540,000. This data was segmented by characteristics of interest - gender, disadvantage and ethnicity.

The GCSE data presented therefore represents the **proportion of the segmented cohort who either achieved a grade within a certain GCSE subject, or did not enter that subject.**



At A level, there are several different further education (FE) routes<sup>1</sup>, with most students opting to do level 2 or level 3 qualifications. Therefore, not every young person in England aged 18 in 2019 sat A levels, a level 3 qualification. Consequently, we cannot use the number of students who did sit A levels in 2019 as the total cohort size as it is not equal to the number of students who were eligible to sit A levels in 2019. As A level courses are two years in length, 18 year old students completing their A levels in 2019 would have sat their GCSEs two years earlier in 2017. As GCSEs are compulsory, the number of students taking GCSEs in 2017 is our closest estimate to the number of students who could go on to sit A levels in 2019. Therefore, to calculate the total number of students who could have sat A levels in 2019, the number of students that sat GCSEs in 2017 was used.

## Ethnicity groups

Certain ethnicity groups were not included in this analysis as they did not allow for reliable conclusions to be drawn about student background due to small sample sizes. These groups were:

- Asian - Any other Asian background
- Black - Any other Black background
- Mixed - Any other Mixed background
- Mixed - White and Asian
- Mixed - White and Black African
- Mixed - White and Black Caribbean
- Any other ethnic group
- White - Any other White background
- White - Gypsy / Roma
- White - Irish
- White - Traveller of Irish Heritage
- Unclassified

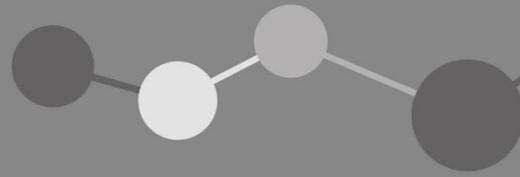
## Triple Science and Combined Science

There are two key differences between triple science and combined science: the amount of content covered and the number of GCSEs you can achieve at the end of the course. Currently, for GCSE science there are two potential routes students can take<sup>2</sup>:

1. **Combined science:** A student taking combined science will study three of: biology, chemistry, physics or computer science. However, they will only cover around two thirds of what is covered in triple science. At the end of the course they will sit a total of six papers, two for each subject, however these papers are shorter than those for triple science. They will then receive a combined science qualification worth two GCSEs, consisting of two equal or adjacent grades (e.g. 9-9, 9-8, 8-8, 8-7 etc.)
2. **Triple science:** a student taking triple science will study the full course of three sciences: biology, chemistry, physics (in some cases computer science also counts). They will then sit a total of six papers, two for each subject, at the end of the course. The student can achieve up to three GCSEs, i.e. a stand-alone GCSE in each of the three sciences they have studied.

<sup>1</sup> Further education routes include: level 2 BTEC (GCSE equivalent); level 3 BTEC (A level equivalent); A levels (level 3 qualification) and apprenticeships (vocational route).

<sup>2</sup> <https://ofqual.blog.gov.uk/2018/03/23/grading-the-new-gcse-science-qualifications/>



## Understanding the charts

Figure 1 shows the proportion of the non-disadvantaged, female cohort that either achieved a grade in GCSE physics, or did not enter GCSE physics. Below Figure 1 there is a numbered key which explains each element of the figure.

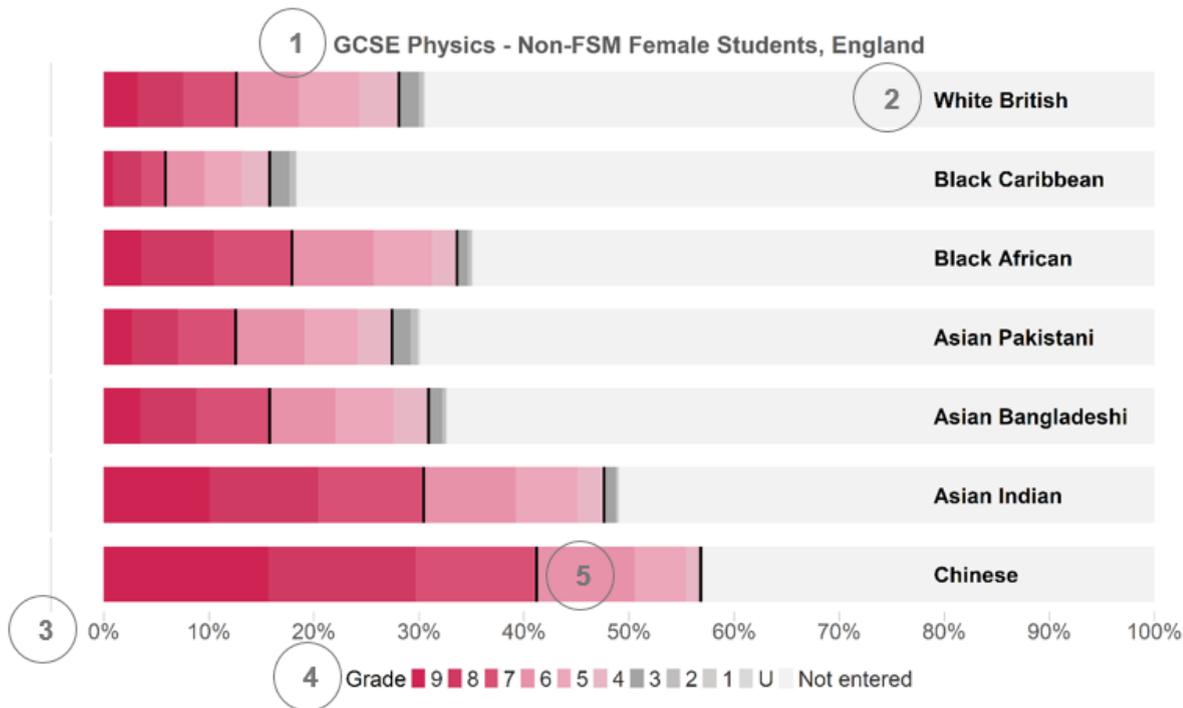


Figure 1: The proportion of the non-disadvantaged, female cohort that either achieved a grade in GCSE physics, or did not enter this subject.

1. The title tells us which GCSE or A level subject the data relates to, and how the cohort has been segmented, i.e. whether the cohort is male or female, and disadvantaged (FSM) or non-disadvantaged (non-FSM).
2. Each facet of the chart shows data for a specific ethnic group; the facet is labelled with that ethnic group.
3. The x-axis shows us what proportion of the segmented cohort has either achieved a grade in the specified subject, or did not enter this subject.
4. Each grade is represented by different colours, with the highest grades in darker shades of pink, pass standard grades in paler pinks and failing grades in shades of grey. The proportion of the cohort that is "Not entered" is shown by the lightest shade of grey.
5. The black lines between the coloured bars highlight drops between grades. The left-most line highlights a drop from the highest grades to passing grades, while the right-most line highlights a drop from passing grades to failing grades.