Questions matter

GCSE
Mathematics

8300/1H

Report on the Examination

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Summary

Overall performance compared to last year

Topics where students excelled

- Standard form
- Drawing a circle
- Scatter graphs
- Adding fractions and converting to a decimal
- Drawing a straight-line graph
- Simplifying a ratio
- Calculating with recurring decimals

Topics where students struggled

- Terminating decimal reasoning
- Interquartile range
- Lengths of lines in a coordinate system
- Explaining why an answer was an estimate
- Solving a quadratic equation
- Proof

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Individual questions

Question 1a

This question was well answered, with over 80% of answers correct. Those who went wrong usually gave an incorrect index.

Question 1b

This question was well answered, with over 80% of answers correct. Those who went wrong usually thought that the negative index meant 'one over 7.9 squared'.

Question 2

This question was well answered, with over 80% of answers correct. Those who went wrong usually drew the circle with a centre different to the origin.

Question 3a

This question was well answered, with nearly 80% of answers correct. Those who went wrong usually started with '+ 5y'. Students should be aware that the rectangular boxes of a number machine should contain only an operator and a number.

Question 3b

This question was the first one that caused widespread problems. While half of the students gave the correct answer the other half almost always gave '– 12' as their answer.

Question 4

Over half of the marks were awarded in this question. Students who went wrong often divided 54 by 4, 2 or 5. Very few confused surface area with volume.

Question 5a+b

Part (a) was fairly well done, with three quarters of the marks awarded. Errors seemed to come from inaccurate reading of the question rather than an inability to perform the maths required.

There was also a good response to part (b), with a similar proportion of the marks awarded. Students who went wrong in part (a) were still able to score both marks here due to follow-through.

Question 6a

This question was well answered, with over 75% of answers correct. Those who went wrong usually said that when one increased or decreased the other did the same. A few students repeated the given information that the graph showed negative correlation.

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Question 6b

This question was well answered, with over 75% of the marks awarded. Those who went wrong usually drew their line with far too steep a negative gradient. Some students misread the vertical scale, taking each small square to be 100 rather than 200.

Question 7a

This question was well answered, with well over 80% of the marks awarded. Those who went wrong often made the standard mistake of adding the numerators and denominators to get 9/25.

Question 7b

This question was not well answered, with less than a third of the answers being correct. Students often used recurring decimals to support their 'No' verdict or just gave general answers without giving a specific counterexample.

Question 8a+b

Both parts were very well done, with over 90% success in part (a) and over 80% in part (b).
In part (a), the main error was in calculating y when $x = 0$, with –1.5 and 2/3 being the most common incorrect answers.
In part (b) most students correctly plotted their points but could only achieve full marks with a correct line. Students should be aware that an equation such as this results in a straight line, and that if one of the points is out of line it must be an incorrect point.

Question 9

Most students drew a correctly sized shape in the correct orientation, but many struggled with the positioning. Those who used the ray method were usually successful.

Question 10a

This question was well answered, with over 80% of the marks awarded. Those who went wrong usually included Rent instead of Food or failed to simplify the initial ratio.

Question 10b

There was a reasonable response to this question, with nearly two thirds of the marks awarded. Most students who lost marks concentrated on there being 360° in the whole pie chart. This could be an intermediate step to a correct answer, but few found it. The students who scored full marks almost invariably did 390 ÷ 130 = 3 and then multiplied by 55, although this did lead to some arithmetic errors.

Question 11

Only about a third of the students got full marks here, and very few scored two marks. It was common to see 6 being used as the radius in the area formula, which could score 1 mark. Of those who did not score full marks, few scored the first mark for realising that the '+ 24' meant that the radius must be 12.

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Question 12a+b

Most students plotted the required points correctly, but only a third went on to draw a correct curve or polygon. Students should understand that, in this case, the graph starts at (0, 0) or (10, 3) and ends at (60, 30), as several continued the graph in an upwards curve. As usual, lots of equal-width histograms were drawn.

Part (b) was poorly done, with only about 20% of the marks awarded. Those students who knew that the quartiles were based at one quarter and three quarters of the data often calculated the fractions of 60 (the time) rather than the cumulative frequency.

Question 13

Approximately half of the marks were awarded in this question. Many students are now familiar with the method of equating ratios, but a fair proportion multiplied 5 and 7 by 3, 3 by 7 and then 2 by 3 instead of 7. Those who got to 15 : 21 : 14 usually went on to give the correct percentage.

Question 14

Approximately one quarter of the students used Pythagoras to support their decision, usually correctly, but the others often measured the lines or discussed the gradients.

Question 15a

This question was a good discriminator, with about a quarter of the students scoring full marks. Many students went awry by linking 300 to an incorrect value, be it the number of small coffees or the total number of coffees.

Question 15b

Few students gave a correct answer here. The most common incorrect reason centred around inaccuracy in the given ratio or value of 300, but these were stated, not given as estimates. The best answers identified that the given ratio was for all coffees and may not be true for large coffees only.

Question 16

Most students could set up the equations, and approximately a half-equated coefficients and showed a correct method to eliminate one of the unknowns. A significant number of students lost the last mark by giving the wrong value as their answer or giving it in incorrect money notation.

Question 17

Few students were fully successful in this question, but nearly three quarters scored at least one mark. The main rounding fault was changing 10.7 to 11 instead of 10. Rounding to 1 significant figure is always a problem for students, and further practice with it would be useful. Those who used 11 could still go on to score 3 marks. Students could score the second mark for the correct use of the cosine rule with or without any rounding. Arithmetic errors cost some students the final mark, with the most common being $30^2 = 600$.

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Question 18

The first mark was for the substitution and rearrangement, which over half of the students didn't manage successfully. Few students managed to solve the quadratic by any means other than factorisation, most going awry numerically when trying to use the formula.

Question 19a

This question was well done for this stage of the paper, with two thirds of the students getting the correct answer. This is a noticeable improvement on the performance in other recent questions involving calculations with recurring decimals.

Question 19b

Students are familiar with this question now, and most made a correct algebraic start. Nearly half of the students achieved the correct answer. Students should be aware that when they write a recurring decimal, they should use correct notation (dot(s) or bar) or write at least two of the recurring digit(s) and at least two dots.

Question 20

Approximately two thirds of the students didn't score on this question, even though the first mark was simply for putting the two expressions in x together in an equation. As with question 18, the most successful students factorised the quadratic to lead to the solution.

Question 21a

This question discriminated well, with an approximately equal proportion of students on each mark. As usual with this type of question, multiplying by a mix of integers and surds caused arithmetic problems.

Question 21b

On this question students tended to score 4 marks for fully correct, 1 mark (usually for 50) or no marks. Unlike with the multiplication of two linear expressions, students didn't realise that the expansion should have four terms.

Question 22

This was a difficult question, which attracted a minimal number of fully correct answers. Some students did pick up a mark for factorising the denominator or realising that the terms had to be 1/6 and 1/7

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

Tel: 0161 957 3852
Email: maths@aqa.org.uk

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