Examiners' Report/
Principal Examiner Feedback

Summer 2014

Pearson Edexcel International GCSE
Mathematics A (4MA0/3H)

Pearson Edexcel Level 1/Level 2
Certificate Mathematics A (KMA0-3H)

Paper 3H

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Principal Examiner's Report
International GCSE Mathematics A / Level 1 / Level 2 Certificate Mathematics A (Paper 4MA0-3H / KMA0-3H)

Report on Individual Questions

Question 1
Part (a) was generally answered well. Those who got the answer wrong in (a) but did show method could pick up a mark for evaluating the numerator or denominator correctly. However, for a large number of students, no method was shown. By far the most common mistake was to calculate $\frac{89.7}{7}+\sqrt{2}$ to give 14.22. Those who answered (a) incorrectly were often awarded the mark in (b) for rounding *their* answer correctly, although many students lost the mark in (b) for rounding the correct answer in (a) to 10.6 instead of 10.7.

Question 2
Most students used the conventional method of multiplying the first fraction by the reciprocal of the second fraction. This could be followed by multiplying the numerators and by multiplying the denominators or by correct cancelling. Other valid methods seen, including finding a common denominator, were quite frequent but less successful. Other students failed to gain marks when they used a decimal approach to the question.

Question 3
In part (a), most students appreciated the transformation was a reflection although many were unable to describe it correctly. Descriptions such as 'flipped' and 'mirrored' were sometimes seen. It was pleasing to see that only few students gave a description that was NOT a single transformation, the most common being a reflection in the *y* axis followed by a translation of 4 squares to the left.

Part (b) was answered well and even those students who weren't able to draw the shape in the correct position often managed the correct orientation.

Question 4
Parts (a) and (b) were almost always correct, although the most common error in (a) was to give the answer as 56*d*.

Parts (c) and (d) were also mostly correct. In part (d), most students arrived at the correct anwer of 20, but students would be advised to show their substitution, which would be awarded one mark if the answer was incorrect. Only less able students made mistakes with the substitution, giving answers such as 8×12 or $2^2+6\times2$. Some students who had the correct substitution failed to gain the correct answer as they did not apply the order of operations correctly.

Question 5

To achieve marks by the most efficient method, students needed to write a correct equation such as $\sin 38 = \frac{PQ}{12.2}$. Those who managed this usually went on to score full marks. However, some students either used the sine rule incorrectly or chose the wrong trigonometric ratio, typically 12.2 x cos38. A small number lost the accuracy mark by rounding their answer to less than three significant figures without first showing their correct unrounded answer.

Question 6

This question was challenging to many students, with a number of students neglecting to use a pair of compasses to draw an arc. Not surprisingly, students were better at drawing a line of the correct length than one with a bearing of 260°. The lack of use of an arc for the length *AD* may have been the cause of some of the inaccuracy with lengths.

Question 7

This was answered well, although some students confused the intersection with the union.

In part (b), an understanding that there are no letters in both sets A and E was required. This was answered in a variety of ways but many had a good understanding of this concept, although sometimes explanations given were a little vague or ambiguous.

Question 8

Many students struggled to draw $x + 2y = 8$ in part (a). Some picked up 1 mark for drawing a line with a negative gradient passing through either (0,4) or (8,0). If the line in (a) was incorrect, it was not possible to achieve full marks in (b). Most were able to draw $x = 2$ and $y = 1$ for 2 marks, although some students made the usual mistake of confusing the lines $x = 2$ with $y = 2$ and $y = 1$ with $x = 1$. Students should be advised to draw the lines that form the boundary of the region **R** and not just rely on shading to define the region.

Question 9

This question seemed to provide some discrimination at the middle of the ability range. Only the more able students managed to achieve full marks. Many were able to score one mark, by finding one correct face which was often for 8 x 10 or 8 x 13. Most failed to find the area of all five faces with the triangle faces often causing problems. A common error was to state that the area of the triangle was $\frac{1}{2} \times (10 \times 13) = 65$. A significant number lost all marks for attempting to find the volume of the prism.

Question 10

There were a numbers of ways students could achieve marks here. Most found 256 and 350 by multiplying 64 by 4 and 70 by 5 whilst some wrote 2 lists, one of which contained four numbers which added to 256 and the other containing 5 numbers adding to 350. For both approaches, students then proceeded to the correct answer by subtracting 256 from 350. Other than that, there was sometimes a lack of clear reasoning which prevented the methods from reaching an accurate conclusion. There were regular instances of trial and improvement, some of which were successful and others attempted to solve $\frac{(64+x)}{2}=70$.

Question 11

Most students answered (a) and (c) correctly. Although (b) was generally done well, a number of students failed to realise that they did not need to include the $60 < v \leq 70$ frequency in their calculations and so gave the probability that the next vehicle passing the speed checkpoint will have a speed of 70 km/h or less, rather than 60 km/h or less. Some students felt that they had to go just past the correct frequency of 56, giving for example $\frac{57}{180}$ or, more often, $\frac{57}{181}$. Students were usually able to plot the points for a cumulative frequency diagram, although some struggled with the scale. There were only few instances of points plotted at mid-interval values. Most were able to pick up one mark for drawing a curve or line segments if 4 or more of their points were plotted accurately.

In part (e), students were usually able to take an appropriate reading but some forgot that they needed to subtract their reading from 180 or instead subtracted from 200. It would be beneficial to indicate their working on the graph, so that one mark could be gained even if the final answer is wrong, although many students chose not to.

Question 12

There were a number of approaches in part (a), some of which were correct. Credit wasn't given for $\frac{155}{167.40}$ but many picked up marks for partial methods even though students often didn't proceed to the correct answer. Such methods included $\frac{167.40}{155}$ or $\frac{12.4}{167.4}$, or for sight of 12.4 in the working. Others lost a mark where they correctly obtained either 1.08 or 108 but failed to subtract 1 or 100 to give the correct increase of 8%.

Like in part (a), there were a number of approaches seen that led to the correct answer in part (b). In all cases, an appreciation that £125.40 represented 104.5% (implied or stated) usually led to a correct solution. Students who didn't have this appreciation often thought that £125.40 represented 100% leading to an incorrect answer of 119.76.

Question 13

Students were unable to gain any marks without using a correct method for finding the radius or diameter. However, there seemed to be a good understanding of the need to use Pythagoras' theorem before finding the circumference using an appropriate formula. A small number of students confused the radius with the diameter. Less able students used 10 as the diameter and occasionally used the formula for the area of a circle.

Question 14

In part (a)(i) there were a reasonable number of correct starting points to gain the first mark. Inevitably, some students simply tried to manipulate the given result with no real aim in sight. Others were unable to identify the length of fencing correctly, showing totals like $8(2x+2y)$ by looking at separate rectangles or $4y+8x$ by disregarding the inner fences.

In part (a)(ii), the area $8xy$ was frequently given correctly, and sometimes used properly to achieve the required result. It is worth reminding students of the need to show all stages of their working in such questions and that their algebra does need to be accurate when the result is given.

In part (b), the differentiation was usually correct for those who knew what they were meant to do. This was sometimes the only 2 marks scored for the question. Working then deteriorated in part (c). Only the more able students showed a clear and correct equation, and some of them stopped after finding the value of x as 7.5

Question 15

This question attracted a wide range of responses. The most able students saw exactly what was required although some forgot to subtract 4 from the total area of 36, and even fewer calculated $4\times3^2=144$. Others ended up with calculations such as 3×4^2, 4×2^2 and 4×3, either with or without 4 subtracted. Attempts to partition the area or to calculate it using the side lengths were rarely successful. A few students simply guessed side lengths, such as *OA* = 2 and *OF* = 6. Others attempted to draw on the shape and divide it into other hexagons and equilateral triangles

Question 16

The most able students found a correct value efficiently. The most common mistakes from those who did not were $6\times6=2x$ and $\frac{4+9}{2}=6.5$

Question 17

Marks on this question were well spread with less able students struggling to start. A large number of students were able to square both sides of the equation and remove the denominator, but were then unable to gather the x terms correctly on one side of the equation. Some students made simple errors, such as losing signs or missing out brackets. Those who did gather the x terms correctly usually found an acceptable expression for x with relatively few continuing with incorrect cancellation.

Question 18

The combination of surds with a context and the rearrangement of an equation proved to be demanding for many students. A few students resorted to decimals, but most tried to proceed with the surds. Those who used the formula for the area of a trapezium usually substituted correctly to gain the first mark, whereas those who subdivided the area were more likely to make mistakes. The subsequent manipulation proved very demanding for most students, as we might expect for a question such as this – written with the more able candidates in mind. For example, many wrote $\frac{1}{2}\times k+4\times\sqrt{3}$ as the area, but without brackets, and then multiplied to get $\frac{1}{2}k+4\sqrt{3}$. If a correct expression for *k* was found it was nearly always simplified accurately.

Question 19

The context of this question distracted many students from the idea of error bounds. They focused on the relationship between speed, distance and time, calculating $2.8\div5$ and possibly making some attempted error bound adjustment to their answer. They usually attempted to convert from hours to minutes. Common mistakes included
2.8 x 5, $2.75\div5.5$, $5.5\div2.75$ and $2.85\div5.5$. Most of those who picked the correct division scored full marks, though there were a few instances where accuracy was lost due to premature rounding.

Question 20

Part (a) was mostly answered well. This was, in part, because the question mentioned the “remaining eight counters” leading to more students than normal appreciating this was a 'without replacement' question although answers of 4/9 x 4/9 were still evident. There were a few who got nowhere or who added fractions (rather than multiplying), and a few who could not correctly evaluate the required multiplication.

Part (b) was a good discriminator, and those who understood the topic normally found a correct answer concisely. Many others gained only one mark because they failed to recognise all of the possibilities but the least able students found it difficult to make any progress at all. Sample space methods were rarely seen and not often successful.

Question 21

The most able students answered this question on functions well. However, less able students sometimes still picked up odd marks. In part (d), those with a partial understanding were likely to work out $\frac{3}{5}\times 6$, $\frac{3}{5}+6$ or $5+\frac{3}{4+1}$, though there were numerous other, less explicable, attempts.

Not surprisingly, the same sorts of mistakes were repeated in part (e), in which students often also showed poor attempts to simplify $\frac{3}{4+(5+x)}$. Even when this was reduced to $\frac{3}{9+x}$ there was often further incorrect cancelling, usually to give $\frac{1}{3+x}$, which lost the accuracy mark.

Question 22

In part (a), more able students usually identified the need to use the sine rule and they applied it accurately. In some instances, mistakes were made in rearranging the original equation or side *OC* was found instead. Less able students were often likely to treat *BOC* as a right angled triangle.

Part (b) achieved further discrimination amongst those who had managed to find *BC*. Many were able to gain a mark for the area of the sector, though it was sometimes taken to be a quarter of a circle, and there was reasonable success with the area of the triangle. Sides and angles were sometimes muddled, using 35^{o} with *BO* and *BC* or 30^{o} with *CO* and *CB*, for instance. There was also a tendency to overcomplicate the work, first finding *OC* and then using it with 35^{o} or 115^{o} to find the area of the triangle. Mistakes and inaccuracy were much more likely with such inefficient methods. Premature rounding lost accuracy marks in some cases.

Question 23

Meaningful attempts at this last question normally came only from the most able students, many of whom, however, demonstrated poor algebraic manipulation skills. Those who tackled the algebra one step at a time were the most successful. Attempting to remove fractions at the first step sometimes led to $4(x+2)+3(x-3)=2$, failing to gain any marks.

A good number of students gained two marks for this question. Students who had got this far often made mistakes when removing brackets, collecting terms together and so failed to arrive at the correct quadratic equation. If the correct quadratic equation was found, solutions usually proceeded to find the two solutions, nearly always showing sufficient detail in their method although many failed to spot the quadratic expression could be factorised.

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