Examiner's Report
Principal Examiner Feedback

Summer 2018

Pearson Edexcel International GCSE
In Mathematics A (4MA0) Paper 3HR

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Introduction

Some good solutions were seen to all questions on the paper. Working was generally shown and clear to follow but there were some exceptions to this; it is to the student's benefit to ensure that all working is clearly shown and easy to follow.

It was notable in this paper, on questions 3 and 13, that students did not always pay careful attention to scales and so lost marks needlessly. Similarly, the answer given was not always the one that the question demanded possibly showing that insufficient care was taken when reading the question.

Question 1

The vast majority of students were able to use their calculator correctly in order to produce the correct answer to part (a). Some were unable to round correctly to 3 significant figures in part (b).

Question 2

Whilst the majority of responses seen were correct there were a good number of students who decided to use the information that Helga scored 9 or more. Thus, the figure 9 appeared in a variety of calculations, all of which were incorrect. A few students gave their answer as the probability of scoring 9 or more, $\frac{50}{60}$, rather than as an estimate for the number of times she would score 9 or more – such a response gained one out of the two available marks.

Question 3

The correct straight line was invariably seen in part (a). Some students lost marks for not joining their correctly plotted coordinates with a ruler. It is important that all pupils bring and use the correct equipment required to the examination. There was slightly less success in part (b). Some students did mis-read the scale on the x-axis as one square rather than two squares per unit.

Question 4

Students who worked with the information about the number of turns completed by each wheel usually gained full marks. Less success was seen from those who worked with the number of teeth in each cog – this approach generally resulted in the incorrect scale factor being used leading to the common incorrect answer of 80. The other common incorrect approach was to find the difference in the number of turns and subtract this from 60.

Question 5

Part (a) was well done. In part (b), those students who either knew that the sum of the interior angles of a pentagon is 540° or who knew a method to work this out generally gained full marks. Those who got the wrong total for the sum of the interior angles were able to pick up one method mark if they demonstrated an otherwise correct method.

Question 6

Part (a) was generally correct. The common error in part (b) was to give the attributes of the fish in sets A and B but then join these with 'and' rather than 'or'. There was more success in part (c) with many fully correct descriptions seen.

Question 7

Many fully correct solutions were seen to this question. There was evidence of some poor algebraic manipulation in part (a) where a correct expression for the perimeter of the rectangle was sometimes simplified incorrectly. Other errors included squaring brackets in both expressions rather than multiplying by two. The information given in part (b) was occasionally interpreted incorrectly with the perimeter of the rectangle rather than the perimeter of the triangle multiplied by two in the student's equation. The mark scheme enabled students to achieve method marks even though they might have made a mistake with one of the perimeters in part (a).

Question 8

Part (a) was invariably correct. Part (b) was also very well done; the occasional slip in working out the products was sometimes seen (this was often the use of 12 rather than 13 as the mid-interval value for the final group). Some made the error of finding the mid-interval value for the first group in the frequency table (2) and then using this to multiply all the frequencies rather than finding the mid-interval value for each group.

Question 9

Whilst many fully correct solutions were seen, some candidates resorted to their calculator to evaluate $\frac{27}{8}\times\frac{4}{9}$ and so gave $\frac{3}{2}$ as the result of this calculation without first either showing cancelling or giving $\frac{108}{72}$. The failure to show this interim step meant that only two out of the available three marks could be awarded. A few students used their calculator to change the fractions to decimals; this resulted in no marks being awarded. When asked to 'show' that a statement is true, all steps must be shown.

Question 10

The vast majority of students used Pythagoras's Theorem correctly to reach the correct solution. A few students did, inevitably, square and add the two given sides and so could not be credited with any marks. Those students who found an angle first using trigonometry usually rounded off prematurely meaning their final solution was inaccurate and so lost the accuracy mark.

Question 11

Having rearranged the given equation correctly in part (a) some students incorrectly gave the gradient as $-0.8x$ or 0.8 rather than -0.8. In part 9b) the majority of students were able to achieve a method mark for $y = 2x + c$.

Question 12

Geometric reasons given must be fully correct – it was not unusual to see the word 'cyclic' omitted from the reason in part (a) as 'opposite angles in a quadrilateral'; this is an insufficient reason so the mark for the reason could not be awarded. Some students clearly had difficulty in identifying angle PSQ in part (b). Some students got as far as giving angle PRQ as 40^o but were then unable to identify angle PSQ as an angle in the same segment and therefore equal to 40^o. In part (b) a common incorrect method to find angle PSQ was to halve angle PSQ and thus give the common incorrect answer of 51^o.

Question 13

The two common errors in part (a) were to read the graph at 40 (half of the last number given on the cumulative frequency scale) or 50 (half way up the cumulative frequency scale) for the median rather than the correct 44 or, having realised that 44 on the cumulative frequency axis should be used to find the median, misinterpreting the scale and so reading from 48 rather than 44. Both these errors could have been avoided through careful reading of the question and the scale. A failure to read the question carefully in part (b) lead to 80 (those who used less than 500 calories) rather than 8 (those who used more than 500 calories) being given as the final answer.

Question 14

In part (a) the operation of division rather than multiplication by 4 resulted in the incorrect solution $p < 1.75$ from a small number of students. The majority of students realised that the square root had to taken in part (b) but some did this before rearranging the inequality and frequently forgot to take the square root of the 16. Those who rearranged first generally went on to score at least one mark. It was very common to see a single inequality given as the answer, $q > ¾$ rather than the correct two inequalities. Some students who did find both critical values of ¾ and $–¾$ then went on to give a single incorrect inequality statement rather than the correct $q < –¾$, $q > 3/4$. When the solution consists of two separate parts of the number line it is not appropriate to attempt to give this in a single inequality statement, thus solutions along the lines of $-¾ < q > ¾$ could not be awarded the accuracy mark.

Question 15

Part (a) was well done although a small minority of students did use 8 rather than 4 as the radius. Part (b) was almost as well done although an incorrect method was to use the volume found in (a) together with the height of 21 cm to attempt to find the diameter of cylinder B; this showed a lack of understanding of the word 'similar' and so gained no marks. A common incorrect answer in part (c) was 768 cm^3 from those students who worked with the length scale factor instead of the volume scale factor. An alternative method to working with the volume scale factor was to use the volume from part (a), multiply this by 64, use the appropriate scale factor to work out the radius of cylinder C and thus find the height of the cylinder. However, this method inevitably led to a slightly incorrect height as the volume used was a rounded figure.

Question 16

The common error in part (a) was to reduce the given amount by 24% rather than dividing by 0.76 or equivalent. Whilst a good number of correct solutions were seen this topic continues to be poorly understood by many students. Those who were able to set up a correct equation in part (b) generally produced a fully correct solution although some of those who worked with y^3 rather than $(1-x)^3$ sometimes gave an answer of 78.8%, forgetting to subtract from 100%. A common error was to work with 4 years rather than 3; candidates who made this error were still able to gain two out of the three marks.

Question 17

It was clear from responses seen in both parts (b) and (c) that a significant number of students are not aware that the process of differentiation gives an expression for the gradient at a point on the associated curve. Part (a) was generally correct. However, part (b) was not done nearly as well; students frequently tried to use both coordinates to get an answer, substituting 2 into to their expression for the gradient and then equating to 4 (the y coordinate), other errors included dividing the y

coordinate by the x coordinate. Those who formed the correct equation in part (c) frequently forgot to provide both positive and negative roots when taking the square root. It was surprising to see some students using the formula, some correctly but others not, to solve $6x^2 - 6 = 7.5$

Question 18

Common incorrect answers in part (a) were $\frac{2}{36}$ from those who forgot to include the outcome 2,2 in their answer or $\frac{4}{36}$ from those who included the outcome 2,2 twice. The other common error was to have a denominator of 12 rather than 36 for the individual probabilities. In part (b), the answer to part (a) was frequently subtracted from one but then the resulting value was multiplied by 3 rather than cubed.

Question 19

Those students who eliminated y from the given equations usually went on to score at least 3 marks. However, students who took the more difficult route and attempted to eliminate x fared less well and usually ended up with no marks through making early algebraic errors. With a resulting quadratic equation to solve that did not factorise it was essential that students maintained full accuracy throughout their solution in order to arrive at accurate values. A significant number rounded prematurely and therefore lost at least one accuracy mark. The majority of solutions seen did have the x and y values paired correctly in the final answer which was encouraging to see.

Question 20

Those students who started by writing $\sqrt{50} - \sqrt{18}$ as $2\sqrt{2}$ without any intermediate step gained no marks. When the instruction in the question is to show your working clearly it is essential that all steps are shown. A significant number of students got as far as the correct $\frac{\sqrt{2}}{2}$ but were then unable to make any further progress.

Question 21

Part (a) was generally correct. Those who attempted to apply Pythagoras's Theorem in part (b) to a triangle without a right-angle gained no marks. Those who started with the cosine rule usually went on to gain at least two marks. Having successfully found the value for the side AB some failed to use the sine rule correctly but there were a good number of fully correct solutions seen.

Question 22

Having successfully factorised the denominator, some students failed to do more than take out a common factor of three in the numerator and therefore were unable to simplify the given expression fully. Other students were able to factorise correctly but wrongly divided the numerator by 3 and so ended up with an incorrect answer. Having arrived at the correct answer a minority of students then cancelled incorrectly to spoil their solution others attempted incorrect cancellation at the start of their solution and so failed to gain any marks.

Question 23

Although a good number of correct solutions were seen to part (b) it was disappointing to see a significant number of students get as far as the correct $y^2 = 4 - x$ but then rearrange this incorrectly to $x = y^2 - 4$ and thus give an incorrect inverse function as their answer. Poor algebraic manipulation also let candidates down in part (c) where $(5 - x)(x - 1)$ was frequently expanded correctly and then simplified incorrectly, often with the term in x^2 being changed from negative to positive in the process. As ever, the subtraction sign outside the brackets in the composite function caused problems when the brackets were removed. Some candidates left their final answer as $\sqrt{x^2 - 6x + 9}$ or even $\sqrt{(x-3)(x-3)}$ presumably thinking that this was the simplest form.

Summary

Based on their performance in this paper, students should:

- read the question carefully and review their answer to ensure that the question set is the one that has been answered
- look carefully at scales on graphs before reading values from the scale
- remember to provide both solutions when solving equations of the form $x^2 = a$
- maintain accuracy throughout the solution to a question, only rounding the final answer
- ensure that all steps are shown when working towards a given result