AQA
Realising potential

GCSE
Mathematics

8300: Paper 1H (non-calculator) Higher

Report on the exam

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Summary

This was the first series with changes made to the assessment. Multiple-choice questions were removed from the start of the papers and efforts were made to ensure that more of the beginnings of the papers were accessible to all at higher tier. We have worked hard to ensure that ramping of demand, wording of questions and the contexts used are appropriate. This has led to an increase to some of the grade boundaries. As a result we feel students were better able to demonstrate their mathematical knowledge and appeared to have a more positive examination experience.

Overall performance compared to last year

The mean mark this series was very similar to summer 2022. As students had prior information last year about the topics on papers it may indicate that performance this year has improved.

Topics where students excelled

- Solving basic inequalities
- Setting up and solving an equation
- Standard form
- Fractions and ratio

Topics where students struggled

- Surface area
- Functions
- Product rule for counting
- Average speed algebraically

Individual questions

Question 1(a)

The majority of students gave the correct answer, with 3.5 being a very common incorrect answer. The other incorrect answer occasionally seen was 0.035

Question 1(b)

Most students got the correct answer, usually by changing to multiplication and inverting 3 to $\frac{1}{3}$.

However, some went wrong with this method by forgetting to invert the 3 or by also inverting $\frac{5}{6}$.

Question 2

This question was very well done. However, while most students halved 26 to get 13, some gave that as the answer and others gave the answer as $x = 13$. A few students thought that the answer required the set of integers that satisfied the inequality, usually settling for the integers from 1 to 12.

Question 3

The majority of students gave the correct answer, although many left their answer as $\frac{9}{4}$, which was not accepted. The most common incorrect value was $\frac{9}{2}$, leading to $4\frac{1}{2}$, from those who only squared the 3.

Question 4

This question was well answered. Nearly all students received at least one mark for knowing that the sum of angles on a straight line is 180°, but some divided 180 by 8, 5 or 3. Some students solved an equation to work out that $x = 20$, but gave that as the answer, forgetting to multiply by 5.

Question 5

This question was well answered, with most students scoring at least 2 marks. Many seemed to have missed the requirement for the answer to be even, and others gave non-prime numbers which they clearly thought were prime, the most common being 27.

Question 6

Most students were able to make good progress with this question, with many scoring full marks. The most common error was to only take one third of £96 from Bruce, giving an answer of £52. In any ratio question there are students who immediately add the ratios, and some did this here, usually then trying to divide 96 by 11.

Question 7

There were many correct answers here, with both of the alternative methods used regularly and successfully, although alternative method 1 led to more arithmetic errors. A small proportion of students got to 8 and then thought that the answer was 4. The least successful students often started by multiplying 2, 3 and 5 to get 30.

Question 8

Virtually every student scored at least one mark on this question, with a good proportion getting the correct answer. The most common error was to incorrectly expand the second bracket to $-2x - 2$, giving the answer $13x + 18$. Some students thought the two expanded brackets should then be cross-multiplied, and a smaller number thought the whole thing was an equation to be solved in some way.

Question 9

While only about one fifth of the students gave two correct criticisms a fair proportion scored one mark, usually for noting that the graph should not touch the y-axis. Many students may have had the right idea, but did not express it correctly. For example, saying 'one line touches the axis and the other doesn't' or 'one curve should be below the axis' or 'the graph should be symmetrical' is not specific enough, and students should be encouraged to write clearly, concisely and in mathematical terms.

Question 10

A large proportion of the students scored full marks on this question, some by working algebraically and some by trial and improvement. The most common error was to use '$x + 1$' for Beth instead of '$x - 1$', but this still allowed students to score 4 marks. Another error seen quite regularly was getting the correct expressions of $x - 1$ and $2x$ but forgetting to also add x when constructing an equation for the total of the three ages. This only allowed a maximum of two marks. Only a small number of students used 5 as the required total for the ages, with the others all realising that if the mean was 5 the total was 15.

Question 11

Many students simply gave numerical values rather than probabilities, which could gain two marks, for which they could score two of the three marks. Common incorrect values were 11 in part (a), 41 in part (b) and 76 in part (c), and a fair proportion of students had the probabilities or values for part (a) and part (c) the wrong way round.

Question 12(a)

Approximately half of the students gave the correct values, with a lower limit of 0 being the most common error.

Question 12(b)

A large majority of students were correct with this question. A small proportion made an error when converting the given number to standard form, and a similar proportion linked the negative index to 'one over' and gave the answer $\frac{1}{7200}$

Question 13(a)

There some concise and correct responses to this question, but many students mistook 'increases by 2' for 'doubles' and used the input $2x$. Students should be aware that they should use variables when trying to show a general rule rather than substituting values. In this case, those who substituted appropriate values for x could score 1 mark, but those who substituted values for x, a and b did not score.

Question 13(b)

Many students did not show understanding of how to use functions. Of those that did, a large proportion ignored f(3), perhaps simply comparing the result of $\frac{\text{f}(6)}{\text{f}(2)}$ to 3. A common algebraic error was to get to $\frac{36k}{4k}$ but then simplify it to $9k$.

Question 14

A large proportion of students gained one mark for having the median value being twice the lower quartile. Relatively few scored full marks, with 12, 24, 30 often being followed by 36 as the highest value.

Question 15

Very few students were correct with all four statements, with two correct being the modal mark. The first and last statements were the ones most regularly judged correctly.

Question 16

This question was quite well answered, with approximately half of the students giving the correct values. Generally, students multiplied the two equations to equate coefficients, and it was at the subtraction/addition stage of the process that some students went awry, often subtracting when the equal coefficients were different signs and adding when they were the same. Those who made one

unknown the subject of an equation and substituted into another usually picked up at least two marks, but their working with the subsequent fractions often led to errors.

Question 17

This question was poorly answered. Students showed little understanding of total surface area being made up of a number of faces. Many omitted the flat face of the hemisphere and an equal proportion tried to work out the volume of the cylinder. Correct use of algebra with pi was scarce. Much of the work was haphazard, and it would help students if they laid out their work in some recognisable order.

Question 18

Nearly two thirds of students chose the correct option, with 45 being the most popular incorrect choice.

Question 19

This question was not answered well, with few students getting the correct answer. A similar number of students scored one mark for one of the special cases. There was little evidence of correct working, and a wide variety of incorrect answers, the most common of which were 10 (from 2×5), 25 (from 5×5) and 63 (from 7×9). This seems to be a topic that students have little familiarity with or competence in.

Question 20

This question was fairly well answered, with students finding many different routes to the correct answer. Some, however, got stuck after writing the two initial equations $3K = 4L$ and $K = L + 2M$, and others manipulated these equations in various ways without ever eliminating one of the unknowns. A small proportion of students started by equating the two sets of scales, as $3K + 4L = K + L + 2m$, which is incorrect.

Question 21

Nearly half the students scored both marks, and about a quarter scored one mark for knowing that a was 3 but making a mistake with b, often leaving it as 15. There was a follow through mark for an incorrect value for a, but very few students were awarded this.

Question 22

This question was answered well and discriminated well between students of varying abilities. By far the most common error was to think that ab equalled 36.

Question 23

Students seem familiar with this topic now, and nearly three quarters scored at least two marks. The students who scored zero generally though that the recurring decimal was equivalent to 0.1313… rather than 0.1333…

Question 24

Nearly half the students gave fully correct responses to this question, but many others got stuck after working out that the y-coordinate was 6. Most of the students who got the correct answer used the gradient of perpendicular lines, but some used a variety of methods linked to similar triangles. Among arithmetic errors, it was common to see 22 – 16 = 8, which gave the student the first mark but ruled out the accuracy mark. Some students worked through to get $\frac{1}{2}x = 20$, but then lost the accuracy mark by solving this as $x = 10$.

Question 25

While many students knew the trig values a large proportion went wrong when processing the fractions. $2 \times \frac{\sqrt{3}}{2}$ often became $\frac{\sqrt{6}}{2}$ or $\frac{\sqrt{6}}{4}$, and it was not uncommon to see $4 \times \frac{1}{2} = 8$. In general, working was not set out well, and many students gained marks that they would not have done in a 'proof' question. Students should be advised that in 'Show that' or 'Prove' questions they should set out their working in a systematic way down the page, with each step shown.

Question 26

Over half of the students worked out that the radius OQ was 10 cm, and roughly half of those who did realised that they could then work out a side length of the square using Pythagoras' Theorem. Many of these lost the last mark, however, by not being able to process the ratio from there or for giving the answer as $\sqrt{2}$.

Question 27

Many students worked on the individual stages and made no progress. However, a proportion of students scored the first mark for giving the total time as $\frac{30}{a} + \frac{30}{b}$, although some lost the mark by trying to simplify the expression before writing it down and incorrectly arrived at $\frac{60}{a+b}$. Those students who realised that 60 had to be divided by $\frac{30}{a} + \frac{30}{b}$ usually managed to show algebraically that it could be rearranged to match the given expression.

Further support

Mark ranges and award of grades

Grade boundaries and cumulative percentage grades are available on the results statistics page of our website.

Enhanced Results Analysis (ERA)

Use our exam results analysis tool to create and customise as many different reports for comparison as you like.

Professional development

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Contact us

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