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Principal Examiner Feedback

Summer 2013

International GCSE Mathematics A
(4MA0) Paper 1F

Level 1/Level 2 Certificate in Mathematics
(KMA0) Paper 1F

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International GCSE Mathematics A (4MA0)
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General comments

This paper gave students the chance to demonstrate positive achievement. Most of the questions had pleasing success rates, but as the demands of the questions broadly increase through this paper, it was not unexpected that the later questions were not as well answered as the earlier ones.

Whilst most students showed their working, there were still students who lost marks by failing to do so. When working with angles on geometric diagrams (eg question 11), students would be well advised either to show calculated angles on the diagram or else to identify them unambiguously in their working.

Question 1

As expected, many students scored full marks on this first question of the paper. Common errors included:

- missing out six hundred in part (a),
- giving an answer of 4780 in (c),
- choosing the wrong even number from the table in (d) or giving an answer of 2
- giving 4773 rather than the correct 4667 in (e).

Question 2

Students demonstrated a good level of understanding in both the interpretation and drawing of bar charts.

Question 3

Part (a) was well answered. The majority of students knew how to answer part (b) but were not always successful in maintaining accuracy through to the 19th term in the sequence.

Question 4

Generally, students were able to show that they understood the various mathematical terms being tested by this question.

Question 5

Success throughout this question, which covered many different areas of the specification, was very varied. Common errors in parts (e) and (f) were that students were using the wrong conversion factors. In part (f), answers of 30 and 300 000 were seen frequently.

In part (g), 2 was a common incorrect answer, as was 1 in part (d).

In part (j) some students left the answer as $\frac{16}{100}$, others got to the correct answer of $\frac{4}{25}$ but then incorrectly cancelled further, usually to $\frac{2}{5}$. Some students went straight to what they believed to be the simplest form, but when this was incorrect, no marks could be awarded. Students would be well advised to write down the unsimplified fraction first before cancelling.

Question 6

Common errors in part (a) were to leave off the 'pm' or to write 16:35. Part (b) was well answered.

Many students gained full marks in part (c). Of those who didn't achieve full marks, failing to divide by 9 for the cost of *each* second class ticket was the most common error. Some students set off wrongly at the start by subtracting the cost of only one first class ticket from the total cost, although they often did realise that they needed subsequently to divide by 9. Some students used approximation following the first step, subtracting 2500 or 2000 rather than the accurate 2520 from 4500.

Question 7

Throughout this question, those who used a ruler and drew lines on the graph to assist in taking readings from the graph generally displayed a greater degree of accuracy and therefore greater success in giving correct answers.

In part (c) those students who knew how to find the area of a rectangle generally gained all 3 marks. However, having found the correct area of 34m^2, some students stopped and offered that as their final answer or else used the graph incorrectly and tried to take the readings from $y = 34$ (cost axis) rather than the correct $x = 34$ (area axis).

Question 8

Success was very varied throughout question 8. In part (b) one error was to divide rather than multiply by $\frac{5}{6}$. Some students changed $\frac{5}{6}$ into a percentage and worked with that; this method generally led to a loss in accuracy with students gaining one of the two available marks.

Many students attempted to answer part (c) without showing any working and frequently used the numerators to order the fractions thus gaining no marks. The most common correct method from those who showed working was to convert the fractions to decimals. The common error when using this approach was to write $\frac{2}{3}$ incorrectly as 0.6 instead of 0.66

Question 9

A number of candidates gave $8c^2$ as a common, incorrect answer to part (a) of this question. In addition, many students gave a numerical value as their final answer.

"$4xy$" , "4", "$9x - y$" and "$9x + 5y$" were all common incorrect answers in part (b) although the latter two examples did each score one mark.

Question 10

Some students used incorrect notation such as 1:5 throughout the question. When asked to find the probability, the answer given must be in the form of a fraction, a decimal or a percentage. No other form is acceptable. Some students thought that the question required a written response such as a description "likely", "impossible" etc. In such instances, the question will ask for a 'word' to be used. If a description was seen with the correct answer then full marks were awarded but a description by itself was marked as incorrect

Question 11

A small number of students were able to demonstrate their understanding of angles in both equilateral and isosceles triangles and gain all 4 marks. Many other students were able to calculate the unknown angles of 65^0 and 50^0 in an isosceles triangle, given a base angle of 65^0; they were rewarded with method marks even if unable to locate these angles with precision. Fewer students gave 60^0 for the angles in the equilateral triangle, assuming often that this was congruent with triangle BCD and therefore also isosceles.

A significant number of students showed a weak understanding of the convention for labelling angles, with angle ABC being taken to mean adding the values of angle A, angle B and angle C for the final answer. Those who unambiguously showed the correct values on the diagram were given credit for this.

Question 12

In part (a) many students did not use the given formula and tried to work from the diagram, generally without success. 150 was seen occasionally as an answer from students who simply substituted the given numbers without carrying out any multiplication to get 123 + 27.

10 was another commonly seen wrong answer, coming from adding the given values of x and y. Some students carried out the substitution and multiplication but left in the variables giving $36x + 14y$ as an incorrect answer.

In part (b), encouraging numbers of students were able to gain full marks, with others gaining two marks for progressing as far as $30(=12x)$. Some, who were not able to proceed very far, at least gained a mark for correct substitution into the expression. Frequently seen incorrect approaches were either to subtract only one lot of 6.5 from 43 or to add it on, or to start by multiplying 43 by 12

Part (c) to this question proved to be a good discriminator, and there were a few students who were able to find a correct formula and simplify it, thus gaining both marks. Many responses were seen gaining one mark, either for an unsimplified expression or for an expression for part of the area, most usually $4xy$ for the area of the rectangle. Attempts to find the perimeter were often seen, as were numerous other ways of manipulating the given dimensions. This question elicited a high number of non-responses and even those who started well found it challenging to collect and simplify terms.

Question 13

Part (a) was generally well done, although 14 was a relatively common incorrect answer. From those students who knew that the median had something to do with the middle number, the common error was to find the middle number of just 0, 1, 2, 3, 4 rather than take the frequency of each number into account. 8 was another common incorrect answer, 8 being the middle of the numbers in the frequency column. The most common correct method used was to list out all the numbers and then find the 20th (or 20.5th) number in the list.

In part (c), 2 was a common answer - this was usually an incorrect answer coming from dividing the sum of the marks (10) by the number of classes (5). Those students who realised the need to multiply each mark by its frequency, then often did not divide by 40 (5, 8 and 10 were common wrong divisors). The majority of errors from students who employed the correct method came from the evaluation of 13×0 as 13 rather than 0.

Question 14

In part (a), it was common to see an incorrect answer of $-1.822...$ from those students who did not realise that the sum in the denominator needed to be evaluated before the division. Some students who made this error were able to pick up the mark in (b) for giving an answer of -1.8 but many left off the negative sign. Students who got the answer to part (a) wrong did not always show their working; those who did generally gained one mark for either the numerator or the denominator of the fraction evaluated correctly.

However, some of those who did show working, rounded the evaluation of the square root to 2.72 and this led to a lack of accuracy in their final answer. It is important that accuracy is maintained and no rounding takes place until the final answer. In (b), rounding to just one decimal place was common.

Question 15

Common incorrect answers in part (a) included $6n - 2$, $-6n$, $4n$ and 4. There were many blank responses to part (b); $5p$ was a common incorrect answer. Part of the requirement of part (c) was to show algebraic working; the majority of students followed this instruction. However, those who chose not to and just gave an answer scored no marks whether or not the answer they gave was correct. There were some students who were able to show clear algebraic working to arrive at a fully correct solution. Many attempted to use algebra but were unable to progress correctly.

Although the question demanded algebraic working, some candidates used a numerical approach. The most common error was to ignore the xs and to write $7 - 3 = 4$ and then $4 \div 2 = 2$; other students left the x in and gave $7x - 3 = 4x$ then $4x \div 2 = 2x$ and gave the answer as $2x$ or 2. Those who gained the first mark often then made sign errors giving answers such as -0.6

Question 16

In part (a), in order to gain the available mark, students had to identify x as a "corresponding angle"; a clear majority of students did not use the appropriate wording in their reasoning. Answers that referred to equal angles being in the shape position on parallel lines or 'F' angles were not accepted.

Angles of polygons, beyond triangles and quadrilaterals, are challenging topics for students at this tier. Of those who knew, or were able to calculate, the interior angle sum of the hexagon as 720^0, most went on to gain full marks. Various incorrect approaches were seen. Some of the more regularly seen were:

- subtracting the sum of the given angles from a range of values;
- simply allocating the value of one of the given angles to y;
- adding up the given angles and subtracting 360^0 from that;
- adding the two angles closest to y (at E and C) and subtracting that from 360^0.

Many students added together the five known angles of the hexagon but could go no further.

Question 17

Success in part (a) was variable, with many incorrect attempts at finding 8% of 475. Some of those who did find 8% correctly then gave the answer as 38 rather than adding this onto the original amount. Dividing by 8, using 1.8 rather than 1.08 and dividing by 0.92 were all common errors. A small minority subtracted 8% from the given amount. Students who used a build up method to find 8% were generally less successful in reaching a correct answer than those who used a calculator method.

There were a pleasing number of fully correct solutions seen in part (b), with some other students able to progress as far as £600 (the original price) thereby gaining both method marks. However, of the students who did not achieve full marks, a large number seemed unable to appreciate the context, with many assuming that they needed to find 8% of £48 and either add this onto £48 or subtract it. Others took the price of the flight to Cairo from part (a) and added £48 onto this. Answers of £56 were seen regularly, being the result of adding 8% onto (b)£48

Question 18

Part (a) was well answered. There was slightly less success in part (b) where some students gave all the letters (i.e. duplicated u,a and e). Some students confused the union and intersection symbols.

Question 19

Despite the use of the word "total" in relation to the surface area of the cylinder, the majority of students worked out only the curved surface area to gain one mark. Of those who realised that more was required and worked out the area of the circle, many did not appreciate that **two** circles were also part of the total area. Calculation of the volume of the cylinder was regularly seen, with the volume formula sometimes clearly labelled as such. Incorrect attempts were varied, for example:

- addition or multiplication of the two given dimensions,
- finding the diameter and multiplying that by the height
- multiplying any chosen dimension by π.

Question 20

Some students approached this question without difficulty, using either exact or appropriately rounded values, and gained full marks for an integer answer within the required range. A small number lost the final accuracy mark by failing to round their answer to an integer. The majority of students, while understanding that division into 37527 was the first step, and thereby gaining one mark, were unsure as to what they needed to divide by. There were a noticeable number of non-responses.

Question 21

Finding an angle using trigonometry proved more demanding than finding an unknown length to students at this tier. There were some who made no response, others who simply either added or multiplied the two given lengths and some who attempted to use Pythagoras' theorem; this was rarely followed by the correct use of tan or sin. Of those who were able to identify that they needed to use cosine, many were unable to use correct notation as they set out their work and premature rounding led often to the loss of the final accuracy mark. A minority of students were able to present a clear and fully correct solution.

Grade Boundaries

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