Examiners’ Report/
Principal Examiner Feedback

Summer 2014

Pearson Edexcel International GCSE
Mathematics B (4MB0/02)

Paper 2

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Principal Examiner's Report

International GCSE Mathematics B

(Paper 4MB0-02)

Introduction to Paper 2

It was pleasing to observe that, overall, the standard of presentation and clarity of work was high.

As in the previous summer examination, it would be prudent for centres to encourage their candidates, where possible, to answer the questions within the examination paper booklet. If students do require additional sheets, they are advised to state clearly in the examination book that they *are* continuing the question on another page.

The question paper did highlight the following problem areas, followed by their corresponding question numbers, which should receive special attention by centres:

- Matrix multiplication (2 and 7(c))
- Deducing algebraic equations (4(b))
- Median number and independent probabilities(6(a(ii)) and 6(b))
- Domains of functions (10(d))
- Ratios of lengths of vectors (11b and 11d)

Report on individual questions

Question 1

It was clear from the candidates' responses to this question that the complement of a set is not well understood by less able students, with the result that there were more correct responses to part (b) than to part (a).

Part (c) thus received even fewer correct answers. It was also clear that a number of students had not read the question carefully enough to realise that the *number* of elements of the set $(A \cap C)' \cap B'$ was required and instead stopped at just giving their version of the *members* of this set.

Question 2

On the whole, this question received a reasonable attempt from most students, however, the majority of these did not realise that the equation $x^2 = 4$ has *two* solutions and thus gave their answer to (a) as $x = +2$ and then $y = 8$, thus gaining 4 out of the 6 available marks. Many students had $2x = 4$ instead of $x^2 = 4$ thus indicating that they had difficulties with matrix multiplication. Some candidates, who continued to work with matrices, left their answer to (a) and (b) as $\begin{pmatrix} 1 & 3 \\ \mathbf{2} & 0 \end{pmatrix}\begin{pmatrix} \mathbf{2} \\ 2 \end{pmatrix} = \begin{pmatrix} \mathbf{8} \\ 4 \end{pmatrix}$ and did not elaborate on what **2** and **8** were thus only gaining the method marks for (a) and (b).

Question 3

Most candidates answered part (a) correctly. A number of candidates thought in part (b) that the velocity was given by $\frac{3t^2 - 4t + 10}{t}$ and not by the derivative of *s*.

There is still a significant number of candidates who are not sure what the n^{th} second means and so *s*(5) = 65 given as the answer was a common error.

Question 4

Part (a) was answered well by the students but many had problems with (b). It was clear that either many of these students had either not read the question carefully enough or had misunderstood it, with the result that answers like $t = 4p$ and variants of $t + 4p = 50$ were seen. Others gave $5t = 50$ as their answer, which whilst correct, did not answer *the* question as stated and so scored B0.

Most of the students who had linearly independent answers to (a) and (b), even if incorrect, normally earned the method M1 mark for attempting to solve their equations in (c) and then usually gained both of the method marks in (d).

Question 5

It is clear from the answers to (a)(ii) and (b)(ii) that candidate are not familiar with how to represent solutions to an inequality usinga number line. The majority of candidates failed to draw the appropriate line and/or the appropriate circle or both. Most of these students had little idea of what was required.

In part (b)(i), many students were confused about how to proceed from $-2x \leq 3$ to the answer of $x \geq -\frac{3}{2}$, most of these thought that $x \leq -\frac{3}{2}$ was the correct answer.

In part (c), there were a number of candidates who did not understand what a "range of values of x" meant and wrote down several numbers starting with -1.5 and ending with 2.5, gaining no marks.

Question 6

Parts (a) (i) and (iii) were well done but it was clear that many candidates do not understand what a median number is, nor how to obtain it from a table rather than a list of numbers.

Part (b) was a good discriminator of this paper with candidates of all ability ranges finding the question demanding. The more able students thought the method was $\frac{4}{30}\times\frac{3}{29}$ or $\frac{3}{30}\times\frac{4}{29}$ but without any addition involved. Some of the less able students thought that the method was given by $\frac{4}{30}\times\frac{3}{30}$. Variants of this type of question have been set many times in the past.

The more able students were more successful on part (c) than on part (b), however, confusion over the number of people and number of houses was the main problem in (c) and a common wrong answer was $\frac{2}{3}$ obtained from $\frac{3+6+8+2+1}{30}$.

Question 7

Most of the cohort managed to draw and label triangles *A*, *B*, *C* and *D* correctly, although many of these lost a mark in part (c) because they failed to give the coordinates of triangle *C* as required. A number of students thought that $\begin{pmatrix}-4 & -8 & -8\\ 4 & 4 & 2\end{pmatrix}\begin{pmatrix}-2 & 0\\ 0 & -2\end{pmatrix}$ was the required matrix product in (c), losing both marks.

In general, the more able students answered parts (e), (f) and (g) correctly.

Question 8

It was pleasing to observe that students across most of the ability range have a basic understanding of trigonometry and are able to apply it correctly, with the result that many correct solutions to (a) and (b) were seen.

A significant number of students collected full marks for (c) but most of the others became confused in their attempts to find $\angle ABD$ or $\angle ADB$, usually losing the first two method marks and thus losing the last two dependent method marks. A common incorrect simplifying assumption seen in part (c), was the idea that *ABCD* was a cyclic quadrilateral. Another incorrect simplifying assumption was that *AB* was parallel to *DC* whilst other candidates took the easy incorrect option of letting $\angle ABC$ $=90^\circ$ and then using Pythagoras's Theorem to find *AC*. Also a few thought incorrectly that *AC* bisected $\angle BCD$. These incorrect approaches usually resulted in the award of no marks for part (c).

Question 9

Parts (a) and (b) usually collected full marks although a common plotting error was to plot the point (2.5, 0.25) incorrectly at (2.5, -0.25).

Part (c) was more problematic because it was clear that the less able students did not understand how to answer this question as they had not realised that the x coordinates of the intersections of the two curves on their grid were required, and thus attempted to solve $2x^2 - 13x + 16 = 0$ analytically. Many candidates though went on and wrote down the *y* coordinates of *A* and *B* , the two points of intersection of the curves, and then tried to substitute them into the gradient formula, usually correctly for their numbers, gaining at least 2 of the 3 marks available for this part of the question.

Question 10

On the whole, this question was answered well, however, there were parts of it that presented problems. Most candidates got part (a) correct as well as part (b). However, there are still a number of candidates who thought in part (b) that the inverse of the function f was $\frac{1}{\mathrm{f}(x)}$ or who did not use their inverse of f in part (c) and used instead the given function, losing all of the marks for that part. Many candidates still have no idea what the domain of a function is.

It was pleasing to observe that most candidates, including those who had problems with the previous parts, were able to collect full marks for part (e).

Question 11

It was pleasing to see that many of the cohort collected all or nearly all of the marks for parts (a), thus displaying a basic understanding of vectors.

Part (b) presented problems to candidates who were not sure of what to make of the ratio *OD* : *OB* = 1 : 4 and thus usually incorrectly assumed in part (b)(i) that $\overrightarrow{OD} = \frac{1}{5}\overrightarrow{OB}$ leading to an answer of $\overrightarrow{OD} = \frac{2\mathbf{b}}{5}$ for (b)(i) (scoring B0) and then $\overrightarrow{AD} = -\mathbf{a} + \frac{2\mathbf{b}}{5}$ (scoring M1 A0) for (b)(ii).

Those that had ratio problems in (b) were confused again in (d) by the ratio *AD* : *AE* = 3 : 4 and so failed to collect the method mark for $\overrightarrow{AE}$ or $\overrightarrow{DE}$ (depending on their approach) thus losing the following dependent method mark (M0).

Fortunately, a significant number of those who had problems with (b) and (d) usually managed to collect the 2 method marks of (e) by equating their versions of $\overrightarrow{FE}$ (M1) and then comparing the resulting components of vectors **a** and/ or **b** (M1).

Grade Boundaries

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