

OXFORD

INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL GCSE MATHEMATICS EXTENSION

(9260) Paper 1E

Report on the examination

November 2022

REPORT ON EXAMINATION: INTERNATIONAL GCSE MATHEMATICS EXTENSION 9260 PAPER 1E NOVEMBER 2022

Students gave some well-constructed solutions to many of the questions. However, some did not set out their solutions clearly, and numbers were often written ambiguously or in extremely tiny handwriting. Some students misread their own handwriting, and this was particularly common with indices and with miscopying x as a multiplication sign. There was no evidence of time pressure, with the majority of students completing the paper.

Topics that were well done included:

- bracket expansion
- identifying a quadratic graph
- standard form
- solving an inequality
- simultaneous equations
- similar shapes problem
- simplifying surds.

Topics which students found difficult included:

- construction
- geometric proof
- bounds
- fraction problem
- completing the square.

QUESTION 01

This question was not very well answered. The common wrong answers were 9 and 3.

QUESTION 02

Part (a) was very well answered, with very few incorrect answers.

Part (b) was slightly less well answered. $5a$ was the common incorrect answer, from an incorrect use of the order of operations.

QUESTION 03

This question was very well answered, with very few incorrect answers.

QUESTION 04

The vast majority of students gave the correct answer to part (a), although commas and spacing were not always used correctly. Some students had the incorrect number of zeros or included a decimal point.

Part (b) was also very well answered. Occasionally, students gave the ratio the wrong way round. Some students wrote out the numbers in full, which meant that some of them made a slip in accuracy.

QUESTION 05

The question was well answered, but $y = 2x + 6$ was a common incorrect response. Some students tried to combine the values 3 and 6 from the intersections with the axes and gave answers such as $6y + 3x$. Occasionally, students gave the expression $-2x + 6$ rather than giving an equation.

QUESTION 06

This question was not very well answered. The common incorrect answers were 40 000 and 4000.

QUESTION 07

In part (a) the vast majority of students correctly wrote about the fact that the mark increases as the time spent revising increases. Some students stated that the two variables were directly proportional, which is not the case. A few students repeated the information about positive correlation.

In part (b) most students attempted a line of best fit, and the majority were accurate. However, some lines were too short and some inappropriately went through the origin. Some students did not have a line or simply joined each point to the next.

QUESTION 08

Many correct solutions were seen, and most students were able to access some of the marks. Some students worked out that 119 visited the palace and 49 visited the gardens, but forgot about the overlap when reaching the final answer. A common error was to assume independence and multiply the two given probabilities. Some students muddled probabilities with numbers of people, for instance they added 85% and 35% and said that there were 120 people. Occasionally students simply worked out 85% of 28 and 35% of 28.

QUESTION 09

This question differentiated well. Most students either knew that an enlargement does not change the angles or rotation will not change the side lengths of a shape and a good number knew both. However, many students thought that it is always true that reflection will change a shape's position. In the context of this question students did not consider that some triangles have a line of symmetry that could be used as the mirror line of a reflection.

QUESTION 10

The vast majority of students were able to work out the calculation accurately, and many went on to give the correct reciprocal. The most common error was to just give the answer to the original calculation without inverting it. Some students thought that the reciprocal was -20 .

QUESTION 11

Many students assumed that the four side elevations would be the same, so gave an answer of 72. Some students worked out the area of the two sides shown or the volume of the cuboid. Occasionally, students only worked out half of the total surface area.

QUESTION 12

Part (a) was very well answered, with only the occasional rearrangement slip seen.

In part (b) some students seemed to think the symbols needed to be different. However, most students gave a fully correct inequality.

QUESTION 13

This question was well answered, with most students forming a correct equation and the majority rearranging correctly. Some students made an error in part of the rearrangement. A small minority tried substituting different values into the number machine.

QUESTION 14

This question was well answered. Most students worked out that the two numbers needed to total 75. However, the common wrong answer was 35 and 40, which gives the correct mean but the wrong median.

QUESTION 15

Most students were able to access the question and gain some credit. Some students listed the correct outcomes but did not realise that this was enough to make a decision, so then worked out the probabilities. Probabilities were sometimes added or multiplied incorrectly. A small number of students thought that you should add two numbers from A or two numbers from B. A few students gave Y as the answer following correct working. However, those who clearly stated that Y was more likely were not penalised.

QUESTION 16

This question differentiated well between students. Some gave a fully correct construction with all the construction lines. A common error was to show no or only one pair of arcs for the perpendicular bisector and use the midpoint of BC from measuring. Some students who had the correct construction shaded the wrong region, often cut off by a construction arc. Weaker responses had circles drawn around each of the given points or A , B and C joined to form a triangle. Students should leave all their construction arcs showing and not erase them.

QUESTION 17

This question was well answered. Some students made a rearranging error or combined the two equations incorrectly. It is always worth doing a check that the two final values work in both given equations. Those who chose to substitute for y or to eliminate y usually made fewer errors because of the easier arithmetic involved.

QUESTION 18

Almost all students selected graph B or graph D. Those who chose B usually made a good attempt at pointing out the decreasing section of the graph. Those who chose D said it was not S-shaped or wrote about the decreasing gradient.

QUESTION 19

This question was very well answered, with most students giving a fully correct solution. Some students gave the value of $2x$ and some worked out the length of the longer side of the wall but went no further. A few students did not use similarity at all and assumed that the gap was uniform around all sides of the mirror. Occasionally, students used area calculations, and usually did not realise that they needed the area scale factor for this approach.

QUESTION 20

This question was very well answered. Occasionally, students chose m^2/s .

QUESTION 21

Part (a) was not very well answered, with many students choosing $2^{100} \times 5^{100}$.

In part (b) there were many correct answers, but a large number of students simplified the calculation as far as $\sqrt{11^{300}}$ and then either left it unsimplified or gave an answer such as $11^{\sqrt{300}}$. Some students started by stating that $\sqrt{11^{400}} = 11^{20}$ and $\sqrt{11^{100}} = 11^{10}$ and made no correct progress.

QUESTION 22

This proof question was not answered well, with many students giving wordy explanations rather than a concise mathematical proof. Many students gave no reasons or made incorrect assumptions. Those who did give reasons often used informal ones rather than stating the correct mathematical reasons. Many students did not mention base angles of an isosceles triangle, and even fewer quoted alternate angles. Some used ambiguous labels for angles. A few students assumed that $ABDC$ was a rhombus, and some attempted to use vectors.

QUESTION 23

This question was very well answered, with many fully correct methods shown. Occasionally, students did not show sufficient working or used decimals.

QUESTION 24

This question was less well answered. Some students started with the assumption that the sum of the exterior and interior angles was 360 degrees and divided that by 9, which meant they could make no further progress. Some did manage to work out an interior or exterior angle, and often went on to use these correctly. Those who worked out the exterior angle was 20 were then able to divide that into 360 to directly give the answer. Students working with the formula for an interior angle also usually progressed well. Those who equated interior angles to set up an equation often had an error in their equation.

QUESTION 25

Some good attempts were seen, with many of these fully correct. Occasionally, some of these students made one or two slips in either calculating the frequency densities or drawing the histogram. However, a large proportion of students ignored the given vertical axis and plotted the frequencies. Some students divided each frequency by the midpoint. There were a few frequency polygons seen.

QUESTION 26

Most students used the cosine rule accurately, and the vast majority stated the correct decision. Some used the cosine rule for the wrong angle or stated the formula incorrectly. Some started correctly but then made rearrangement errors. A significant number of students substituted into the cosine rule, but did not show their rearrangement and just gave the angle. But those who gave the incorrect answer were unable to gain credit for the second stage of the working. A few students assumed it was a right-angled triangle and inappropriately used basic trigonometry.

QUESTION 27

Some fully correct solutions were seen. However, many students misunderstood the sequence. Some thought they had been given the n th term and substituted in $n = 1$, $n = 2$ etc. Some thought $2x + 4$ was the third term and equated that to x^2 . Others thought $2x + 4$ was the first term and so ended up with $8x + 28$ as the third term. Occasionally, students started with $\frac{x}{2} + 4$ as the second term. Weaker students just trialled different values, often finding one but not both solutions. Those who did form a quadratic equation usually gained some credit for solving their equation.

QUESTION 28

The majority of students used the $\frac{1}{2}ab\sin C$ formula for area, and usually set up an equation and solved it accurately. However, some students stated the formula incorrectly, either missing the $\frac{1}{2}$ or using cosine instead of sine. Some students found the perpendicular height first, and some of these made no further progress, but many went on to give a fully correct solution. A significant number of students attempted to use the cosine rule.

QUESTION 29

Most students used the traditional method for conversion of a recurring decimal, without using the given information. Most of those using the traditional method did show sufficient working, although some missed steps. Some weaker responses did not manage to match up the recurring decimals or simply worked out 0.635 as a fraction. Those who used the given information usually gave a succinct and accurate solution, although some assumed that $0.0\dot{3}\dot{5}$ would be $\frac{35}{999}$.

QUESTION 30

The majority of students differentiated, usually correctly, and set up an equation. Most solved this correctly, but some tried to treat it as a 3-term quadratic or incorrectly attempted the difference of two squares. The most common error was to equate the given equation to 17 and attempt to solve that.

QUESTION 31

In part (a) some students made errors with the inequality signs or wrote the inequality using x rather than $f(x)$. The most common incorrect approach was to use the values from solving $7 - 4x = -2$ and $7 - 4x = 5$.

Part (b) was well answered. Occasional slips in rearrangement were seen, and sometimes answers were left in terms of y . Some students just worked out the reciprocal of $g(x)$.

QUESTION 32

This question was not answered very well. Although some students used the correct upper bound and went on to give fully correct solutions, many used the lower bound of 4.25. A large number of students did not use bounds at all and just substituted 4.5. There were many instances of incorrect bounds used. Often the upper bound was 5 or 4.55 or 4.74. The lower bound was frequently seen as 4 or 4.45.

QUESTION 33

Most students chose to expand in full and many were accurate. Some errors were seen in the expansion of $(2n + 2)^2$ but most were correct. Occasionally, when factorising in the final statement the constant term disappeared. Some expanded $(2n + 2)^3$ in one go, usually as $8n^3 + 8$ and made no further progress. A few students tried to substitute different numbers to verify rather than prove the statement.

QUESTION 34

This question was well answered, with $2a - 3b$ occasionally seen as the incorrect answer.

QUESTION 35

This novel problem-solving question proved to be quite challenging for some students. Many formed an algebraic expression for the sum of the two fractions but did not know what to do with the 35. Some realised that the factors 5 and 7 were important, but often these were seen assigned to the incorrect variables. Occasionally students used 5 and 7 in the denominators but did not realise that b was also a numerator so did not complete either fraction. However, some well-thought-out solutions were seen.

QUESTION 36

This was a testing completing the square question, but some students were able to meet the challenge and give fully or almost fully correct solutions. Occasionally, students only gave the positive value or

made an error when taking the square root of $25 - \frac{c}{2}$, assuming it was equal to $5 \pm \sqrt{\frac{c}{2}}$. Many students

were unsure how to start, and some simply used the quadratic formula. Fairly frequently, $2(x - 10)^2$ was seen as the starting point. Even those who knew it was $2(x - 5)^2$ often forgot to divide everything by 2, so -25 appeared instead of -50 .

QUESTION 37

Many students gave one or both correct values. Some only gave the y -coordinates of the intersections or gave them alongside the x -coordinates.

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