Examiners' Report/
Principal Examiner Feedback

January 2016

Pearson Edexcel International GCSE
Mathematics A (4MA0)
Paper 1F

Pearson Edexcel Certificate
Mathematics A (KMA0)
Paper 1F

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While many correct responses were seen throughout the paper, there were a significant number of blank responses to questions. Of the early questions, the responses to question 3b and 3c were particularly disappointing, clearly showing that many did not know the appropriate metric conversions needed.

1 It was rare to see an incorrect answer in (a); when this did occur it was usually London . Parts (b) and (c) were well done. In part (d) most students gave the correct answer but others attempted to round to the nearest hundred or nearest thousand or just gave the answer as 20 rather than 3520. Part (e) was attempted by almost every student and had an extremely high success rate. All but a handful of students were able to select the correct two distances from the table and add them. A few mistakenly subtracted the values, while a very small number simply gave one or other of the distances as their answer.

2 The first two parts of this question were correctly answered by a large majority. Where an error was made in part (a), many were able to gain a follow-through mark in (b) by converting their incorrect fraction to a decimal. There was a noticeable number of responses where students wrongly gave 7.1(0) as their conversion from 7/10, or similar from their incorrect fraction in (a). In part (b), while most students were able in part (i) to shade 2 triangles out of the 8 in the diagram to depict 25%, responses with two and a half triangles shaded (presumably a careless assumption that each triangle was 1/10 of the shape) and three triangles shaded were seen regularly. 25/100 or an equivalent fraction gained many students the mark in (ii). A decimal here was not given credit. Part (c) was well done although the incorrect answer of 67 (rather than 57) was seen a number of times suggesting that students need to be encouraged to check their answers.

3 Part (a) was well done although some students did give the name of the heaviest (rather than lightest) tablet. Parts (b) and (c) were both very poorly answered with 31.5 being a popular incorrect answer in (b), 1370 and 1.37 seen as popular incorrect answers in (c). The 2-step problem in part (d) was correctly interpreted and solved by almost all students, gaining them all 3 marks. Occasionally, a response was seen where the value of only one computer had been subtracted from the £1000 budget or where this total was divided equally amongst the six staff.

4 While most students produced correct tallies and frequencies in the table, careless errors from time to time crept in. There were also those who were not able to interpret tally and frequency, giving the frequencies in the tally column and various other values (usually score multiplied by frequency) in the frequency column; for full marks, the correct frequencies needed to be seen in the frequency column. Many candidates failed to check that their four frequencies added up to 20. The meaning of mode was well understood, with many correct answers in (b), the most common error being to give the frequency of the modal score rather than the mode itself. The idea of range being the difference between the highest and lowest values was also well understood but wrongly using the frequencies for this calculation was seen about as often as the correct use of the actual scores.

To gain a mark in part (d), students had to both identify that 9 is not a prime number and give a brief explanation as to why it is not prime. There was a good number of acceptable responses which gained credit but also many that were incomplete, muddled or completely wrong. Students appear to have difficulty articulating the distinction between numbers being divided by another number and numbers dividing into other numbers. Hence, '9 goes into other numbers' was frequently given as a reason for it not being prime.

Most tables were correctly completed in part (e), although some students multiplied the scores despite some entries already having been entered for them. It was rare to see an incomplete table. A pleasing number of students progressed to give correct probabilities in part (f); it was encouraging to see that these nearly always used correct notation. Students who simply gave a word description, for example 'unlikely', gained no credit. A regularly seen error in f(ii) was interpreting greater than 12 as including 12 itself.

5 Again the vast majority of students gained both the mark for finding the next term of the given sequence and for explaining how they found their answer. A few wrongly added 4 to give 20 or 8 to give 24 and used this as an explanation, gaining no marks. Occasional explanations did not make sufficient sense but blank responses were rare. Part (c) was generally well done although some students did mis-count and so give either the 9^{th} term (256) or the 11^{th} term (1024) as their answer.

6 The correct name 'octagon' featured regularly, as however did hexagon, descriptions such as rectangular polygons and non-responses. The most common way that a mark was gained in (b) as to why the given shape was irregular focused in various ways on the lengths not all being equal. Some degree of precision was needed so more vague responses about the shape being stretched or wider than normal did not gain the mark. A surprisingly high number of students gave the reason for its irregular shape as being due to it having parallel sides or having 8 sides. (c) was correctly answered more often than the previous parts of this question; unfortunately those students who probably recognised several pairs of parallel lines but who marked them all with the same symbol could not be credited.

7 Most students were able to give the co-ordinates of the marked point in part (a), with only a handful unable to gain a mark, usually when they reversed the co-ordinates. In part (b), incorrect answers were seen more often than the correct reflection. The most common error was to reflect the given triangle in the y axis instead of in the x axis. Translation and rotations were also in evidence, as were attempts that produced triangles in each quadrant. Finding the area of the triangle, which could have been worked out either by using the formula or simply by counting squares, proved beyond a surprisingly high number of students. Giving cm^2 as the appropriate unit gained a mark, either with or without the correct value of 3 for the area; this was regularly seen, as was the incorrect cm.

8 Parts (a) and (b) were well done although a small minority of students did leave out the variables thus giving incorrect answers of 10 in part (a) and 4 in part (b). Many students gained 2 marks in (c) for solving the equation correctly, although few used a formal algebraic method. Others simply subtracted the 5 from the 17 to give 12,

using this as their answer, failing to understand that they had actually found the value for 6m. Others gave 6 as their answer, mostly from 6+6-5=17, again not able to interpret 6m correctly. Another false approach was to add the 6 from 6m to the 5 to give 11, subtracting this from the 17, again giving 6 as their final answer. Blank responses were beginning to make an appearance. Part (d) was very badly done with $25r$ being the most common incorrect answer as well as the most common answer seen. Students who showed some understanding of factorising gave an incorrect answer of $3r + 2$. Students had more success in part (e) where y^{14} was, unsurprisingly, the most common incorrect answer seen.

In part (f), a noticeable number of students was able to multiply out two brackets and simplify the resulting expression, achieving two marks. A good number of others picked up one mark, mostly for producing three correct terms out of the four, the most common error being to give the product of 5 and -1 as 4 (or sometimes -4), presumably because they had tried adding instead of multiplying. Simplifying the 4 term expression produced a wide variety of squared and linear terms as terms were imaginatively, but wrongly, combined. Another regularly seen incorrect approach was to add the terms in the brackets with no attempt at multiplication.

9 The majority of students were able to add up the given angles in part (a), including the 90^o which was indicated on the diagram only as a right-angle, and subtract these from 360^o, to calculate the correct answer of 107^o. A common error was to omit the right-angle from the calculation. Attempts to work with 180^o rather than 360^o also appeared. The reasoning behind this method, which was needed to gain a mark in part (ii), that angles at a point add up to 360^o, was known to a pleasing number of students. Reference to a circle and 360^o was also given credit but the frequently occurring vague descriptions, for example, 'all angles are 360^o' were not.

In part (b) the first step of working to find a base angle (31^o) of the isosceles triangle was accessible to many students and a good number of these, knowing also that 'angles on a straight line add up to 180^o' continued working to subtract this from 180^o to find the required angle. This gained them 3 marks. It was clear, however, that many students did not fully understand this 'rule' and thought that all the angles anywhere along the line should add up to 180^o. Thus they tried to subtract two angles of 31^o, losing both the second method mark and the accuracy mark. Others wrongly subtracted the one angle they were given from 180^o or based their working on 360^o rather than 180^o. Blank responses again appeared.

10 In part (ai) 'am' was frequently missing. Students need reminding that, when giving times using the 12 hour clock, times must include either am or pm. Part (aii) was answered far more successfully. Fully correct answers for the speed of a journey in part (b) were very rare. Students found difficulty at each stage; working out the time interval between two given times, converting this to hours, and knowing that division was required. One mark could be gained for converting a clearly stated time either to hours or to minutes, the latter being seen more often than the first. Where students did use 105 minutes, they often failed to gain the second method mark because they omitted to multiply by 60. If 1 hour 45 minutes had been wrongly given as 1.45 hours, some students were able to benefit from the award of one mark for dividing 140 (km) by 1.45. Deciding that the journey took nearly two hours and the speed was

therefore 70km/hour was not rewarded with any marks, although this answer made a regular appearance. Seemingly random answers and blank responses were also noticeable.

11 Many students made at least a successful start to the question in part (a) by working out that 70% of 1200 passengers is 840 passengers and thus gained the first method mark. However, many of these then misinterpreted the question; instead of finding 1/6 of 1200 passengers, they calculated 1/6 of the remaining passengers, having subtracted 840 from 1200. Other students chose to convert 1/6 into a percentage and work the question through using percentages, usually losing the accuracy mark due to premature rounding. Others simply found the required percentages but did nothing to work out numbers of passengers so failed to achieve any marks. Fully correct solutions were seen but not as often as might have been expected. There were also students who felt unable even to make a start towards an answer.

Writing 1200:900 as a ratio in part (b) and simplifying it to 4:3 was accessible to most students, with more gaining one mark for an un-simplified or partially simplified ratio than those who gained both marks. Those who reversed the ratio but did simplify to 3:4 benefitted from the award of one mark. Some fractions rather than ratios were seen but this was not rewarded. Addition, subtraction or division of the ratio numbers was sometimes attempted and blank responses were noticeable.

12 In part (a), a good number of students were able to work out the input for a given output for a 2-stage number machine. Common errors were to use the given output as the input or starting correctly with the given output but failing to use the inverse of the 2 operations. Some could produce a correct algebraic expression in part (b) for the output in terms of x but many lost a mark for wrongly writing this as $x = 4x – 7$ or for attempting further incorrect ‘simplification’ of this expression. There were a few blanks in part (a) and rather more in part (b).

13 For some students, showing how to divide one fraction by another proved very straightforward and they gained two marks for their clear concise working but for many the traditional methods for division of fractions clearly remain a mystery. Conversion to decimals was not accepted for the award of marks. All kinds of muddled manipulation of numbers appeared as did frequent blank answer spaces.

14 Working out quantities for different numbers of people from a given recipe was attempted by most students and successfully answered by a high number, who gained all 4 marks here. The only commonly seen error in part (a) was taking the quantity for 6 people in the recipe as for only 1 person and occasionally the accuracy mark was lost due to premature rounding part way through their calculation. In (b), wrong answers of 8 and of 7 were regularly seen, mostly without working.

15 Interpreting data given in a frequency table proved a difficulty for many and blanks were noticeable in all parts of this question. Some students were able to work out that 6 people out of 40 should be represented by 54^o on a pie chart but far more divided 360 by 6 and gave 60 as their answer; guesswork also seemed to be a favoured method. Part (b), writing down the modal class, was the most well answered part but even here incorrect categories were selected. Calculating the mean in part (c) provided the more able with 4 well-earned marks but the most frequently seen method

was to divide the total frequency by 5. The sum of the mid-points was also used, again divided by 5. For part (d), while selecting 14 from the table and writing this as a percentage of 40 was well done by a good number students, surprisingly many seemed not to understand that 14 was needed; others wrongly worked out 14% of 40.

16 A clearly constructed perpendicular bisector with two pairs of relevant arcs gave some students two marks; some benefitted from one mark either for showing relevant arcs but failing to draw in the bisector or more usually for producing a perpendicular bisector but with no arcs present. Occasionally an isosceles triangle was offered as a response, with one set of arcs at the vertex. A very high number did not attempt anything for this question while some made seemingly random attempts to use a compass.

17 Neither part of this question was well done by students at this tier, although some produced fully correct solutions. Commonly seen errors in part (a) arose from finding the members of the intersection rather than the union or simply listing the members of set A. Where full marks were not awarded in part (b), one mark was gained for just 4 and 5, for including 4 and 5 with two incorrect numbers (these did have to be from the universal set), for including 4 and 5 with all four other possible values when only two of these should have been selected, or for these four values without including the 4 and 5. All of these appeared, showing some understanding of sets. However, from the number of non-responses, it is clearly not a well-known topic.

18 A clear and precise algebraic method leading to a correct solution was presented by some students, who gained 3 marks, but this was rare. More common were blank answer spaces and random algebraic terms; where such terms appeared, fewer students than usual worked only with numbers. Correct expansion of the bracket provided the opportunity to score one mark, which many students did. From here on, most were let down more by their confusion with positive and negative signs than by the concept of rearrangement to bring x terms on one side and numbers on the other.

19 Showing that the answer could be calculated by $\pi \times 5.4^2 \times 16$ provided the opportunity to gain one mark and using this to give a sufficiently accurate answer secured a fair number of students the second mark as well. However, wrong formulae and answers were seen far more often. The most common false approaches were simply to multiply the radius by the height or to add those two dimensions. Also occurring regularly were the use of 2rh and πrh Given that the correct formula is clearly provided for students, it is hard to understand why they fail to make use of this, as much of the working that was seen indicates an ability to substitute numbers into a formula and to evaluate. Some students misinterpreted the requirement in part (b) by giving the diameter in part (i) rather than the upper bound.

20 Few fully correct graphs were produced, although some students were able to do so for 3 marks. Occasionally, marks were picked up for incomplete lines or for two or more points stated or plotted but many were unable to score any marks here, not knowing where to start from an instruction that simply asked for the graph to be drawn. Even fewer correct regions were shown in part (b). Drawing both x = 3 and y = 2 was required for one method mark but only a handful of students managed this.

Assorted shaded squares were sometimes drawn bordering these lines but were not worthy of credit.

21 The most popular method seen was using Pythagoras' theorem to find the length of AC and invariably this was then given as the answer; however, as the question asked for the size of angle ACB and required the use of trigonometry, such answers gained no credit. Where a direct link was made between tan ACB and 4.5/9.6, this scored the first method mark and some were able to do this. Fewer could proceed to indicate that inverse tan was needed for the next step and were unable to progress further; most who could also went on to find the correct answer.

Summary

Based on their performance on this paper, students should:

- read each question carefully, preferably referring back to the question when the answer has been found to ensure that the answer given does answer the question set
- learn all the necessary metric conversions eg. 1 kg = 1000 g, 1 cm = 10 mm
- ensure that correct geometric reasons are given when required
- learn to distinguish between instances when Pythagoras's theorem should be used and when trigonometric ratios should be used