Examiners' Report
Principal Examiner Feedback

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Pearson Edexcel International GCSE
In Mathematics A (4MA0) Paper 4HR

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Principal Examiner's Report International GCSE Mathematics A (Paper 4MA0-4HR)

Introduction to Paper 4HR

The paper performed as expected and was accessible to students at this tier. It included questions that differentiated appropriately and enabled students to demonstrate their ability across the assessment criteria.

Report on Individual Questions

Question 1

Part (a) was a well answered question with the vast majority of students reaching the correct answer. A variety of methods were used with many finding 12% of 36 and then then subtracting from 36; others chose the more efficient method by multiplying 36 by 0.88. If full marks were not gained then it was quite common to score one mark for simply finding 12% of 36. The most common error was to increase 36 by 12%, usually by multiplying 36 by 1.12. Most students also answered part (b) correctly although incorrect solutions included 81/100 × 180 or 180/81 × 100.

Question 2

Most students managed to find a correct area in part (a) and then use it to find the value of *h* in (b). A significant minority failed to see the connection between (a) and (b) and simply started again in (b). A common incorrect answer in (a) was 34, obtained from the 6 by 3 and 8 by 2 rectangles, not accounting for the overlap. In (b), errors included finding the cube root of 350 and treating the prism as a cuboid.

Question 3

This question proved to be problematic for many students. Those who answered it incorrectly usually subtracted the coordinates before dividing by two. Some correctly found the *x*-coordinate but not the *y*-coordinate while others wrote the coordinates the wrong way round.

Question 4

Almost all pupils answered this correctly by identifying the number of marbles of each colour (250 red and 150 green). A relatively small number did not read the question carefully and failed to find the difference between the number of red and green marbles.

Question 5

In part (a), most students gained both marks. Some students lost marks for not using the correct terminology; typically using 'transformation' in place of 'translation'. A small number used coordinates rather than column vectors while others used words to describe the translation. Part (b) was generally answered well. Those who didn't score both marks often gained credit for a triangle drawn with the correct orientation but incorrect position.

Question 6

In part (a), students were largely successful in finding the total number of goals scored. This was usually divided by 40 but there were some that chose to divide by 5 (the number of different scores possible). Some other incorrect solutions were obtained where pupils mistakenly multiplied 1 by 0 to get 1; others added the number of goals. Part (b) was answered less well. Many used the position of the lower and upper quartiles and subtracted them to get their interquartile range. Students who listed the number of goals often then managed to find the quartiles correctly. In part (c), a common incorrect answer was 31/40 which was the probability that at least 2 goals were scored.

Question 7

Most students were able to factorise $4ab + 7a^2 - a$ correctly in part (a), although incorrect responses included $-a(4b + 7a - a)$ and $a(4b + 7a) - a$. In part (b), many students only scored one mark because they failed to reverse the inequality sign when dividing by a negative number which often resulted in an answer of $p > -\frac{7}{8}$. Part (c) was problematic to only a few; in these cases, students often had three correct terms or made a sign error. A small number of students answered part (d) incorrectly, usually because they divided the powers, rather than subtracted. Likewise in (e), there were a relatively small number of errors, with $9e$ being the most common one.

Question 8

Most students used the correct trigonometric ratio and went on to gain full marks. Those who did not reach the correct answer often used cosine rather than sine. Those who began by finding the length of AC were often unsuccessful at using Pythagoras' Theorem to obtain BC. Some students rounded prematurely and consequently lost the accuracy mark.

Question 9

In part (i), students often tried to divide 1426 into prime factors, thus not being able to find the full list of factors. They were usually more successful if they broke 1426 down into pairs of products, although many would miss two factors. Students who appreciated the connection between 2, 23, and 31 and the other factors invariably achieved full marks. Those who saw the link between parts (i) and (ii) were usually successful in (ii). Others started again by drawing a factor tree diagram.

Question 10

Parts (a) and (b) were answered correctly by most students. Likewise, part (c) was answered well by most, although some weren't able to give their answer in standard form. Part (d) proved to be more challenging. Some started with the ratio the wrong way round and so ended up with $1/n$.

Question 11

Almost all students answered part (a) correctly, although the occasional error was made by multiplying the powers rather than adding. Part (b) highlighted that many students have a lack of understanding of the more advanced index rules. Some successfully dealt with the fourth root of the square of c but were then often unable to proceed further. This usually led to $\frac{1}{2}$ as the answer. In part (c), most students scored at least one mark. Some only partially simplified the fraction while others attempted to expand the brackets. Most students scored one mark for $3(x^2 - 25y^2)$ in (d) but were unable to completely factorise the expression.

Question 12

Parts (a) and (b) were answered correctly by most students with only a few not able to complete the probability tree diagram. Even those who failed to do this were usually able to answer part (b) correctly. Only a small number of students failed to realise that this was a without replacement question. Part (c) was a tougher proposition. The most common approach seen was to multiply probabilities for eating three green grapes instead of two green and one red grape.

Question 13

Part (a) was generally well-answered although some found where the graph crossed the x axis rather than the line $y = 2$. In part (b), many students scored a mark for $k = 1$ but lacked accuracy with the second solution. Many students were unable to make an attempt at part (c). Those who found the difference between the equations given generally reached the correct answer with a few gaining one mark for getting part of the correct equation.

Question 14

The majority of students were well- acquainted with the correct method for this question and were able to both reach the formula in part (a) and use it correctly in (b). A small number of students used the proportionality symbol, although this was condoned for the method marks. The most common error was to attempt the question as if P was proportional to Q, for which no marks were awarded. A small number used an inverse proportion method, again gaining no marks.

Question 15

In part (a), most students were able to identify this as requiring the Cosine Rule, although many were unable to use the correct order of operations to achieve the correct answer. In this case, only one mark could be gained. Students who could use the order of operations correctly invariably went on to reach the correct answer. Part (b) was poorly answered with many students not realising they were expected to use the Intersecting Chord Theorem. Others simply applied the formula incorrectly by using ED in place of AD. Some students tried to incorrectly apply trigonometry.

Question 16

Most students had a good knowledge of differentiation and were able to gain both marks in part (a). In part (b), many correctly equated their answer to part (a) to zero and continued to find the coordinates of M. In fact, both turning points were often found and the gradient between them rather than the gradient of the line OM.

Question 17

Most students answered part (a) correctly. Those who were able to make a start in part (b) often found $\overrightarrow{UX}$ but didn't offer a satisfactory conclusion. Those who weren't able to find such an expression often did not account for the direction of the vectors. In part (c), the most common incorrect answer was $\sqrt{11}$, reached by either subtracting the correct squares or by incorrectly finding the square of -5.

Question 18

Most students who appreciated this question involved lower and upper bounds gained at least one method mark. Only a few used both bounds correctly, with 16.5 frequently being used instead of 17.5. The most common incorrect answer was to work through the method with the values given and then attempt to write a lower bound of the answer (14.5).

Question 19

Many students were able to use the angle sum property of a quadrilateral and then simplify and solve the resulting equation to get the required value of x. Most of those who got to this stage substituted to find the four angles but then did not make a conclusion for the final mark. Some formed an equation by adding two of the angles to make 180° but often selected incorrect pairings; this received no credit.

Summary

Based on their performance on this paper, students should:

- understand how to find the midpoint of a line segment
- practice finding quartiles
- avoid premature rounding as this can lead to the loss of accuracy in the final answer
- ensure that a conclusion is provided when appropriate
- practice questions involving the use of bounds