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Examiners' Report/ Principal Examiner Feedback

Summer 2013

International GCSE Mathematics A (4MA0) Paper 3HR

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General comments

The demands of this paper proved to be appropriate; the vast majority of students were able to demonstrate positive achievement and many scored high marks. The majority of students gave sufficient explanation and showed their working clearly.

The most able students performed well throughout the paper, including the more challenging questions towards the end.

On questions where there is more than one step needed to get to the final solution, students would be well advised to keep full accuracy until the final answer.

Question 1

Nearly all students got off to a good start by answering both parts of this question correctly. Very occasionally, the wrong probability was used in part (b) and students are advised to read questions carefully. Those who gave their final answer as $\frac{6}{40}$ in part (b) only gained one of the two available marks.

Question 2

Finding an average speed when given the distance and time is well understood by students at this tier. Errors were rare but, when they appeared, fell into one of two categories. Students either wrote 2 hours 15 minutes incorrectly as 2.15 rather than 2.25 or worked initially in minutes. Those who worked in minutes generally found an answer in km/min and then either did not realise the need to convert into km/h or else multiplied by 100 rather than 60 in an attempt to do so.

Question 3

The most commonly seen error in part (a) was to use 3 or 9 instead of 6. Some students lost the accuracy mark, as the correct answer to the question (18.75%) was not seen, with students going straight to an answer of 19. Where there is no requirement in the question to give a rounded answer, the full answer should always be given.

In part (b) it was relatively common to see the mean given as the final answer rather than the total time spent. Indeed, some students went straight to the mean. It is imperative that students read the question carefully and give the answer that is asked for in the demand. Some students used the values at the ends of the intervals rather than the mid-interval values.

Question 4

The mark in part (a) was generally lost due to several mistakes in multiplication, for example:

- $3\times6=16$,
- omitting a variable (eg $18a - 12 + 6c$)
- or in cancelling inappropriately (eg answer of $9a - 6b + 3c$).

Part (b) was very well answered. In part (c), clear algebraic working was required and this was certainly seen from virtually all students. If there was an error in the working then it came once the fraction had been cleared. The equation $3x = 7 - 2x$ was generally the first correct line of working seen, but this was sometimes followed by the incorrect $3x - 2x = 7$.

Question 5

It was rare to see an incorrect answer to this question. It is clear that the majority of students were able to manipulate fractions and demonstrate the correct method for the subtraction of fractions. A number of students chose to use common denominators other then 18 (eg 36 or 54) sometimes making errors in the conversion and neglecting to show the result of their subtraction going straight to the answer of 5/18.

Question 6

Appropriate use of terminology appeared to be an issue in part (a) with some students unable to state the correct transformation. Alargement, expand, elevation, expansion, magnify, magnification and zoomed out are all examples of incorrect attempts to describe an enlargement. Of the three necessary pieces of information required for a correct answer, it was the centre of enlargement that was most frequently missing or incorrect. A number of students gave responses that were not a **single** transformation; once a second transformation was named no marks were available for this part of the question. Errors in part (b) included reflecting the shape in the *x* axis or using the wrong centre of rotation.

Question 7

Any errors in part (a) generally arose from incorrect calculator use. Those who put brackets around the −2 when this was substituted into the equation generally scored full marks. Those who left out the brackets, frequently showed an incorrect value of −12 from $3\times(-2)^2$; other incorrect values included 36 from multiplying first before squaring. A number of students tried to rearrange before substituting, often incorrectly. Part (b) was well done, any errors generally arising again from evaluation with 3×4^2 evaluated as 144 rather than 48 or from incorrect rearrangement following correct substitution.

Question 8

Part (a)(i) was well answered. There was slightly less success in part (a)(ii) where some students gave all the letters (ie repeated the letters u, p, e and r). However, some students confused the union and intersection symbols. In part (b) some students gave the answer very succinctly with the correct statement $X \cap Y = \{2, 3\}$. Others gave the same information in a written explanation. A common error was to identify 1 as both a prime number and a factor of 12. A number did not identify either 2 or 3 instead giving a vague statement such as “they have numbers in common” which gained no marks.

Question 9

81^{14} was a common incorrect answer to part (a)(i). Many students got the correct answer to part (b) but some made an initial error, writing $5^{n \times 3} = 5^{24}$ and then concluding that $n = 8$.

Question 10

This was another well-answered question. The common error seen was to use 36.6 rather than 73.2 as the width of the rectangle. Some students gave $\pi\times36.6^2$ correctly but then evaluated this incorrectly. A few students confused perimeter for area.

Question 11

The majority of students worked with sin52 either using the trigonometric ratio or the Sine Rule. Others used cos38 successfully. A few students gave a two stage solution generally using tan to find the other shorter side and then Pythagoras's Theorem. Provided that accuracy was maintained throughout, this lead to the correct answer and full marks. The most common error seen was to start correctly with $\sin 52 = \frac{6.8}{x}$ but then make an error in rearranging this to get 6.8×sin52.

Question 12

Students generally showed a good understanding of standard form and performed well in this question, although a number gave the order from the largest to smallest.

Question 13

In part (a) the usual method was to find $\frac{\text{increase in } y}{\text{increase in } x}$ from the straight line. However, some students recognised that the equation of the straight line would be of the form $y = mx + 3$ and then substituted (8,5) to find the value of m. Many students were able to write down the correct answers to (b) and (c) without any working. However, a significant number used $y = 0.25x + c$ in part (c) and then found the value of c by substituting $(-4, -2)$ into this equation.

Question 14

The answer to part (a) was almost always correct. There was less success in part (b) with many students using the linear rather than area scale factor and so giving the common incorrect answer of 19.2

Question 15

Those who understood the connection between the area of the bars on a histogram and frequency generally scored full marks. The occasional error was to draw the final bar using an incorrect width, extending to the edge of the graph rather than stopping at 50 or to use frequency for frequency density, often lengthening the vertical axis to fit.

Question 16

Two incorrect methods were seen here. The most common of these, $168.5 - 122.5$ gained one mark for the use of 168.5. However, the other involved finding the difference of the given values of 46 and then applying bounds to get 46.5, an approach that gained no marks.

Question 17

The majority of students were able to gain the first mark available for squaring both sides of the equation. However, progress beyond this step proved more problematic with many not realising the need to isolate the terms in n.

Question 18

The tree diagram was completed correctly by the vast majority of students. Part (b) was also well answered with many students demonstrating a fully correct method. From the incorrect responses seen, the wrong answer from arithmetic errors $\frac{1}{3} \times \frac{1}{3} \times \frac{1}{3}$ was the most common.

Question 19

Those students who understood that they needed to differentiate the given expression for displacement in order to find the velocity generally gained full marks in part (a). An occasional error was to get $18t - 2t^2$ rather than the correct $18t - 3t^2$. Not all students who differentiated in part (a) realised that they had to do the same again in part (b), as solving $18t - 3t^2 = 0$ was a common incorrect method.

Question 20

The correct answer of 4.5 cm and the incorrect answer of 2cm (from $10 \div (15 \div 3)$) were the most frequently seen answers. 8 (from $15 + 3 - 10$) was another common incorrect answer.

Question 21

Students generally scored either full marks or no marks for part (a). Occasionally, the correct fractions were seen added together rather than multiplied. In part (b), a few managed to give an answer of $x = 15$ without showing any appropriate working and so scored no marks. Most students showed fully correct working in part (b) as required by the question. Those who related the question back to part (a) and so only gave the positive value for x received full marks, provided supporting working was seen.

Question 22

Many students managed to expand the brackets but were then unable to make any further progress.

Question 23

Many students gave correct answers in part (a). A number of students left their answer in unsimplified form, which gained them full marks. However, in order to gain any marks in part (b) students needed to have correct, simplified answers to part (a) in order to justify their answers. Many students realised the lines were parallel but not so many realised OD=2AM

Question 24

Some students attempted to find an angle other than the required angle *AHF*. Most started by finding the length of one of the face diagonals correctly and so gained the first two marks. From there, a variety of different methods were seen. Those who rounded the length of the face diagonal to 7.1cm and used this in their subsequent calculation lost accuracy and so failed to gain the final mark. A few students used Pythagoras's Theorem in 3-D to find the length of *AH* and proceeded from there. A number of students thought $AH^2 = 5^2 + 5^2$.

Question 25

Many fully correct solutions were seen. Some students gained 5 out of 6 marks as they found the values for one variable and then forgot to substitute back into the equation to find the values of the second variable. Other students knew that they had to use substitution to eliminate one of the variables, but made an early error in expanding the brackets for $(3 - 2x)^2$. Those who got a fully correct answer but left out stage 4, showing where they got their answer for x, lost the final 3 marks even if their answer was correct. Students should make sure they show all algebraic working when solving quadratic equations.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
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