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Examiners' Report/
Principal Examiner Feedback

January 2016

Pearson Edexcel International GCSE
Mathematics A (4MA0)
Paper 2F

Pearson Edexcel Certificate
Mathematics A (KMA0)
Paper 2F

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Introduction

The paper was fairly typical of those in previous years with a good number of more straightforward familiar questions at the beginning of the paper with more challenges at the end.

The more able students made a good effort on all questions and it was good to see relatively few blank responses.

Students sitting this paper were still reluctant to show all stages of their working which includes marking angles on the diagram or drawing lines showing their readings from the conversion graph; these often held the key to valuable method marks.

There was also occasional evidence of lengthy computational processes being used, for example to find a percentage of an amount suggesting that some students may be working without a calculator.

Some showed a lack of understanding of basic mathematical words such as edges and vertices along with the concepts of area and volume.

It was noticeable on this paper when students were given a list of numbers to select from, some used numbers not on the list and then on another question gave answers from a list for the next question. Students must be shown how one question begins and one ends so that this is avoided.

Question 1

This question was generally well done by the students sitting this paper. There were a small number of candidates who in (a) (iv) gave two numbers to equal 58 that were not from the table, e.g. 50 + 8. It is essential that students are shown that (i), (ii), etc. all refer to the same question.

Question 2

Many candidates were able to measure the angle correctly, although there were a number of candidates reading their protractor incorrectly who gave 60° rather than 120° as their answer. Many students knew the angle was 'obtuse' but we also saw answers of reflex and acute. Again, many knew the triangle was isosceles, but a few felt it was scalene or equilateral.

Question 3

The majority of students were able to answer the whole of the pictogram question correctly with occasional problems with part (c) where candidates struggled with the half rectangle symbol; most of the students were able to gain a method mark for recognising that one rectangle symbol stood for 6 books.

Question 4

It was surprising that so many students were able to draw the correct 2 lines of symmetry but then spoilt their attempt by adding the 2 diagonal lines. Many students knew that the order of

rotational symmetry of a rectangle is 2 but for part (c) many students were confused with perimeter and area, the common wrong answer being 7 (i.e. the area of the shape).

Questions 5

The majority of students were able to answer parts (a) and (b) correctly but it should be noted that when we ask for the probability of something which cannot happen we want the answer '0' rather than words. For part (c) many students were unable to find an estimate for the number of times the spinner lands on yellow, common mistakes being to multiply the numerator and denominator of 2/5 by 30 giving an answer of 60/150. Some students who found the correct answer of 12 proceeded to write this as a probability on the answer line of 12/30 misunderstanding the statement 'number of times'; such a response gained M1 only.

Question 6

A good number of students recognised the 3-D shape as a cone and also that the second shape was a prism. It was a shame that while the word 'prism' gained the mark, some students spoiled their answer by adding 'rectangular based prism', showing a misunderstanding of how a prism is named. Many students know what is meant by the terms 'edges' and 'vertices' but there was a good number who got the two terms mixed up. Part (c) was poorly attempted, with many students failing to understand what was required to find the height of the cuboid. There were a lot of candidates who gave the answer '4' which was a measurement already on the cuboid and some gave 40, the product of the two given measurements. A large number were seen to be working with either perimeter or surface area.

Question 7

It was rare for a student to write down all the factors of 20, many missing out 1 or 20. Some gave their answer as factor pairs which were given full credit. We also saw a number of factor trees where candidates got mixed up with prime factors rather than factors. The number '6' was seen in the list of factors a surprising number of times. It was also evident that some students had looked at the list for part (b) when answering part (a) and gave −10 and −4 as factors of 20. Students must be shown that a question begins when a bracketed letter is in line with the words and that there will not be parts of a question below its answer line. Most students were able to gain full marks for the negative numbers, which given they had a calculator should have happened. For the last part of the question, finding 15% of 80 was more of a challenge and although a good number gained full marks for this, a fair number divided 80 by 15 or 15 by 80, or added 15 to 80; a few calculated 12 correctly and then added or subtracted it from 80 and this gained a mark as long as we could see the method.

Question 8

This question on conversion graphs was done well, with the majority of students gaining full marks for parts (a) and (b). Part (c) was more challenging and although we saw a fair number of correct answers, lack of working often meant that students who may have been using a good method lost marks. The main omission in terms of working was lack of lines drawn on the graph, when a conversion factor from (a) or (b) was not being used; these lines should be

encourages as they show a method even where the reading of one of the scales is incorrect. Students struggled particularly with the vertical scale.

Question 9

Part (a) was fairly well done with a good number of students gaining 2 or 3 marks. 2 marks were gained for 4 numbers in order of size; candidates who gained this often had 7/9 and 8/11 in the wrong order. It was surprising how few students showed the fractions converted to decimals or percentages; this could have gained them 2 method marks if written correctly to at least 2 significant figures. Students who did show the fractions converted to decimals often showed 7/9 as 0.7 (i.e. just to one significant figure) and this would explain why 7/9 and 8/11 were frequently the wrong way round. In part (b) many students worked out 3×5 rather than 3^5 and for part (c) the modal answer for the square of −2.1 was −4.41

In part (c) the correct answer and 12.57 were seen about the same number of times. 12.57 came from $3 \times \sqrt{17.576}$ rather than the cube root of 15.576. It is essential that students are familiar with mathematical notation and the use of the calculator.

Question 10

The majority of students knew they needed to split the shape and as long as this was shown correctly on the diagram, a mark was gained. After the splitting, many candidates struggled; many only gaining one more mark for a correct area from the diagram. However, many students also worked with perimeter. Some students multiplied numbers from the diagram together but often figures that would not give an area in the diagram, eg 7×11, opposite sides on the shape. A surprising number of students seemed to have no concept of area as the product of two lengths and multiplied more than two numbers together consequently achieving large values for the answer. One of the most common loss of marks was down to failure in halving the triangle product.

Question 11

In part (a) the majority of students knew how to find the median, although a few forgot to arrange the 'cards' in order, giving 5 as their incorrect answer. A few candidates struggled with having an even number of cards; this resulted in answers such as 3, 3 or 3.5. Some candidates knew they had to add the two middle numbers and divide by 2 but incorrect use of the BIDMAS rules meant they gave 4.5 as their answer. As long as we saw the numbers in the correct order we were able to award a method mark. As is usual on this type of question we saw some students calculate the mean or range or give the mode (3 and 5) as the answer; such answers gained no credit.

(b) This question was a common question on paper 2F and 4H. On the foundation tier, many students used a trial and improvement method to find two cards that would enable the mean of all the cards to be 4. This resulted in two cards with a total of 13 for which they could gain SCB1 if the correct values were not selected; this mark could also be awarded for 2 values that would give a range of 9 for the 8 cards. To gain full marks the student needed to take into account that the range had to be 9 and the total of the two cards had to be 13; some students think that if the range is 9 one of the cards must be 9. It was surprising how many candidates managed to get 3 and 10 for the answers without any visible working out. Some

thought that the range was the difference between the first value shown (3) and the last so chose 12 as one of their values (usually 12 and 1).

Question 12

This question on time was very poorly done, given that time has an everyday application. The problem was the 20 minutes after 7 in the morning and counting correctly for the number of whole hours. Students need to be encouraged to consider whether their answers are reasonable – answers such as 6 hours or less were seen when the sleep started before midnight and finished after 7am.

Question 13

This question was done quite well, although students must be careful they read this type of question thoroughly; a number of students divided the total cost by 5, thinking that everyone paid the same amount and some only deducted the price of one adult ticket. Another common error was working with just 2 children rather than 3.

Question 14

There were a fair number of blank responses for this question and also some where the students were clearly unaware of angle rules. A good number were able to gain the correct answer for angle *x* but often completely omitted to give any reason at all for their answer, perhaps on purpose or maybe because they hadn't read the question carefully. It must be noted that statements such as 'triangles equal 180°' or 'AE is parallel to BD' are insufficient and we need to see reasons such as 'angles in a triangle total 180°' or 'corresponding angles (are equal)'. Some candidates gave 'I measured it with a protractor' as a reason; they inevitably scored no marks as the diagram was not accurately drawn.

Question 15

Several students were able to gain the correct answer for (a) and (b) but part (c) was seldom correct. Part (c) was demanding in that it required clear algebraic working and involved a negative value of *x* as well as a fraction. Students sitting this tier were often unable to make the correct start to solving the equation by multiplying both sides by 4; subtracting 3 was often seen instead. Some of those that made a good start and did multiply correctly by 4 to get $3 - 5m = 32$ often followed this by $5m = 35$ or $-5m = 35$, showing a confusion with the minus value. A correct answer **without** clear algebraic working was awarded no marks as the questions told the students this was needed.

Question 16

While some students were able to gain full marks on this question it was surprising to see quite a large amount unable to use their calculators correctly. Without the use of the fraction button or correct use of brackets for the BIDMAS rule, candidates often ended up calculating $\sqrt{4.6} \div 8.1 - 3.7$. Some students calculated the numerator and denominator separately, the $\sqrt{4.6}$ often causing rounding problems. We awarded a mark for seeing the numerator or denominator calculated correctly or for the correct value as given by the calculator, but not in decimal form.

The rounding in part (b) was a problem to many students, where they rounded up the last figure or gave the value to 2 significant figures, perhaps believing that the leading zero was a significant figure.

Question 17

Most students were able to give the correct coordinate for R with only the occasional (6, 9) rather than (9, 6). Part (b) caused problems for some students because of the instruction to measure the distance between the points in millimetres. Some showed a measurement such as 8.1 cm in the working and then an answer of 810 mm. We also saw a number of values such as 80.3 which we felt were meant to be 83 but the student could not multiply 8.3 cm correctly by 10. Part (c) was answered well with many correct crosses showing the position of point S. A good number of students were able to find the coordinates of the midpoint of PQ but it was the least well answered part of the question. Candidates tended to use the diagram to find the midpoint, rather than by using any calculation. Some seemed to assume that the coordinates must be integers – despite marking a point between the gridlines.

Question 18

This was a common question on papers 2F and 4H but candidates on the foundation tier found it very challenging. It was disappointing to see so many students fall down on squaring a negative number; again incorrect use of the calculator often caused this problem. Many candidates gave the answer of -95 coming from using -25 for $(-5)^2$. We also saw a number of candidates calculating $(3e)^2$ rather than $3e^2$. If a student did not get the correct answer we awarded a mark for seeing $(-5)^2 + 4 \times -5$ with brackets essential, or a value of 75 for $3e^2$; however this was rarely seen.

Question 19

There was the occasional correct answer amongst mainly blank responses for this question. Those that had attempted it without gaining full marks usually calculated $24.5 \div (2 + 6 + 7)$, i.e. splitting the length of the given side rather than realising the given side amounted to 7/15 of the perimeter.

Question 20

For part (a) it was pleasing to see a good number of correct responses and some not fully correct but with working that enabled them to gain method marks. Some students correctly found 12% of £30 but forgot or didn't realise the need to subtract it from £30. Students should be reminded to take note of any question using percentages as to whether they are increasing, reducing or just giving the percentage of the amount. Some weaker students surprisingly used a non-calculator, break down approach to finding 12%, so 10% = £3, 5% = £1.50 etc or 1% = 30p, these mostly proved to be incorrect as students found 2.5% and could not find 2%, whilst others could not add the pence to the pounds correctly. A few students simply subtracted 12 pence or £12 from £30, showing no knowledge of finding a percentage of an amount.

(b) This was a more challenging percentage question for most students but a fair few gained full marks; those that didn't could pick up 2 marks for fully correct working, or as more often was the case here could gain 1 mark for recognition of £9 being 12%, e.g. 9 = 12%. Trial and improvement style methods were frequently seen for this part of the question.

Question 21

This question was found very challenging by the majority. Part (a) was more often correct than part (b). The most frequent incorrect answer was that of 0.4, the total of the given probabilities. Part (b) was rarely correct but a few students were able to pick up a method for finding the number of cars correctly for 2 colours other than blue, which was given, and showing they were working with 4 products; the 3 correct values seen were always for blue, red and black but the number for silver (72) proved elusive. The students could simply do a single calculation, e.g. 6÷0.05, but this was not seen at this level.

Question 22

(a) This was done correctly by a fair few, but incorrect answers such as $x^2 + 2$ or $3x$ were frequently seen as candidates did not multiply both values in the bracket by x or tried to combine the values incorrectly.

(b) We saw many incorrect answers and it is clear that students at this level find simplifying algebraic expressions very challenging. The negative signs caused many problems and instead of
$-2t + 4$, we saw a lot of $-2t + 10$ and also candidates who gave a single answer such as 2 where they had simply ignored 't' and calculated $6 – 3 – 8 + 7$.

(c) We had many blank responses for this inequality question. A few students were able to give the correct answer, but we also saw a number calculate the inequality correctly only to give the answer of 2.5 rather than $x > 2.5$; these candidates were able to gain a method mark for the correct method seen.

Question 23

Just a small number of students gained full marks for this question. We saw many blank responses and also a few where they were using trial and improvement in an attempt to find the values of x and y; clear algebraic working was required for the award of any marks so these trial and improvement attempts gained zero marks, even if the correct answers were found.

Question 24

There are several ways of gaining the correct answer for this question and provided we saw evidence of a correct method with no contradictions, such as an interior angle marked as an exterior angle on the diagram we were able to credit these attempts. Students were asked to

‘show your working clearly’ and without gaining at least a method mark they were unable to gain any credit.
However, on the Foundation tier the majority of students did not attempt the question and even when they did, often could not see a clear method through from beginning to end. Those that spotted they could draw a regular pentagon inside the decagon were often the ones that did well. Some picked up a method mark for calculating the interior angle of a decagon but they often did not know how to proceed after this.

Summary

Based on their performance on this paper, students are offered the following advice. They should:

- Ensure they read questions carefully, giving the answer that is asked for.
- Ensure adequate working is shown for all questions, showing all stages even when a calculator has been used.
- Think carefully about whether their answers are sensible.
- Have ample practice on terminology such as edges, faces, vertices and understand the concepts of area, perimeter and volume.
- Show working for conversion graphs and angle questions on the diagram as this is often worthy of method marks.
- Use a calculator to their full advantage, making use of the ‘fraction’ function and brackets as well as using it for calculations including percentages.

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