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Examiners' Report/ Principal Examiner Feedback

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Pearson Edexcel International GCSE
Mathematics A(4MA0)

Pearson Edexcel Level 1/Level 2 Certificate
Mathematics A (KMA0)

Paper 3H

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Grade Boundaries

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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.

Question 1
This question proved to be straightforward for the vast majority of students. Those who lost marks divided by 120 or/and 1.2 or performed a partial conversion.

Question 2
Almost all students were able to use their calculator competently. The small number who lost marks did so by calculating $\frac{451.4}{14.1} + 10.3 = 42.31$ in (a). In (b), some evaluated $\sqrt{7.8^2} - 7.2^2 = -44.04$ and others worked out $\sqrt{7.8^2 - 7.2^2} = 7.8 - 7.2 = 0.6$.

Question 3
Although the majority of students scored full marks in (b), a sizeable minority lost one mark for $6c - 15 - 2c - 8$. In (c), over half of the students achieved a correct answer but incorrect answers included $4e^6$, $16e^9$, $4e^5$, $8e^6$, $16e^5$. Likewise in (d), most students correctly expanded and simplified the product of two brackets although problems sometimes came from simplifying the initial expansion, leading to expressions like $2a^2 - 9a - 5$ or $2a^2 \pm 11a - 5$.

Question 4
Students usually managed to gain one mark, most often for 15 x 12. Fewer scored two marks, either omitting one of the usual triangles or miscalculating one or both of their areas. It was common to see $2 \times \frac{1}{2} \times 10 \times 12$ or $2 \times \frac{1}{2} \times 4 \times 12$. Trapeziums were not often used. Almost all of those who gained the third method mark went on to calculate an accurate answer.

Question 5
There were many correct answers in (a)(i) although a few students multiplied 0.08 by 0.25 and others divided their answer by 0.43, the sum of the given probabilities. There were more errors in a(ii). Some students found 0.18 but failed to take it from 1. Others thought that the bead must be blue, giving 0.25, or sometimes doing a calculation to reach this figure [(0.08 + 0.1 + 0.25) – (0.1 + 0.08)]. The most common mistake in (b) was to add 0.08 and 0.25 to give 0.33. In (c), most students reached the correct answer although incorrect solutions included $\frac{60}{20} \times 100$ and 20×60.

Question 6
To achieve any marks, at least one bracket needed to be expanded correctly. This was done well and in fact most students scored full marks. Some of the expansion errors included 20y – 1 and 18y + 7. Some students found the simplification and rearrangement of the equation difficult, ending up with equations such as 38y = 25, –2y = 25 and 2y = 17.

Question 7
Over half of all students scored full marks in (a) and (b). Some students scored only M1 for 28 in (a) and for 153 = 85% in (b). There were many varied attempts but the most common error was to divide by 153 instead of 125 in (a) and to increase 153 by 15% in (b).

Question 8

Over two thirds of all students scored full marks. Part (a) was done well but some added 15^2 to 10^2 which scored zero marks. There were occasional attempts to use trigonometry. In (b), higher grade students produced concise and accurate answers but others gave quite a variety of responses. The obvious near miss, $\tan C = \frac{12.5}{10}$, did not occur too frequently. Sine, cosine and Pythagoras' theorem were all attempted and some resorted to the sine rule or the cosine rule. Only a minority of the alternative methods yielded marks.

Question 9

This posed more problems than expected. In (a), the size of one interior angle was often calculated for one mark. There were a significant number of completely incorrect solutions such as

$\frac{360}{7} = 51.4$. Students often didn't use their answer from (a) to find the value of *x* in (b).

$\frac{128.6}{2} = 64.3$ was a common answer but there were many other incorrect solutions.

Question 10

Students who made *y* the subject in (a) usually score two marks. There was the occasional attempt to find points on the line and use the difference of *y* values divided by the difference of *x* values but this was rarely successful. In (b), there was again quite a distinct divide between those who had some understanding of the topic and those who did not. The former usually achieved the correct equation concisely. Others made confused attempts, sometimes trying to link their answer to the equation in part (a). Diagrams were sometimes drawn but they rarely helped.

Question 11

A relatively small number of students used an efficient method in (a) and (b). This may have been because it was not a standard HCF/LCM question and students weren't able to deviate from the method they were most familiar with. Many started again and worked out their own factors. Those who did this accurately often extracted a correct HCF/LCM, though they sometimes lost a mark by stating 540 and 22680 without ever showing the product of prime factors. Inevitably, a few students mixed up the HCF and the LCM. In (b), it was not uncommon to see a partial factorisation such as $2^3 \times 3^2 \times 5 \times 7 \times 9$.

Question 12

Nearly three quarters of all students scored full marks and most of these used the elimination method. Those who failed to produce a fully correct solution usually scored zero marks, sometimes because they used a trial and improvement approach and sometimes because they added two equations when they should have subtracted or vice versa. Those who only managed one mark often did so because they made one arithmetic error.

Question 13

Most students were able to attempt part (a) and, on the whole, did so successfully. A number of students used the scales incorrectly. In particular, 85 was often marked at 90 and 115 at 110 which would gain zero marks. Some students obtained acceptable readings but then added them to give an answer near to 90. In (b), students needed to have an awareness that they were looking for an IQ value relating to a cumulative frequency of 75. Most of these used the value correctly and gave an acceptable answer. Some felt that there was more to do, typically subtracting their answer from 140.

Question 14
Almost half of all students scored full marks. Those who didn't often gained a method mark for identifying OT as 2 cm. A significant number of students were unaware this question related to the Intersecting Chord Theorem although some incorrect answers came from 3 x 5 = 6PT. A few treated PR as a diameter and concluded that PT = 4. There was the occasional scale drawings and some attempts to use trigonometry.

Question 15
Most students gained at least one mark for a scale factor of 4. Many didn't realise that this only applied to linear dimensions and not to volumes. This often led to an answer of 8. Some students used the ratios 32 : 2000 and h : 500. The correct scale factor was occasionally used incorrectly, for example $32 \times \sqrt[3]{4}$.

Question 16
In (a), a significant number of students gained full marks although a final answer $\frac{4}{9}$ was seen quite frequently (there were four even counters out of nine). Part (b), was answered as we might expect. Some scored one mark for using only one of the products. There were attempts at using sample spaces, many of which were accurate. A small number of responses used replacement.

Question 17
The majority of students produced a fully correct solution in (a) although a significant minority did not have an understanding of direct proportion. Occasionally the correct value of *k* was evaluated without the formula on the answer line. Some attempts used linear proportion. Only those with a correct answer in part (a) were likely to have a chance to score in part (b). However, many of them were unable to get started.

Question 18
Almost one third of students scored zero in this question, mainly because they were not familiar with differentiation. Most students who were able to differentiate correctly in (a) appreciated the need to equate their answer to zero in (b) although some moved straight towards solving an equation without stating it first. These students tended to use factorising or the quadratic formula to good effect to find two *x* values although too many lost marks by failing to show sufficient algebraic working. Some failed to find any y values and others put both x values on the answer line. A few students went back to the equation of the curve and tried to solve for y = 0. In part (c), relatively few students understood how this related to their working in part (b). Some did manage one mark for $x < 2$ but only the most able gained both marks.

Question 19
All parts proved accessible for the higher grade students. Those who struggled sometimes seemed to confuse Union with Intersection. Some didn't appreciate the need to find the number of elements in (b) and others didn't understand notation such as the complement of *A*.

Question 20
Those who were familiar with composite functions usually gained one mark in part (a) but some failed to simplify the expression sufficiently and others made mistakes, usually with attempts to cancel. There were not too many instances of working out *fg*(x) nor of simply multiplying *f* and *g*. Those familiar with inverse functions were able to score at least one mark in (b) but full marks required an ability to rearrange equations. The latter was beyond a large number of students, often because they did not grasp the principal of using factorisation to isolate the intended subject of the formula.

Question 21

The formula for the volume of a cone is given on page 2 of the examination paper yet some students still used an incorrect formula. Most did identify the correct volume formula but this was not always equated to the numerical volume, nor was a number for the height always substituted. Those who did get started correctly were usually able to find a correct value for *r*. Some got confused at this point or worked out π x 8 x 15 but many went on to finish the question accurately. A very common mistake was to use 320 for the volume. Some of the working was very unstructured but those with well organised working tended to be the most successful.

Question 22

Some students were not able to start the question whilst others used Pythagoras' Theorem or the Sine rule, for instance. The most able students did correctly use the Cosine rule to gain one mark but few were able to simplify accurately. $\left(2\sqrt{7}\right)^2$ was often written without brackets, frequently leading to 14 instead of 28. Using cos(60) was a greater problem. Those who realised it had a value of 0.5 at an early stage were more likely to be successful. Others tried to simplify the equation without evaluating it and mistakes were often made, especially by losing brackets and signs.

Summary

- When asked to show clear algebraic working, a trial and improvement approach should be avoided because it is likely to result in no marks.
- It was clear from responses to question 9 that fewer than expected students had an understanding of interior angles.
- In question 13, it was disappointing to see so few students using a ruler to draw lines to help find their estimate. Not doing so risks losing a method mark and also accuracy.
- Some students seemed to lack awareness of some basic set notation used in question 19 and would benefit from learning and understanding this.
- For question 21, some students seemed unable to use a clear algebraic approach. This is often required for the later questions in these papers.

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