

OXFORD

INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL GCSE MATHEMATICS

(9260/1E) Paper 1E

Report on the examination

June 2022

REPORT ON EXAMINATION: INTERNATIONAL GCSE MATHEMATICS 9260/1E PAPER 1E JUNE 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, which 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:

- use of a calculator
- difference of two squares
- area of a compound shape
- speed-time graph
- substitution into a formula
- area of a non-right-angled triangle
- cosine rule
- indices problem
- inverse function.

Topics which students found difficult included:

- reliable estimate of probability
- tiling ratio problem
- bounds
- proof of congruence
- matrix of a transformation
- Venn diagram
- completing the square.

QUESTION 01

This question was extremely well answered.

QUESTION 02

This question was well answered. The most common incorrect answers were $\begin{pmatrix} 0 \\ -3 \end{pmatrix}$ and $\begin{pmatrix} 0 \\ 3 \end{pmatrix}$.

QUESTION 03

This question was very well answered. A few gave the answers 10^{12} and $10^{12.5}$.

QUESTION 04

This question was slightly less well answered. Each of the incorrect options was chosen by a similar number of students.

QUESTION 05

Most students either compared the area of the semicircle with 20% of the area of the rectangle or correctly worked out the percentage of the rectangle that was unshaded. Some students used the whole circle. Occasionally students used a diameter of 9 cm. A few students did not realise that the height of the rectangle was the same as the radius.

QUESTION 06

Part (a) was very well answered, with a few incorrect responses of 3 or $\frac{7}{10}$ or 30.

Part (b) was very poorly answered. The vast majority of students said 'No because it is biased' or 'Yes because it is 3 out of 10'. Some mentioned the randomness of probability, but very few referred to the small size of the sample making the results unreliable.

Part (c) was well answered. Exactly 3 and More than 3 were the common wrong answers.

QUESTION 07

Part (a) was very well answered. Some students gave an answer of $(y - 7)^2$ or just wrote one of the factors.

Students who were confident with algebra and understood HCF managed the challenge of this slightly unusual question. Some students tried a value for p and gave the corresponding HCF, although not all students chose a prime value for p . Occasionally students gave the LCM. There was a high number of blank responses for this stage of the paper.

QUESTION 08

In part (a) most students showed their full working for both the areas. Occasionally students did not show the calculations to reach the two areas, which is essential in this type of question. Some students tried to use Pythagoras' theorem but made no progress.

The area of the cross-section was given at the start of the question, so this should have been used in part (b). Some students misunderstood the diagram and only worked out the volume of the cuboid part of the pool. Occasionally students converted by multiplying instead of dividing.

QUESTION 09

Many students gave fully correct solutions. Those who did not often gave the answer $\frac{14x + 4}{8}$ or had the correct answer but then attempted to simplify it further. Occasionally, students made an error in multiplying out the bracket when forming fractions with a common denominator. Some students completely ignored the denominators and gave an answer of $7x + 2$.

QUESTION 10

Those who used 1.02^5 usually gave a fully correct solution, although some did not give their answer to a suitable degree of accuracy. Some students worked year by year and this sometimes meant that they made an arithmetic slip. A small proportion of students used simple interest. Sometimes the multiplier was incorrectly written as $1 + \frac{2\%}{100}$.

QUESTION 11

This question was mostly well answered. A significant minority thought 15 was the area of the circle rather than the circumference and some muddled diameter and radius. Some students simply divided 15 by 2 or became confused by the height of the cylinder and tried to incorporate the 6, usually incorrectly.

QUESTION 12

This question was very well answered. Some students thought that the denominator simplified to $3w^8$ or $4w^6$. Occasionally, students correctly simplified the denominator but then made a mistake with the rules of indices and divided them rather than subtracting them.

QUESTION 13

Many fully correct or almost fully correct solutions were given. The most frequent error was to work out 1400 and 2800 and give the answer a half. A few students did not give their correct fraction in its simplest form or gave the answer as a percentage.

QUESTION 14

Many graphs were fully correct, but some used curves instead of straight lines. A common error was to make the section of constant speed too short or to give it a positive gradient. Many students did manage to get the final section correct for their graph even if earlier sections were incorrect.

QUESTION 15

A variety of methods were successfully used to give some fully correct solutions. Some students assigned a variable to the first term and worked forwards, while others worked back from the last term and some found two expressions for the third term and equated them. The most common error was to start with the equation $6 + x = 45$. A few students tried to use methods for working out the n th term of a quadratic sequence. Some students confused the idea of a position-to-term rule with the given term-to-term rule.

QUESTION 16

This question was well answered. Some students did not know how to work out the upper quartile or the maximum value, but usually knew one of the two so were able to give an almost fully correct box plot. Some students did not have a box plot with the correct structure, ie a box with one dividing line for the median and two whiskers.

QUESTION 17

In part (a), students who used the angles of the octagon and trigonometry usually gave fully or almost fully correct mathematical working. However, sometimes they did not rearrange their trigonometric equation to make h the subject and just restated the value given in the question. Those who used the isosceles triangle with hypotenuse 1 cm did not always fully explain their working.

Some students tried to work with the right-angled triangle with sides h and 0.5 cm, but usually found the hypotenuse using the given value for h and then used Pythagoras' theorem a second time to give a circular argument for the value of h .

Many students did not know how to approach part (b) and often gave a ratio linking the 16 octagons and the 25 grey shapes. Those who made an attempt at one of the correct methods usually made reasonable progress, although some left the final value of n as a fraction with a decimal in the denominator. The simplest solution was to just look at one octagon and the grey triangles around it but most used the area of the whole pattern. There were some very complex but correct algebraic solutions seen but the majority of correct solutions came from using the values in part (a).

QUESTION 18

Part (a) was exceptionally well answered. Most students were able to show the correct substitution, but very occasionally made keying errors or miscopied from their calculator. Occasionally, students only square-rooted the numerator of the fraction or omitted the 0.7665 or the 734 from the formula.

In part (b) most students were able to substitute correctly, but some rearrangement errors were seen. For example, some students subtracted 0.7665×682 from 1250 instead of dividing, and some multiplied by 50 before squaring. Some premature approximation was seen, leading to an inaccurate final answer.

QUESTION 19

The majority of students chose the correct answer, but $n + 1$ also proved popular.

QUESTION 20

This question was well answered. The common wrong answer was growth of 85%.

QUESTION 21

Part (a) was very well answered. The common error was to treat the triangle as right-angled and work out $0.5 \times 12 \times 46$. Some students attempted to find the third side and use one of the other angles, but usually had errors in their accuracy. Those who dropped a perpendicular to split the triangle into two often used 46 instead of 40 for the base of the right-hand triangle they had created.

In part (b) some students continued to treat it as a right-angled triangle and therefore used Pythagoras' theorem. Those who used the correct formula often multiplied the whole expression by $\cos 60^\circ$ rather than just the final term and then square-rooted. Some students did not square-root at all.

QUESTION 22

Many students used incorrect bounds or no bounds. Students seemed to have more trouble finding the upper bound, with many working out 8.24×6 . Some students worked out the perimeter of the hexagon and then treated that as though it were correct to 1 decimal place. Some students thought that a hexagon had 5 or 7 or 10 sides. Some worked out the perimeter of the top half of the hexagon minus the bottom half of the hexagon. A few students just gave the upper and lower bounds of the perimeter without subtracting. There was a high number of blank responses.

QUESTION 23

This question was reasonably well answered, with the most common wrong answer being 90° to 180° .

QUESTION 24

Very few formal proofs were seen, with most students describing common sides or angles in sentences. Some students only marked common attributes on the diagram. Those who attempted to use the rules for congruence sometimes incorrectly used ASS. Mathematical reasons were often given in a very informal way, eg 'angle which looks to the diameter' instead of 'angle in a semicircle', but the proper terminology was required for a full proof.

QUESTION 25

There were some arithmetic and conceptual errors seen in the multiplication process in part (a). Many reached the correct matrix, but not all showed clearly that this was equivalent to $20I$, and it was vital that at some point they actually wrote out the identity matrix.

In part (b) those who knew it was an enlargement did not always state both the centre and the scale factor. Some students were too informal and wrote responses such as '20 times bigger'. Some thought it was a translation, rotation or reflection. There was a high number of blank responses in this poorly answered question.

QUESTION 26

This question was well answered. Many students correctly found the equation $ab^0 = 20$ but did not always realise that meant that $a = 20$. Similarly, many reached $8.192 = ab^2$ but then either made no further progress because they did not have the correct value for a or because they rearranged incorrectly.

QUESTION 27

Many students knew to multiply the given probabilities to work out the intersection, but then put the whole probabilities for A and B in the remaining sections of the circles. Some incorrectly worked out the intersection by adding the given probabilities and subtracting 1 or by working out $P(B) - P(A)$. A significant minority completed the Venn diagram with integer values rather than probabilities, but some of these were in the correct ratio.

QUESTION 28

Most students were able to square the first bracket, but sometimes made errors when multiplying again to cube it. There was often a sign error in the expansion of the second bracket, which was sometimes recovered when the terms were collected. Some students simply cubed both terms in the first bracket instead of expanding. Many students thought they needed to factorise the final answer and generally did this accurately to give an equivalent answer, although some just divided through by a common factor to give an incorrect final answer.

QUESTION 29

From those who used linear scale factors, the answer 5 : 4 was the most common wrong answer. Among the other students, the vast majority gave the answer 16 : 25, just simplifying the given areas.

QUESTION 30

This question was well answered. Some students simply gave the reciprocal of the original function or attempted to differentiate. Most errors were due to manipulation slips.

QUESTION 31

The vast majority of students did not complete the square as instructed. Many differentiated or used some other method to work out the minimum. Those who did try to complete the square sometimes added back the 4 instead of subtracting. Some students either divided through by the 3 and then ignored it or struggled with the factorisation.

QUESTION 32

As calculators were allowed it was vital that students showed their full method, but some did not. Those who wrote out the full method sometimes thought that both the 1 and the 8 were recurring, so wrote that $100 \times 0.18\dots$ was $18.1818\dots$. However, the majority of students were able to multiply correctly by 100 and show in full that the equivalent fraction was $\frac{17}{90}$. Some fell at the last hurdle because they could not divide the two fractions correctly or gave their answer as a decimal.

QUESTION 33

A large proportion of students did not realise that they needed to find the equation of the tangent, and just worked out the roots of the quadratic curve. Students who differentiated usually did so correctly, but then some substituted $x = 0$ or solved $4x - 11 = 0$ and made no further progress. Some students seemed to assume that the gradient was 1 rather than show their method. Occasionally students worked out that point Q was $(0, -10)$ but did not know how to work out the distance PQ .

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