Examiners' Report
Principal Examiner Feedback

November 2021

Pearson Edexcel International GCSE

In Mathematics B (4MB1)

Paper 02

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Introduction

Students were generally prepared for this paper and there were some excellent responses.
To enhance performance in future series, centres should focus their student's attention on the following topics:

- Drawing accurate lines when no table is given.
- Questions that involve the demand to show all working – paying particular attention to labelling what they are finding.
- Read questions carefully and ensure they are doing what is requested such as using the graph.
- Give answers to the required degree of accuracy.
- Do not use information given for example after part (a) of a question to answer part (a)
- In general, students should be encouraged to identify the number of marks available for each part of a question and allocate a proportionate amount of time to each part of the question. In addition, students should also be advised to read the demands of the question very carefully before attempting to answer. It should be pointed out that the methods identified within this report and on the mark scheme may not be the only legitimate methods for correctly solving the questions. Alternative methods, whilst not explicitly identified, earn the equivalent marks. Some students use methods which are beyond the scope of the syllabus and, where used correctly, the corresponding marks are given.

Report on individual Questions

Question 1

Part (a) was generally well done with roughly 50% of students being able to draw the 3 lines. Drawing the line $x + y = 8$ was more successful than $y = x$ and $y = 2$. A variety of incorrect regions emerged, which were not always finite and not always bounded by the lines drawn. Better students identified the correct region but lost marks in part (b) by either failing to recognise that integer coordinates were required or included various points in the region $\boldsymbol{R}$ but not on the line $x - 2y + 2 = 0$ in their answer.

Question 2

This question proved accessible to most students although few gained full marks. In part (a) students understood what they needed to do to find the surface area, but many believed that all the triangular sides were the same area. One of the major problems here was that many students produced lots of calculations of sides and angles but did not label what they were finding resulting with marks being lost as their methods were not clear. For example in if they are finding EQ then they would be advised to write $EQ = \sqrt{119}$ rather than just $\sqrt{119}$. This will then allow method marks using follow through if EQ is incorrect and is used later in the question. In part (b) students who had labelled the sides/angles were able to demonstrate they knew what was required in this part even if they had the wrong values for *EP* and *EQ*

Question 3

In part (a), roughly half of the students found the correct interval. The common error made was to simply select the middle interval of the five intervals in the table showing a lack of understanding of the concept of median in such a context.

In part (b) there were the usual errors, but most students used the correct method. The most common errors were

- finding the sum of the frequencies and then dividing by 5,
- using the end values rather than the mid-interval values
- multiplying all the frequencies by the class widths

In part (c) it was pleasing to see that over half the students were familiar with histograms and produced a fully correct solution. Others made a slip when drawing one of the bars or forgot to put a scale on the y-axis. Some made the common error of plotting the frequencies, despite the vertical axis being labelled as Frequency density.

Question 4

Part (a) was generally answered well with the majority of students gaining full marks. The most common error was to calculate 5/8 rather than 3/8 of the number of jars that were not jam. Others just stopped having calculated the number of jars of jam that were sold.

Part (b) was not well done. Most students were able to find the total number of jars of jam sold on Friday but did not calculate the increase in the number of jars of jam sold and instead solved the equation $220 = \frac{1}{n} \times 176$. Part (c) and (d) were well answered. The Most common errors were using 3.5 as the denominator in part (c) and in part (d) the usual error of finding $5.10 - 0.0625 \times 5.10$ which gave 4.78 and gains no marks.

Question 5

This question was another good source of marks for most students. In part (a) the majority of students recognised the transformation as an enlargement with just under a half going to gain full marks. The common errors were thinking the scale factor was 0.5 and forgetting to give a centre of enlargement. Part (b) was very well answered with only a minority reflecting in the line $y = -1$. In part(c) it was pleasing to see that students knew the order of matrix multiplication with many going on to gain full marks. Part (e) discriminated well. Only the most able used the inverse matrix method with the majority who attempted the question choosing the longer simultaneous route with varied degrees of success.

Question 6

It was pleasing to see that many students were able to make a good attempt at part (a) and gain at least 1 mark. The main error was giving the answer as a vector rather than as coordinates. Part (b) discriminated at the higher end with a minority gaining full marks. A wide variety of methods were used with Pythagoras and trigonometry being the most popular. Students who attempted the question using this method were generally able to gain marks for finding a suitable length correctly. The most common error was forgetting to double the area of the triangle.

Finding the equations of the lines followed by simultaneous equations suited the higher level students but the less able who used this method had pages of working which were quite muddled and worth few marks. The use of determinants is not in the specification and only the highest level students used this method.

Question 7

Parts (a) and (b) proved to be a good source of marks for most students. The main errors were rounding the y value for $x = 0.5$ to one decimal place rather than 2 decimal places. In part (b) the most common error was to plot the point $(-1.5, 0.13)$ as $(-1.5, -0.13)$ or a similar error in plotting $(2, 1)$ as $(2, -1)$. Parts (c) and (d) were poorly answered, principally due to candidates being unable to show their work derives from the graph. In part (c) it was clear that many candidates know how to use the functionality of their calculators to derive the results for these questions, many centres would be well advised to encourage candidates to pay careful attention to both the accuracy required in the question and how to show where those results would have come on the graph even if the answers didn't come from there. The question states "Use your graph" so there needs to be clear evidence that the graph had been used such as drawing the line $y = 0.5$. In part (d) few students followed the instruction "By drawing a suitable line …" If no suitable line is seen on the graph then then no marks can be awarded. A few students drew a tangent at $y = 0.5$

Question 8

On the whole very few totally correct answers were seen for this question. In part (a), the majority were able to score at least one mark for placing 8 and 25 correctly. Un-simplified answers were often seen which were allowed but in future it would be advisable to simplify answers where possible.
Some students used the information given after the question to find a value of x before filling in the Venn diagram. Students should be advised not use information provided after a question to solve a previous part.
In part (b) students generally tried to find a value for x and then used this to find the total. Some students were able to use the quick method of just adding the numbers in the Venn diagram but this only worked if the x's cancelled out.

Part (c) was again poorly answered with few correct answers seen. A number of answers included denominators not equal to 40 showing a lack of understanding of conditional probability.

Question 9

This question was a good discriminator at the upper grades with only about 20% of students gaining full marks. The most common error was to forget to add $2r$ to the arc length for the perimeter of the sector. Those who made this error were then generally able to gain the method marks for finding the area. The most successful student were the ones who attempted to use

shaded area = area of the sector *OBCD* – the area of triangle *OBD*

Those who used the area of the full circle minus the unshaded area made errors in their calculations or subtracted the area or triangle *OAB* rather than the sector *OAB*.

Question 10

It is pleasing that so many students were able to attempt part (a) with the majority gaining full marks. The most common error was using $\overrightarrow{AB}$ instead of $\overrightarrow{BA}$ and vice versa when finding $\overrightarrow{OC}$

Part (b) proved to be more challenging. There are a couple of ways to find the value of n with the majority of those who attempted the question gaining the mark for $\overrightarrow{OQ} = \lambda b$ or equivalent. A few candidates found $\overrightarrow{PT}$ and some gave a correct expression for $\overrightarrow{PQ}$ few found a second equation for either $\overrightarrow{OQ}$ or $\overrightarrow{PQ}$. Even fewer candidates used $\overrightarrow{PT} = \mu\overrightarrow{PQ}$ to find $\frac{27}{5}$ and equate this to $\frac{6n}{n+1}$

Question 11

It was pleasing to see that the majority of students attempted parts (a) and (b) with the majority gaining full marks. In part (c) students demonstrated they knew what was required and were able to find the inverse accurately in most instances. Some scored M1 but found the grouping of terms and subsequent factorisation difficult. The vast majority used the correct notation of $g^{-1}(x) = \ldots$ which is an improvement on previous years. Part (e)(i) was regularly answered using algebraic division despite the question clearly stating the requirement to use the factor theorem. Centres must ensure students know how to use the factor theorem to show something is a factor rather than relying on algebraic division. Many candidates scored the first 3 marks from (e)(ii) in part (i). Most were then able to continue to factorise their quadratic obtained by division and gain the three solutions for x. Some left their answers in the factorised form and omitted to state the values for x, others omitted $(2x + 3)$. Other students used the known factor and split the trinomial up as $4x^3 + 6x^2 - 2x^2 - 3x - 2x - 3$ and then took $(3x + 2)$ out of each pair as a common factor.