Questions matter

GCSE
Mathematics

8300/1H Paper 1 (non-calculator) Higher

Report on the Examination

June 2024

Version: 1.0

Contents

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Summary

Overall performance compared to last year

The paper was accessible to most students with only a few questions having a significant number of non-attempts. The mean mark was slightly higher than last year.
There were a number of questions where some students did not show enough working to be awarded marks and there were a number of responses seen where the writing was very poor indeed – especially in questions asking for reasons.

Topics where students excelled

- Solving linear equations
- Calculating the surface area of a cone
- Using BIDMAS in calculations
- Plotting time-series

Topics where students struggled

- Algebraic proofs
- Identities
- Simplifying fractions involving decimals and square roots
- Equations of circles
- Enlargements with fractional scale factors.

Individual questions

Question 1

Over three quarters of students scored full marks on this first question. For the rest, some students thought $12^2 = 24$, others simplified $\frac{1}{3} \times \sqrt{36}$ to $\sqrt{12}$. A number of students were confused about dividing by fractions and $144 \div \frac{1}{2}$ was often seen. A few changed $\frac{1}{3}$ to a decimal and a number thought $\frac{1}{3} \times 6 = \frac{6}{18}$. Multiplying or dividing whole numbers by fractions caused problems in other questions as well.

Question 2

A large majority of students scored full marks. A few students measured to the end of the line or vertically and some students gave their answer in centimeters. A small number of students thought that a centimeter was 100 millimeters.

Question 3

Most students gave the correct answer, but some students wrote $\begin{pmatrix} 7 \\ -3 \end{pmatrix}$ or $\begin{pmatrix} -7 \\ 3 \end{pmatrix}$.

Question 4a

The first part of Question 4 was very well answered with most students giving the correct figure.

Question 4b

This part was not so well understood with only about half of the students getting it correct. The most common wrong answer was 8450.

Question 5a

This question was well answered, with most students scoring at least 2 marks. A few students calculated 30% of 78.

Question 5b

A large proportion of students received one mark for the correct answer or the answer that followed through from their diagram. Some students answered $\frac{7}{15}$ or the equivalent for their digram.

Question 6a

Nearly all students scored full marks for completing the graph. Just a few students made an error with the scale on the y-axis.

Question 6b

A wide range was allowed here, and most students scored full marks. Using a line of best fit was condoned.

Question 7a

Most students gave an acceptable answer. Many different terms were allowed for the two heights.

Question 7b

A large majority of students gained full marks here but most of the rest did not score anything. The common mistake was to use $\pi = 3$ to estimate the curved surface area from part a.

Question 7c

This part was also answered correctly by most students, but a few students thought that Beth's estimate would be more because her value of π was more accurate. If a wrong formula had been used in the previous part this was followed through, if necessary, here.

Question 8

The vast majority of students gained full marks for this question and almost everyone scored at least 2 marks. The most common error was to handle the -22 wrongly usually giving $3x = 7$ Provided one side of the equation was correct, this was followed through for the third mark.

Question 9

Just under half of the students scored full marks here. Many started wrongly by putting 26 in the denominator thinking that the numerator should always be the smaller of the two. Also, students did not realise they should multiply the numerator and denominator by 10 to remove the decimal. Those students who did sometimes failed to correctly simplify $\frac{260}{164}$

Question 10a

Most students knew how to represent an inequality on a number line, but some circles were shaded, and some lines ended with arrowheads instead of circles. A few students did not draw a line, just placed circles on the given line.

Question 10b

Students were not as confident solving inequalities as solving equations, but more than half scored full marks. Some answers were $x = -\frac{3}{5}$ and these scored one out of the two marks.

Question 11

This question was not well answered. Only around one fifth of the students scored full marks and around two-fifths scored nothing. This was often because two transformations were stated or implied while the question asks for a single transformation.

Reduction was sometimes named instead of enlargement but did not score. Often the centre was not given, and a few answers were transformations from B to A. Instead of saying the scale factor was $\frac{1}{2}$ some students said the shape was halved which was not accepted for the scale factor mark.

Question 12

This question was fairly well answered, with approximately half of the students giving the correct value however many students scored just the first mark, either for a correct expression for the circumference or for multiplying by $\frac{60}{360}$. Some were working with a diameter of 12 and others were finding the area of the sector. A few multiplied by 6 instead of dividing.

Question 13

Around half the students scored full marks for this question with most of the others just losing one mark for plotting E in the wrong place. Another mark was sometimes lost because the vertices were not labelled.

Question 14

Most students who used the information to write down two correct simultaneous equations were able to solve them and the question was well answered with the majority gaining 3 or 4 marks. One mark was sometimes lost for incorrect money notation eg £0.5. A number of students however tried to find the costs by trial and improvement or by a kind of ratio method. These students only scored if they obtained the correct answers.

More than one letter in the variable names was condoned eg cb and pm. A number of students working with decimals and not being allowed a calculator could not solve the equation $11x = 8.8$

Question 15a

Around two third of the students answered this question correctly. Common wrong answers were the squares 14^2 and 15^2 or 196 and 225.

Question 15b

Less than half of the students gained full marks here but most of the rest scored 1 or 2 marks making an error in one or two of the three approximations. 2^7 was sometimes evaluated as 256 and 7^3 caused problems for some students. $\sqrt[3]{1000\,000} = 1000$ was another common error.

Question 16

Just over half of the students scored both marks in this question and about a quarter scored one mark usually making the mistake of thinking that a larger interquartile range meant a higher consistency. Many of those scoring zero gave just numerical calculations with no words at all. Some students made the mistake of thinking that the number of members in the clubs was the same so the cycling club had more older people but with the sizes of the clubs unknown that may not be true. Similarly answers that said swimmers ages had a greater range were not allowed because range has a defined meaning in mathematics and the values are not known here.

Some answers were almost impossible to read, and students should understand that poor handwriting may lose them marks.

Question 17

Most students began this question correctly by multiplying both sides of the equation by x. After that only a half made any further progress. The rest divided by y or subtracted the 7 and only scored 1 mark. Those that did continue correctly by subtracting $3x$ usually were able to obtain the correct answer and score 4 marks. Hence there were very few students scoring 2 or 3 marks.

Question 18

This question was not answered well with less than a third of the students gaining the one mark. Nearly all of the rest seemed not to know what form the equation of a circle would take. Most answers were the equations of straight lines. Others were purely numerical such as $0^2 + 6^2 = 36$

Question 19

Very few students could answer this question correctly with less than a half gaining more than one mark. The most common mistake was to think that if A is increased by 150% it becomes 1.5A. Other problems were mixing the fractions and percentages and having to put the larger quantity in the numerator again. Alternative Method 2 where a value is picked for A is possibly an easier way to answer this question, but students still faced the same the problems as above.

Question 20

Many students do not seem to understand that in an identity like this one the coefficients of equal powers of x must be the same on each side. Consequently, this question was not well answered. Less than a third of the students gained full marks and more than a half scored zero. Often quite a lot of working was seen, expanding the right-hand side and collecting it up with the left-hand side but this rarely led anywhere.

Question 21

This is a familiar topic now on this paper but this year students were asked to prove the result algebraically. That meant defining a variable and working with equations. Last year nearly three quarters gained at least two marks and this year only just over a half did.
Some students lost the first mark because they did not write recurring decimals. It is essential to put dots over the recurring digits or dots after the last digit.

Question 22

This question was fairly well answered with students finding many different ways to solve it. A could be joined to B to make an isosceles triangle and then the alternate segment theorem gave x or A, and B could each be joined to O so that AOB could be found which gave $2x$. These were just two of the possibilities. Many students did almost all their working on the diagram which was fine because reasons were not required. Some students made the mistake of thinking BC was parallel to PA and others thought PBCA was a cyclic quadrilateral. More than a third of the students scored full marks and more than a half gained at least two marks.

Question 23a

Just over a half of the students gained one mark here, mostly by realising all they had to do was multiply the denominator by 2 and the numerator by $\sqrt{5}$ Multiplying the numerator caused some errors.

Question 23b

Unfortunately, many students did not recognise the nth term formula and did not realise they just needed to expand $(2+\sqrt{3})^3$. More than 10% did not attempt the question. Those students who did try to expand the bracket were often successful although some did not show enough working for a question that said, “Show that .”.
Just over two-fifths of the students gained full marks.

Question 24a

This question was not answered well. Nearly 15% of the students did not attempt it and less than a third gained any marks. Some correct solutions came from trial and improvement since the value for k, which was 5, was not hard to find. A number of students read that $9k$+7 was smaller and thought it was an inequality question. Those who did try to set up an equation sometimes had the difference of 1 added to the wrong side. Solving an incorrect quadratic equation was followed through.

Question 24b

This question was poorly answered. Less than 10% of the students gained full marks for the algebraic proof but many scored one mark for a numeric example.

Question 25

As in last year’s paper, while many students knew the trig values a large proportion went wrong when processing the fractions. $2\times\frac{\sqrt{3}}{2}$ often became $\frac{2\sqrt{3}}{4}$. The value of tan30 was often wrongly obtained from their own table. Nevertheless, more than a quarter gained full marks, and more than half scored at least 2 marks. Quite a few students copied down the wrong signs from the question, often changing the multiplication sign to an addition sign.

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
Attend one of our feedback courses where you can review example responses from students and commentaries from our examiners.

Contact us

Our friendly team will be happy to support you between 8am and 5pm, Monday to Friday.

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