Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

Summer 2022

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:

- Understanding set notation
- Lines of symmetry and rotational symmetry
- Questions that involve the demand to show all working
- Following the instruction in graph questions when asked to find by drawing a straight line
- 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

This question was well answered with the majority of students gaining 4 or more marks. The most common error was multiplying total GDP with GDP per capita to find the population.

Question 2

Part (a) was generally answered well, with the only major slip up being confusing "and" and "or" when working out the intersection and union.
Part (b) was significantly more poorly answered. Few students showed the understanding the required to think through part (b) - those who drew a Venn diagram to visualise the question tended to have a little more success.
Part (c) was a little more successful, helped by the follow through marks that were available, but again a lack of understanding of the logic of sets meant that few students were able to achieve those marks even when they were available.

Question 3

In part (a) the majority of students understood the requirements of the question and were able to express the values of 4 and 8 as powers of 2. However, a majority of these were not sufficiently thorough in the steps required to fully show the given equation was true with many missing the steps to combine the powers as 2^{x+2y} or 2^{3x-2y}. Some tried to answer part (a) and part (b) by solving the equation, but then, unfortunately, did not answer part (c) where their answer was actually valid. An alternative method was seen by a minority using logs but again few were able to show sufficient workings steps to gain full marks, or showed an incomplete knowledge of log rules.

Part (c) was by far the best answered with almost all students demonstrating they can successfully solve a pair of linear simultaneous equations.

Question 4

A significant number of students had difficulties with part (a) with the most common incorrect answer being $30 \leqslant t \leqslant 60$
Part (b) was generally better handled although often students ignored the frequencies and just added the times (either the lower values, or the upper values) together before dividing by 90. The other common incorrect method used was to multiply the class widths by the frequencies.
For part (c) most students worked out the width without much difficulty. However, they often made mistakes on the height, not realising that they had to work out the frequency divided by class width. Those that did realise this generally gained full marks.

Question 5

The vast majority of students failed to recognise this as a bounds question. However, there were some marks available for those who attempted this question without using any bounds.

In part (a) the majority of students generally knew how to find the surface area, but there were a significant number that worked out the volume instead.
In part (b) many students just worked out the length of the longest diagonal on a side. Only a minority realised they needed to use of 3D Pythagoras to find the length of the diagonal of the box. A significant number of students tried to use the formulae for a cylinder. Of those that did use 3D Pythagoras and use bounds, it was a 50:50 split over those that used upper bounds rather than lower bounds.

Question 6

The majority of students were able to answer part (a) and score 2 marks. Most could identify that *QP* required the use of the tangent of 16.9 and set up a correct equation using either 1km or 1000 metres. A few used the sine rule after evaluating the other angle of 73.1. Not all gave sufficient workings steps to gain the second mark with many omitting to write that they had multiplied by 1000 but many were able to gain the mark by giving awrt 303.8 As this is a show that question simply writing 304 after the equation was not enough to gain full marks.

Part (b) was much less well answered, and not attempted by many. Of those that did, most were able to calculate 288 m but common errors included adding this to 304, thereby not recognising that *Q* was higher than *C* or dividing by 3000m, not realising that the points being east and south of *P* formed a right angled triangle. Students do seem to find 3D trigonometry questions, such as these, extremely challenging and although some tried to draw a diagram, most did not, and it should be advised.

Question 7

Most students had very little problem gaining both marks for part (a), with a very small number not taking the direction of vectors into account when calculating their vector sum. The last mark was lost by some by failing to simplify their final result to show clearly that the two vectors were indeed parallel. While not required in this case, students would be well advised to provide some sort of conclusion for “show that” and proof question, even if it is as minimal as “and so they are parallel.”

Part (b) was more poorly attempted, although most students who were able to set up an equation from the fact that BE was parallel to BC were able to get the correct answer with little problem at all. A minority of students were able to spot the similar triangles and reason to a correct answer with very little effort - something that gained both marks. Part (c) was poorly attempted, with a very small proportion able to make any progress at all. It was noted that a significant number of students did not understand how areas are related in similar shapes, given that similar shapes has been a common trait in vector questions on past papers.

Question 8

In part (a) those students who knew that *h* is the perpendicular distance between the parallel lines were successful in finding the area of the trapezium. As significant number used 0.9 m for *h*.
Part (b) turned out to one of the most challenging questions for the students. Although the mathematical skills needed were not of the highest level the problem solving nature of the question caused problems and very few students gained full marks. Firstly, the students had to decide which method they were going to use and once they had decided this they needed to deal with the units. Very few students were able to deal with a mix of cm, m and litres accurately. Students who chose to calculate the volume and work out how many bags needed were most successful. Students who calculated how many litres often showed 16 bags is enough but omitted to show that 15 bags is not enough.

Question 9

We saw some very good responses to this question, but also a large number who did not have the necessary skills to gain a large number of marks across the question.
The mark in part (a) for plotting the points and joining them to give triangle A was sometimes the only mark gained by a student for this question. It was unfortunate that a few students could not plot all the points correctly; students must be taught to check this first stage very carefully as it is the key to the other parts, and while follow through marks are available, an incorrect initial triangle can lead to problems such as a shape not fitting on the grid.
In part (b) the most common error was reflecting in the y-axis rather than a rotation about the origin. Of those who carried out a rotation only a few rotated clockwise.
In part(c) we allowed students who showed an incorrect order of matrix multiplication to score full marks if they clearly drew the correct rectangle. However, we do expect to see matrices put in the correct order for multiplication and it must be stressed to students to show this correct order as it may result in a loss of marks on another occasion.
Part (d) was very well answered with the majority of students gaining the mark showing they are able to use the formula given.

Part (e) was very poorly answered with few correct answers seen. The most successful generally drew a rectangle and subtracted the 4 triangles and 2 smaller rectangles or used the shoelace method.

Question 10

The majority of candidates were able to show the given expression in part (a).
In part (b) those who were able to differentiate accurately were then able to go on to gain at least 3 marks. The final mark was then lost by not eliminating the value 7.89 as they did not realise this would give a negative length which is impossible.
The table in part (c) was generally filled in correctly.
There was some incorrect plotting of points from weaker students in part (d); particularly misusing the vertical scale. A few missed the first or last points or the one near the origin. Generally, points were joined using a reasonable curve.
In part (e) the more able students demonstrated that they understood how to draw a tangent at $x = 1.5$. A few students misread the values on their graph when attempting to calculate the gradient and some calculated values just outside of the acceptable range. A few did not draw a tangent and used calculus to find the gradient and thus were not able to gain the marks since the question stated that the graph should be used.
Only the most able students realised that they needed to draw the line $y = 200 - 25x$ and find the points of intersection. The question once again stated that a suitable straight line should be drawn so those who chose to ignore this instruction gained no marks.

Question 11

Part (a) was well answered with the majority of students substituting $x = 3$ into the formula and hence gaining the correct answer.
Part (b) was also well answered with most students realising that $x = 1$ as the denominator cannot be zero.
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.
Very few students were able to make any headway with part (d). The most successful method attempted was to use $\frac{3g(x)+1}{g(x)-1} = \frac{x-1}{3x+1}$ however, the majority simply equated f(x) to fg(x) to form the equation $\frac{3x+1}{x-1} = \frac{x-1}{3x+1}$

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