Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

November 2023

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. It was pleasing to see that students are now labelling what they are finding.

To enhance performance in future series, centres should focus their student’s attention on the following topics:

- Following the instruction in graph questions when asked to find by drawing a straight line including finding the tangent.
- Using bounds
- Translation and how to describe it
- 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
- Use of brackets was poor and centres could be reminded that correct use would be helpful to minimise candidates’ sign errors when manipulating a lot of terms in algebraic questions.
- Students would be advised to think about how they layout their work, particularly on the problem-solving questions. Working down the page rather than a mix of across up and down. If they want to use both sides of a page it may help them to draw a line down the middle so the sides do not get muddled up and merge into one. This may help them eliminate careless mistakes in selecting the incorrect numbers, from their working, to use in in later calculations.

Report on Individual Questions

Question 1

This question proved accessible to the majority of students with any gaining full marks on parts (a) to (d)

In part (e) the main error was the use of the formula for the circumference of a circle rather than the volume.

Part (f) proved to be more challenging with over 50% of students unable to make a start. Those who knew what was required were usually able to gain the first 2 marks but were not able to give the correct answer in standard form. The most common incorrect answer was 6.25×10^{-14n}

Question 2

The majority of candidates were able to score 1 mark by either equating one pair of sides or by stating a correct algebraic perimeter, un-simplified or simplified, but then made no further progress.

Whilst there were some very effective methods used to solve this problem one common error was to set either one or more of their sides or the perimeter to zero to try and find the values of *x* and *y*. For those students who equated the two pairs of sides solving the resulting equations by elimination seemed to produce less errors. The most common errors were usually made when simplifying the two equations.

The most successful method to then find the perimeter came from substituting *x* and *y* into the perimeter expression rather than finding the perimeter in terms of one variable.

Question 3

This question was well answered by the majority of students, showing a good understanding of basic set notation.

Part (a) was accurately answered by most.

The most common error in part (b) was including included 21 in their list but again this wea well answered.

In part (c) most students were able to go straight to the correct solution without listing $A \cup B$ For those who did start with $A \cup B$ the most common error was omitting 12 through to 15 in their list.

Question 4

There were many different methods used to prove part (a) some were successful and some went round in circles. The most effective method was to replace $x^{\frac{1}{3}}$ with y from the start

Part(b)(i) was well answered with the majority of students gaining full marks.

There were few real attempts at part (b)(ii). The majority of students did not see the connection between the two equations and tried to solve this one from scratch usually with little success. It was those who perhaps understood that the use of the word “Hence” indicated there was a connection that were able to gain the marks on this part.

Question 5

Almost every student achieved the first mark on this although some then went on to complete the question without using bounds at all. The candidates mostly understood the need to have the smallest value in the numerator and largest value in the denominator of their fraction but a lot of candidates made mistakes with the values for their bounds. One of the most common errors in finding bounds was made for the mass where 1450 was often seen.

In part (b) the basic understanding of the solid and how to calculate surface area caused issues for many. Those who grasped what calculation was needed usually used the correct bounds and achieved the correct result.

Question 6

Part (a) was generally answered correctly by the majority of students as they could correctly identify the class interval that contained the median.

Part (b) was answered well by many students. Those that used the midpoint usually scored full marks, but a few students made one error, usually with the midpoint for the first-class interval. A common error was to use the upper-class boundary, but this was usually divided by 65 and so 2 marks were available. Other errors seen included multiplying frequencies by the width of the class interval and adding the frequencies and dividing by

5. Both of these gave answers that could not have possibly been the mean and it is worth encouraging students to check that their final answer makes sense.

The majority of students were able write down the required probability in part (c) correctly.

Part (d) proved more problematic for students and a variety of approaches were seen. These included either using a frequency density approach or by counting squares. Those that took the approach of calculating frequency density for the given class interval were usually more successful.

Question 7

It was surprising that only around 50% of students were able to describe this transformation. Of these only around half gained full marks. The remainder usually gained the mark for translation with the most common errors for the vector were giving either both values as positive or one positive and one negative.

Part (b) was more familiar to the students with many correct answers. Some used the wrong centre of enlargement, and some did not enlarge accurately but for around 60% of students this was a good source of marks.

The students found part (c) challenging. The most common incorrect answer being $2x$ with very few students making the link to area scale factors.

It was pleasing to see that compared to previous papers the topic tested in part (d) was well answered with many candidates gaining 4 or 5 marks. Common mistakes were errors in dealing with the negative numbers in calculating the determinant leading to the equation $2y+2=2$ and multiplying the two matrices in the incorrect order, although this was less common.

Question 8

Parts (a) and (b) was generally answered well by the majority of students with many scoring 2 marks in each part. The most common error in part (a) was having –1 instead of 1 in the table. It was pleasing to see that many students joined the plotted points with a smooth curve.

Part (c) caused a few issues for some students. Those that drew the correct line required often scored full marks, however a few failed to give the intersection to the required degree of accuracy. A minority of students drew the required line and then failed to state any intersection. Other students failed to follow the demand of the question, which asked students to draw a suitable line on the grid and solved the quadratic to obtain correct solutions to the given equation so gained no credit.

The majority of students found part (d) challenging with many students making no valid attempt. Again, some students failed to follow the demand of the question, which asked students to draw a suitable line on the grid and used differentiation to obtain the correct gradient so gained no credit. Students should be advised to follow the demands of the question and draw clear lines. Even those students who drew a tangent on the graph often failed to calculate the required gradient. It was surprising that after drawing a tangent with a negative gradient some students gave positive answers for their gradient.

Question 9

It was pleasing to see that the majority of students attempted part (a), with many correct answers seen for $\overrightarrow{CA}$ and $\overrightarrow{AB}$. The most common errors seen usually involved a sign error e.g. $\overrightarrow{CA} = -4\mathbf{a}+2\mathbf{b}$ or $\overrightarrow{OD} = 3\mathbf{b} + \frac{1}{2}(\text{"}-4\mathbf{a}+3\mathbf{b}\text{"})$

Part (b) was more problematic for students. It wasn't uncommon for students to have a limited attempt at this part of the question. There were multiple ways that this question could be approached but students were usually more successful when finding $\overrightarrow{CA}$ using $\overrightarrow{CE} = \overrightarrow{CO} + \overrightarrow{OE}$. Those that took this approach usually compared coefficients and obtained $\text{"}4\text{"}\lambda = \text{"}2\text{"}\beta$ but often too many errors occurred when equating coefficients to find $-\text{"}2\text{"}\lambda = -2 + \text{"}\frac{3}{2}\text{"}\beta$

Part (c) proved to be challenging to all but the most capable students. Many students failed to identify the correct scale factor, even following through their value for lamda and so this part proved a nonstarter for many students. Some students scored 1 mark for finding $CE : EA = 2 : 3$, but then made no further progress

Question 10

The students who attempted part (a) usually completed it without problems.

For the other parts, students demonstrated their understanding of both Pythagoras' and SOHCAHTOA but failed to use the correct triangles needed to answer the questions. Although it was good to see the diagram used, in this case it was too small for so many triangles and candidates may have been better served by redrawing each section or identifying and drawing the relevant triangle.

In part (b) there were few correct answers and more answers of 79.8 than the correct answer of 10.2. indicating that candidates did not understand the term 'angle of depression'.

Those students are familiar with Pythagoras in 3D were able to gain full marks in part (c)

In part d, although *AQ* was often found correctly many candidates did not recognise that they were dealing with similar triangles and used various combinations of Trig and Pythagoras to find *PQ*. A common error in using these rather long-winded methods to find *PQ* was to believe that triangle *AGP* was right-angled.

It was pleasing to see that many students are now labelling the sides/angles they are finding. However, students would perhaps benefit from thinking about the presentation of their work to help them avoid transition errors or using the incorrect numbers. Work was often muddled and students found it hard to select the correct figures

Question 11

The majority of students knew what was required in part (a) and were able to gain the mark.

In part (b) most cases candidates recognised the need to differentiate and equate their answer to 0. This was usually followed by a correct answer for those who had differentiated correctly with the most common error, although rare, being a sign slip resulting in an answer of 0.75 rather than –0.75

Students familiar with the term domain in part (c) knew what to do here with the majority giving the correct answer.

Part (d) was generally well done with the majority of students reaching the final answer of 20. A minority stopped after finding g(5). Other errors included substituting in the wrong order so found gf(5) and there were some errors in with the power of *x* when calculating fg(5)

Part (e) was a high mark question which many found challenging. Students who used the main method and realised they needed to find the inverse of g were usually able to do so accurately and gained 3 marks. After this point had been reached the most common errors were to substitute $g^{-1}(x)$ into $\frac{3x-4}{x-1}$ or find $\frac{3x-4}{x-1}\times\frac{5-3x}{x-3}$

For those who used the alternative method the main error was made at the start by using the same letter throughout e.g. $4-\frac{x+7}{x+3}=\frac{3x-4}{x-1}$

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