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Examiners' Report/ Principal Examiner Feedback

Summer 2012

International GCSE Mathematics (4MB0) Paper 01

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Introduction

There was no general indication that the examination paper was too long, with most candidates making reasonable attempts at most of the questions. Overall, the standard of presentation and clarity of work was high. However, it should be emphasized that candidates should be encouraged to include their working on the paper to show how they obtained their answers since if an incorrect answer was given without any working shown, all of the associated marks would be lost. This is particularly important if the question requests that the candidates show all of their working or their construction lines. Centres should emphasize to candidates who do need to use extra sheets of paper to answer questions, to clearly indicate this in the answer area of the relevant question in the examination booklet.

It was pleasing to observe that many candidates showed that they have a good understanding of the basic techniques of arithmetic, algebra and geometry and were able to apply them competently. Centres should emphasize to candidates that they should give their answers to the required degree of accuracy as often marks are lost. The question paper did however highlight the following problem areas, followed by their corresponding question numbers, which should receive special attention

- Bearings (4)
- Standard form (9)
- Expressions involving indices (10)
- Order of rotational symmetry (16b)
- Manipulating inequalities (17)
- Similar solids (23)
- Mensuration (27)
- Median weight (29c)

Report on individual questions

Question 1

Fortunately, many candidates answered this question correctly. There were, however, a number of candidates who correctly calculated the total costs for the adult and child tickets but then failed to add them (M0) to arrive at the required answer thus gaining no marks.

Question 2

The majority of pupils correctly summed the allied angles to 180^{o} (M1) and many correct answers were seen (A1). However, a minority of pupils gave an incorrect answer of 30^{o} because of carelessness as the -30^{o} term on the LHS was not correctly rearranged to the RHS. (A0)

Question 3

Most candidates collected full marks from clear working. However, poor candidates either ignored the square root signs (usually arriving at $x = 6$, M0 A0) or squared each term separately (usually arriving at $x = 37$, M0 A0). Other common mistakes were to write $\sqrt{x}+\sqrt{x}=x$ or $\sqrt{x}+\sqrt{x}=\sqrt{2x}$, both gaining no marks.

Question 4

Most candidates scored all or nothing at all in this question. Of those that scored nothing showed that they did not understand the definition of bearing by thinking that $180^\circ - 145^\circ = 35^\circ$ or $360^\circ - 145^\circ = 215^\circ$ were correct answers.

Question 5

This was another question where most candidates scored all or nothing at all. Many thought that $\frac{3\times 60 \text{ sec}}{1440 \text{ min}} = 0.125 \text{sec/ min}$ was the required answer (M0 A0) or that the way forward was to firstly convert the latter expression to seconds but then stopped or became confused (M0 A0).

Question 6

This was generally well done with many candidates correctly expanding the brackets (M1 A1). Incorrect answers stemmed from pupils adding a $6x$ term rather than $6x^2$ in their expansion (M0 A0). There were a significant number of candidates who thought that question required them to solve the resulting quadratic equation or to factorise their answer back to the original expression given in the question. Fortunately for these candidates, such subsequent work was ignored.

Question 7

The majority of the responses were correct. Most common incorrect answers were either multiples of 18 and/or had working showing the correct prime factors of at least two of the given numbers from 72, 162 and 270 (gaining M1 A0).

Question 8

Most candidates answered correctly (B1 B1). The main cause of incorrect answers was due to erroneously subtracting the vectors usually resulting in the answer $\begin{pmatrix} -1 \\ 6 \end{pmatrix}$ (B0 B0).

Question 9

It was pleasing to see many correct standard forms (M1 A1), however some pupils lost the accuracy mark due to either leaving their answer as 0.075 or 75×10^{-3}. Others misunderstood what indicates a negative index and how to work out the required value of the index and an answer of 7.5×10^{2} was often seen with such candidates usually collecting only the method mark.

Question 10

This question was answered well by many pupils. However, a significant minority separately evaluated the roots before subtracting usually writing $\sqrt{25}-\sqrt{9}$ = 5 - 3 = 2, which gained no marks, unless it was preceded by $\sqrt{25-9}$ (M1).

Question 11

Most candidates found the common factor of 3 (B1). Some then saw the difference of squares and produced different signs in the two brackets (M0) but only the best could cope with the correct factorization (M1 A1).

Question 12

Many correct answers were seen for both parts of this question. In part (b), some thought that $5\times"21"=105$ was required answer (M0 A0) whilst others thought that $4\times6+1=25$ was the solution (M0 A0).

Question 13

For the most part, candidates either scored full marks (using $\frac{615}{51}$) or no marks (using $\frac{615}{17}$). Others arrived at an incorrect answer of 9 km/ litre resulting from $\frac{615}{68}$ (M0 M0 A0).

Question 14

Most candidates collected at least 1 mark from this question but it was obvious that a number of candidates guessed their answers rather than used their understanding of the basics of set theory.

Question 15

It was pleasing to see many fully correct answers to both parts of this question. However, there were a number of candidates who apparently had no idea how to answer part (a) or misunderstood it (B0) but nonetheless answered part (b) correctly by using what should have been their answer to (a) (M1 A1).

Question 16

Part (a) was correctly answered a minority of candidates and it was clear that many of the others had no idea of what a hexagon was and guessed the answer. In part (b), many candidates correctly calculated the number of sides that the polygon had (M1) but were not able to relate this to the order of rotational symmetry of this *regular* polygon (A0) and after having obtained 12 as the number of sides then guessed the order of rotational symmetry, sometimes showing extra work. Fortunately, there was a significant numbers of candidates who understood this relation.

Question 17

The majority of candidates obtained the correct inequality (M1 A1) but then a number of them did not state the correct integer answer because they either left their answer as $\frac{17}{8}$ or 2.125 or did not understand the difference between greater than and less than as required by the final part of the question.

Question 18

This was answered very well by candidates who used Pythagoras to find the missing length. Candidates who used the trigonometric ratios to find the missing angle where less successful at arriving at the correct fraction.

Question 19

It was clear that, unfortunately, a number of candidates had difficulty in multiplying out the two matrices and thus failed to collect any marks for this question. There were, fortunately, many candidates who could and collected all of the three marks.

Question 20

It was pleasing to see that many candidates realized that the sum of the three unknown angles added to the given one of 54^{o} was 360^{o} and then used the given ratio to arrive at the correct value for the largest angle.

Unfortunately in part (b), many candidates, including those who answered part (a) successfully, did not realize that they were dealing with a cyclic quadrilateral.

Question 21

The majority of candidates gained full marks for this question. Of those that did not, usually calculated 14% or 16% of their "2100" (from part (a)) in part (b) (M0 A0).

Question 22

Many candidates simplified the information given in the question and assumed that *y* varied *directly* as the square of *x* or got confused when substituting the given values of *y* and *x* into their $y = \frac{k}{x^2}$ thus usually losing all of the marks. A minority of candidates successfully found that *k* = 150 but then wrote incorrectly that *y* = $\frac{"150"}{10}$ thus only gaining M1 A1 for the question. Fortunately, the majority of candidates collected full marks for this question.

Question 23

This question was a discriminator of the paper. A significant number of candidates failed to realize that the ratio of the given volumes was equal to the ratio of the cubes of the corresponding radii. Some realized that somehow the ratio $\frac{0.25}{16}$ was involved (B1) but then usually did not know how (B0 M0 A0). A reasonable number did, though, manage to answer this question successfully.

Question 24

Most candidates successfully calculated *v*(3) to be 93 and so collected the mark for part (a) and also managed to find the correct expression for the acceleration in part (b). Common mistakes in part (b), were to divide $12t^2 - 2t - 2$ by 2 or to differentiate twice, gaining only the M1 in both of these cases.

Question 25

This question asked the candidates to show *all* of their construction lines. Unfortunately, some did not, omitting, for example, to show their arcs below *CD* in part (a). Numerous candidates lost the accuracy marks in parts (a) and (b) by not drawing their lines sufficiently long to intersect *AB*. A small number of candidates failed to label their region in part (c) as "R" as required (B0).

Question 26

In general, part (a) was well answered, occasionally marred by some candidates mixing up their $\frac{3}{7}$ and $\frac{4}{7}$ probabilities. It was pleasing to observe that a significant majority of candidates realized that the required probability was the sum of $\frac{3}{8}\times\frac{2}{7}$ and their "$\frac{5}{8}\times\frac{4}{7}$" thus gaining at least the method mark.

Question 27

This question was another discriminator of the paper with the majority of responses gaining one (B1 for 16) or no marks. Of those that found "16" usually lost the remaining marks as they had no idea of what to do with their "16" or that the radius of the surface of the water had to be found. Of those who realized that they had to find this radius, usually went on and collected full marks but there a few who lost the final mark by failing to round to 3 significant figures, leaving their answer as 2827.8.

Question 28

This question was answered correctly by many candidates. A number of candidates were, however, let down by their algebra and failed to collect the first 2 marks but many of these were able to collect the second M mark by correctly attempting to factorise their trinomial quadratic.

Question 29

Part (a) was usually correctly answered but there were a few candidates who clearly did not understand what was meant by "modal class". Many candidates attempted part (b) and usually gained either 1 or all 3 marks. Unfortunately, a significant number used the width of the weight intervals (2) thus losing both method marks.
Part (c) was the discriminator of the paper with very few candidates understanding the demand of the question. Most calculated the mean frequency and then wrote down the weight interval which corresponded their mean frequency, usually giving $2 < x \leq 4$ as their final answer.

Question 30

The majority of candidates collected both of the marks available in part (a).

In part (b), many equated their answer to part (a) to 5*x* or 0 rather than 5 and so had only the second method mark available to them which they usually collected. Most of the candidates who correctly equated their correct answer to (a) to 5, usually went on and collected all of the marks the question.

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