AQA
Realising potential

# GCSE MATHEMATICS

## Insight report:
2019 results at a glance

September 2019

insights

2019

aqa.org.uk

# How to use this report

This report provides a snapshot of this summer's results. It contains information on grade boundaries and performance by paper. This report is part of our full results insight series. For extra information on results:

- Join your Head of Curriculum for a video breakdown.
- Access our free Enhanced Results Analysis tool. We've created two-minute tutorials to show you how.
- Navigate to e-AQA to download the full report on the exam for a detailed breakdown.
- Book on to one of our Live lessons webinars. The Head of Curriculum for your subject will take you through this year's results and answer your questions.
- Book on to a Feedback event. See examples from real scripts from the summer to highlight common areas where students did well and where there's room for improvement.

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# Qualification summary

This year the entry profile for GCSE Mathematics was largely stable, with the proportion of post-16 students increasing by 2% and the overall balance between Foundation and Higher tier entry unchanged. For 16 year olds, 55% sat the Higher tier, which is also unchanged from 2018.

Conduct your own analysis using data relevant to you. Watch our two-minute tutorials on using Enhanced Results Analysis (ERA) for school, subject, group or student performance; or log straight in through aqa.org.uk/log-in

# Grade boundaries foundation

| Subject or paper | Max mark | Summer 2019 grade boundaries (raw mark) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Mathematics 8300F (Foundation) | 240 | - | - | - | - | 157 | 122 | 89 | 57 | 25 |

In contrast to the first two summer series of this exam, the performance of the three papers was less consistent with paper 2 proving more difficult, resulting in slightly lower grade boundaries across the grade range.

### Grade boundaries are set using a mix of statistics and expert judgement

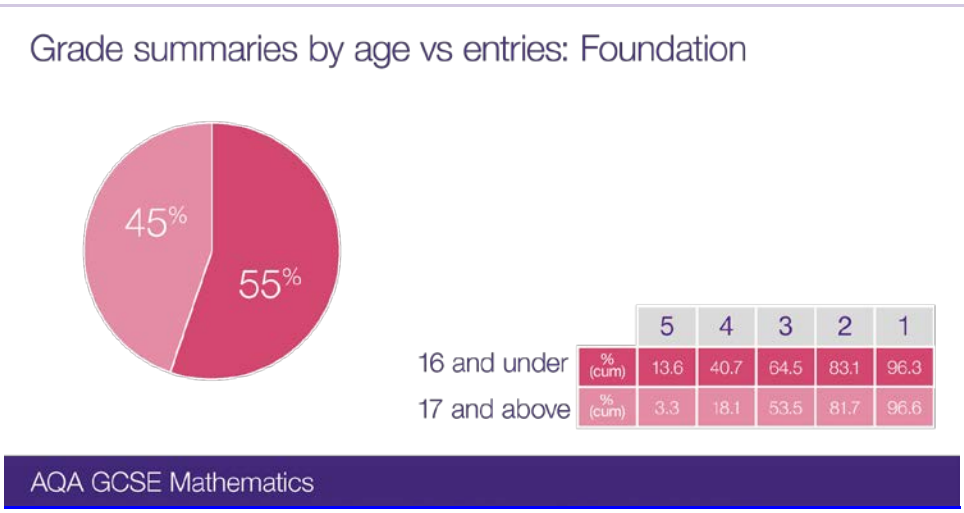
Our research team uses a range of statistics to make predictions that suggest the most appropriate grade boundaries. The statistical evidence considers the prior attainment of the given cohort as well as the distribution of marks. Senior examiners then review a script sample to confirm the statistically recommended marks are sensible for the grade.

Boundary setting is overseen by Ofqual. To find more grade boundaries and learn how they are set, visit aqa.org.uk/exams-administration/results-days/grade-boundaries-and-ums

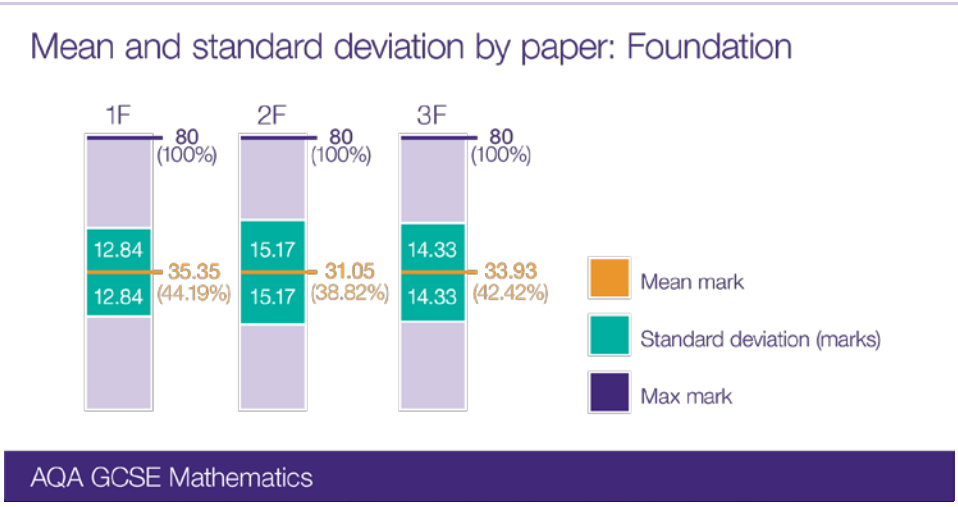
# Foundation tier insights

This is a snapshot. Learn more about every question from the summer 2019 series in the Chief Examiner's reports. Visit allaboutmaths.aqa.org.uk, log in and follow:

Home > GCSE Maths (8300) > June 2019 GCSE Examiner reports.




45% of Foundation tier students were aged 17 or older. Their results profile is very different from that of 16 year olds.




Mean raw mark and standard deviation by paper.

# Paper 1 Foundation

| Areas where students did best | Areas where students could improve |
|---|---|
| • Multiplying a decimal<br>• Coordinate problem solving<br>• Money problem solving<br>• Factors<br>• Long division in context<br>• Long multiplication in context<br>• Calculating a percentage of an amount<br>• Volume of a cuboid<br><br>Question 7:<br><br>This early problem solving question was very well answered with nearly 80% of students getting both marks demonstrating, once again, that students at all levels of attainment can deal with accessible, novel problems. Many students showed careful working to arrive at the correct answer.<br><br>Question 10:<br><br>This six-mark, two-part question involved both long division and multiplication and an element of problem solving. It was very well answered, with over 70% of students getting full marks in each part. Over the whole paper, examiners reported improvements in both arithmetic skills and in showing clear working, both of which were essential in making good progress with this question. | • Simplifying a ratio to n : 1<br>• Working with algebraic expressions<br>• Calculating with standard form<br>• Using a tree diagram to compare and calculate probabilities<br>• Simplifying powers<br>• Plotting and using a curve<br><br>Question 12:<br><br>This question was a straightforward percentage calculation and most students used one of a variety of valid, build-up methods. Whilst performance was good with over two-thirds of students getting full marks, many students did not show their method clearly and lost out if they made an arithmetic mistake. For example, the student who wrote down 50% = 140 would not get a mark for method but the student who wrote down 50% = 300/2 = 140 would get a method mark as they have shown that they know a method for calculating 50% even though they have slipped up. Of course, the student who correctly wrote down 150, as very many did, would get the mark.<br><br>Question 25:<br><br>This was a challenging common question that involved comparing areas of circles and semi-circles. Very few Foundation tier students were able to complete it fully and gain 3 or 4 marks. We had hoped that a greater number of students would have been able to make some progress by showing a method for the area of the large circle. Only about 30% of students were able to make a start and the majority of those went on to make further progress. |

# Paper 2, Foundation

| Areas where students did best | Areas where students could improve |
|---|---|
| • Working with fractions and decimals<br>• Using a calculator<br>• Criticising a bar chart<br>• Direct proportion graph<br><br>Question 5:<br><br>This question was well answered, with the majority of students successfully comparing the times and achieving all three marks. The most popular and successful method was to convert ¾ of a day into hours and then minutes. Those students who started by trying to convert 1000 minutes into hours tended to be less likely to score full marks.<br><br>Question 19:<br><br>Over 60% of students showed understanding of direct proportion by producing a sketch of a straight line through the origin. Common incorrect responses were lines that did not pass through the origin or curves with increasing gradient. | • Angles and shape properties<br>• Area and scale<br>• Straight line graphs<br>• Constructions<br>• Forming and solving an equation<br>• Inequalities<br><br>Question 6:<br><br>Whilst a pleasing 80% of students were able to use their calculators effectively in answering part (a), only about half were able to show a fully correct approximation and use it to decide their answer was sensible. This question showed better performance than similar questions in the past and the instruction to round the numbers clearly helped many to get some marks in part (b). However, there were lots of slips and errors seen in carrying out the 'rounded' calculation.<br><br>Question 17:<br><br>Almost 70% of students completed the table in part (a) with a correct expression. However, few students could successfully use the expressions from the table to form and solve an equation, with only around 30% of students getting any credit in part (b). Most of those who attempted an algebraic approach in part (b) went on to achieve all four available marks. |

# Paper 3, Foundation

| Areas where students did best | Areas where students could improve |
|---|---|
| • Working with numbers, including primes and multiples<br>• Proportion and best buy problems<br>• Pictogram<br>• Metric/imperial conversion<br>• Systematic listing<br>• Substitution<br><br>Question 7:<br><br>This question was well answered by most students. As expected, over 90% gained the first mark by taking the frequencies from the pictogram. It was pleasing to see that around 70% of students understood what to do and were able to show a method for calculating the number of bedrooms, with almost all doing this accurately. In this calculator paper, it was surprising to see some students having difficulty with 27 + 40 + 15 with incorrect answers of 72 or 92 being occasionally seen.<br><br>Question 23:<br><br>This four-mark problem solving question was well answered with over half of students giving fully correct answers and nearly two-thirds achieving some credit. This suggests that most students understood the unfamiliar context and were able to reason proportionally within that context. The most common errors were based on incorrect conversion between time notation and decimals or slips in working with time, eg after identifying 4.30 pm, then incorrectly stating four and a half hours were left until 8 pm. | • Angle problems<br>• Function machines<br>• Drawing a Pie chart<br>• Enlargement<br>• Algebraic manipulation and equations<br>• Density<br>• Compound interest<br>• Equation of a line<br><br>Question 17:<br><br>Part (a) was very well answered with most students applying a systematic approach correctly. Part (b), however, was not well answered even though it was a very straightforward question. Only about one third of students were able to complete a fully correct pie chart with many not seeing the link between 180 scoops and 360˚. A common error was to complete only half the pie chart using 45˚, 75˚, 50˚ and 10˚.<br><br>Question 22:<br><br>Part (a) was well answered for a question late in the paper. Common incorrect answers were 25 from $5^2$ with no more work seen or 2.6 from wrongly ordering the operations, ie 25 – 12 ÷ 5 = 2.6.<br>Part (b), in contrast, turned out to be the lowest performing item on the paper with fewer than 10% of students scoring marks and a high proportion of non-attempts. Even among the few who made some progress in explaining why $T$ must be positive, full algebraic arguments considering both terms were rare. Common partial explanations included ‘a negative multiplied by a negative gives a positive’ without particular reference to any term. Other students |

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| | used an approach of substituting one or more negative values of $n$ but could not generalise from there. |

# Grade boundaries Higher tier

| Subject or paper | Max mark | Summer 2019 grade boundaries (raw mark) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Mathematics 8300H (Higher) | 240 | 206 | 171 | 136 | 105 | 74 | 43 | 27 | - | - |

## How to interpret grade boundaries

Grade boundaries in the Higher tier were similar to last year with a slight rise in the grade 8 and 9 boundaries compared to 2018, and a small drop at grades 7 and below.

### Grade boundaries are set using a mix of statistics and expert judgement

Our research team uses a range of statistics to make predictions that suggest the most appropriate grade boundaries. The statistical evidence considers the prior attainment of the given cohort as well as the distribution of marks. Senior examiners then review a script sample to confirm the statistically recommended marks are sensible for the grade.

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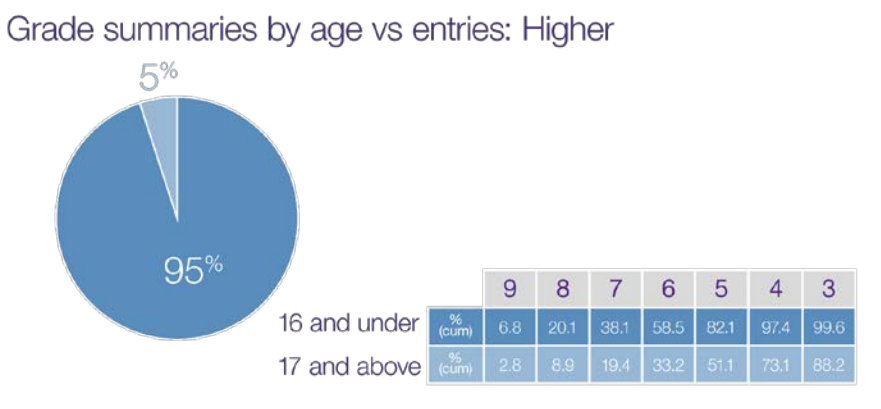
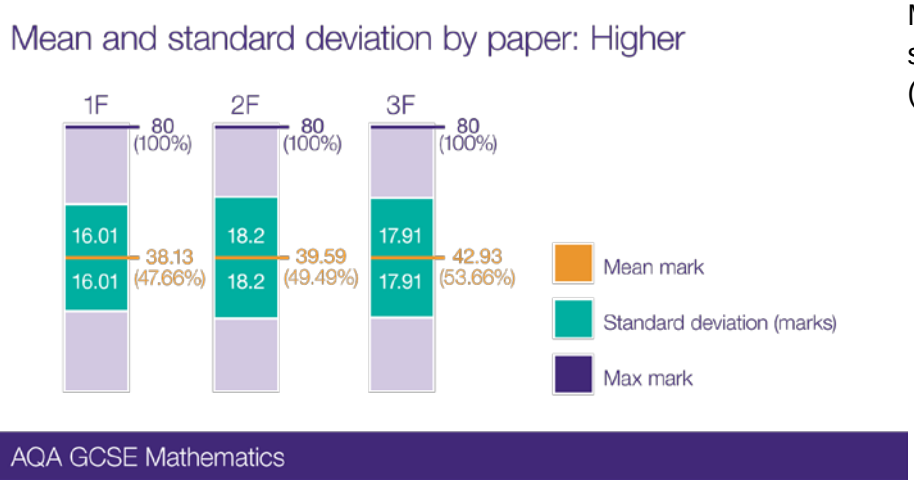
# Higher tier insights




In contrast to the Foundation tier, older students make only 5% of the Higher tier cohort.




Mean raw mark and standard deviation by paper (all tiers).

# Paper 1, Higher

This is a snapshot. Learn more about every question from the summer 2019 series in the Chief Examiner's reports. Visit allaboutmaths.aqa.org.uk, log in and follow:

Home > GCSE Maths (8300) > June 2019 GCSE Examiner reports.

| Areas where students did best | Areas where students could improve |
|---|---|
| • Similarity<br>• Completing a tree diagram<br>• Drawing and interpreting a graph<br>• Ratio problems<br>• Cumulative frequency<br><br>Question 11:<br><br>This question was very well answered, with nearly all students scoring at least 2 marks. A sizeable number of students, however, made an arithmetic slip when dividing 330 by 11, with 33 being a common, incorrect result. In addition to being incorrect, this made their subsequent calculations more difficult.<br><br>Question 15:<br><br>Most students gave the three correct values to complete the table in part (a). In part (b), whilst most students plotted the points accurately, a significant number lost a mark through poor curve drawing. Straight lines between plotted points are acceptable for a cumulative frequency diagram, and students using this approach are more likely to produce an accurate diagram. Those students who had a graph to use were generally successful in part (c).<br><br>Question 21:<br><br>This was a novel, problem solving question on simultaneous equations and it was pleasing to see many students being wholly or partially successful. It was notable that most students | • Probability with more than one event<br>• Geometry proof<br>• Forming and solving an equation<br>• Vector problem<br>• Index problems<br>• Turning points<br><br>Question 6:<br><br>Part (a) was well answered; the probabilities for the first roll were generally correct and students also did well with the probabilities for the second roll, although $\frac{1}{3}$ and $\frac{2}{3}$ were seen quite a lot. However, students were less successful in part (b). The three correct values were often selected from the tree diagram but combined in a variety of incorrect ways. Students who obtained 'their' probability of winning were usually able to draw an appropriate conclusion.<br><br>Question 17:<br><br>Part (a) proved to be one of the most difficult questions on this paper. Most students were not able to convert the description in words into an equation, with many confusing 'product' with 'sum' and others omitting the required brackets around '$y + 3$'.<br>Students were more successful in part (b), although many thought that the error was in giving a negative solution. Those who understood where the error had occurred could usually explain it satisfactorily. |

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| approached the problem by rearranging the second equation and eliminating a variable rather than using the easier route of substitution. This led to errors in rearrangement, and in combining their equations which could have been avoided. The question proved to be a strong discriminator, with a good proportion of students on each mark. | |

# Paper 2, Higher

| Areas where students did best | Areas where students could improve |
|---|---|
| • Pythagoras and area problem<br>• Estimating and comparing grouped data<br>• Ratio problems<br>• Simplifying surd expressions<br><br>Question 7:<br><br>This common question was well answered with most students able to apply Pythagoras' theorem correctly and use the given ratio to find the length BD.<br><br>Question 18:<br><br>The ratio problems in this paper were generally tackled well and this problem was answered quite well, with many students successfully processing the given information. Some worked using ratios while others used numbers of discs. Full algebraic solutions were rarely seen but were not necessary. The question also discriminated well with a good proportion at each mark and over 80% of students achieving some credit.<br><br>Question 22:<br><br>The more common approach to this question was to expand the brackets without simplifying the contents first. This was more work but often successful. Overall this high demand question was well attempted with almost 70% of students making some progress and around 40% getting all three marks. Some students obtained 27 but without showing any method and did not score any marks in this 'show that' question. | • Constructions and sketching<br>• Product rule for counting<br>• Forming and solving an equation from a shape problem<br>• Quadratic inequality<br>• Inverse function<br><br>Question 5:<br><br>This early, common question was not well answered. Many could draw a correct circle, centre A, but this was often accompanied by other circles using centres B and C. Correct perpendicular bisectors were not seen often.<br><br>Question 21:<br><br>As with question 17 on paper 1, students find it very difficult to generate and solve equations in more demanding problems like this. Although the curved surface area formula was given, many did not replace the slant height with an appropriate expression in $r$. Errors were made when dealing with $\pi$, either omitting it or cancelling incorrectly. Fully correct responses were not common with many not scoring at all.<br><br>Question 27:<br><br>Working in function notation, and particularly inverse functions remains a very challenging topic and appropriate as the last question in the paper. A reasonable number of students achieved one mark for an attempt to evaluate f(–0.5) and it was common to see f(3) evaluated rather than an attempt at an inverse function. Most students may not see finding the inverse function as the same process as changing the subject, which they tend to do quite well. |

# Paper 3, Higher

| Areas where students did best | Areas where students could improve |
|---|---|
| • Using the density formula<br>• Compound interest<br>• Changing the subject of an equation<br>• Probability from Venn diagrams<br>• Calculating distance from a speed/time graph<br><br>General Comments:<br><br>Overall, students did very well on this paper, with most questions performing as anticipated. Generally, the longer problem solving and reasoning questions were attempted by most students with many picking up some marks on high demand questions late on in the paper.<br><br>Question 17:<br><br>This question was well answered with a majority of students gaining full marks and well over 80% achieving some credit in this novel problem, combining relative frequency with range.<br><br>Question 28:<br><br>Part (a) was very well attempted with over half of the students gaining some marks and just under a third achieving full marks, which is very pleasing for the final question on the paper. The most successful students cut the diagram into 3 distinct regions and used a triangle from 9 to 12 seconds understanding this would give an overestimate for the distance. Students who attempted to divide the area under the graph into many strips were more likely to slip up at some point.<br>Students were less successful with part (b) though most attempted it and more than half got some credit. | • Drawing a vector<br>• Finding areas of sectors using algebra<br>• Using the quadratic formula<br><br>Question 13:<br><br>This question drawing vectors was one of the most poorly answered on the paper with only about one in six students achieving both marks for part (b). In part (a) many students did not recognise the significance of direction and gave 2a as their answer. The main errors in part (b) included: vectors c and d connected incorrectly, no directions or incorrect directions indicated on the vectors, c and d drawn but c – d not shown or no attempt at a vector sum.<br><br>Question 16:<br><br>This question was the least well answered on the paper with very few students gaining full marks. The main algebraic error was writing $(1.5r)^2$ as $1.5r^2$ for Sector A and many responses omitted $x$, $r$ or $\pi$. Students who did not use an algebraic approach and chose their own values for $x$ and $r$ gained no marks. As with the examples on papers 1 and 2, students found it very challenging to derive accurate algebraic expressions from situations, with only the most confident able to generate and compare expressions for area featuring $x$, $r$ and $\pi$. |

## Next steps

**Access our full suite of insight resources:**

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## Contact us

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