Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

January 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:

- 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 and
  - showing their methods for solving quadratics rather than using their calculators.

- Read questions carefully and ensure they are doing what is requested such as using the graph.
- 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

In general the paper proved accessible to the majority of students and there was no evidence that they did not have time to attempt all questions. It was good to see that candidates continue to show some working although when working is required candidates should show the complete method and not just the result. There are still some candidates who rely on calculators to solve quadratic equations but when working is required they should show their method in order to gain the marks. Labelling of answers part way through a question is particularly poor. In question such as Q9 it is in the student's interest to label the sides they have found in case they make a slip in the calculation.

Question 1

This proved to a nice start to the paper with the majority of students able to score marks. Parts (a) and (b) were straightforward however, in part (c), a common mistake was to subtract the decimals and then deal with the powers but without any apparent understanding of place value or the sizes of the numbers being used.

Question 2

The first 2 parts were generally well done but part (c) was less successful. The majority of students did not realise they needed to find the total age of the passengers who are not pensioners. Students who realised they needed to generally go on to gain full marks.

Question 3

This question had a mixed with response with roughly 50% gaining full marks on parts (a) and (b). In part (a) the line $y = -x$ was rarely seen and when it was drawn it was usually plotted incorrectly. In part(c) the most common errors were giving the transformation as a rotation, or described as an enlargement and a rotation rather than a single transformation. The other main error was to give the SF as 2 or $\frac{1}{2}$

Question 4

This question proved challenging for many candidates who were either unable to secure any marks or did not provide a response. In some instances, while the working was sound securing all method marks, the conclusion that there was only one intersection point was not explicitly stated so the candidate would lose the final mark.

A common approach used was to equate the expressions for y using $x = \sqrt{(64 - y^2)}$

Where this approach was used a common error was to simplify this incorrectly to $(8 - y)$. If the square included a fraction the numerator would often be squared, but the denominator left unchanged. The common error of $(-3x)^2 = -9x^2$ was not seen so often showing candidates have improved their skills in this regard.

Question 5

Candidates found this to be a challenging question. The vast majority of candidates were able to secure the mark for part (a). However few were successful in part (b) with the majority who made some progress commonly stopping after identifying $\overrightarrow{CD}$

Most candidates appear not to understand how to address this type of question. Those students that did understand the need to use a constant such as λ to express $\overrightarrow{AE}$ were usually able to progress to the correct solution although in a few cases a transcription error of $\frac{2}{5}\mathbf{b}$ changing into $\frac{2}{3}\mathbf{b}$ was seen.

Question 6

Working was required in this question and marks were not awarded for $x = -2$ unless the correct working was seen. It wasn't unusual to see the method using simultaneous equations, but the majority of candidates used inverse matrices. It was pleasing to see that those students who were unsure of exactly what to do were often able to gain a mark for finding the inverse of matrix **A**. From there, candidates that came unstuck made an error in the order of multiplication or arithmetic errors when working out the terms or determinant of **B**. A minority found $x = -2$ but forgot to give the matrix **B**

Question 7

This proved to be a fairly challenging question. Many candidates failed to correctly use circle theorems appropriately to correctly evaluate the $\angle AOD$ in part (a). A common error was to incorrectly use the angle at the centre is twice the angle at the circumference rule and identify $\angle AOD$ as 172°. There were several possible ways to work out $\angle AOD$ and candidates used a

variety of rules to do. Unfortunately, many either gave no reasons for their working or gave reasons which were imprecise or incorrect and therefore lost the final A mark. Some candidates incorrectly worked back from the given value $r = 1.5$ to determine $\angle AOD$ and then used that to prove the radius was 1.5cm. In part (b) some candidates incorrectly used Area of circle $= 2\pi r$ or Area of circle $= \frac{1}{2}ab\sin C$ or worked out the area of the sector $OAGD$ rather than the area of the circle. But, in general, this part was correctly completed by most.

Question 8

Students who managed part (a) correctly often went on to gain the majority of marks available in this question. However, around 50% of students were not able to complete the Venn diagram accurately. The majority were able to use 11 as the intersection of all 3 groups as this was taken straight from the question text. A significant number of students then looked to simply fit the remaining numbers given in the question into the diagram. Students need to be realise that the statement "16 take part in dancing and singing" includes those who took part in all 3 activities and is different to "16 take part in dancing and singing **only**" Part (c) was poorly attempted with several candidates not appreciating the population was limited to those who took part in dancing.

Question 9

This question discriminated well with approximately 8% of students gaining full marks. It was good to see many candidates drawing on the diagram on the question paper to help them. The first part - the simple trigonometry was done quite well with most candidates who attempted the question being able to gain some of the first 2 or 3 marks. From there approximately25% were able to use the sine and cosine rules and, with follow through marks available even if their values were incorrect, were able to get some of the next 3. Very few students used a correct method to find the bearing for the last part of this question. Those students who had found angle $\angle CAB$ forgot to add the 15. Those who found $\angle ACB$ generally attempted to find the bearing of A from C

Question 10

This question proved accessible to all students with the majority solving part (a) correctly. The most common error in part (b) was not noticing that the overheads had decreased rather than increased. However, about 40% of candidates solved this part correctly. In part (c) the most common error was to calculate 25% of the amount the boat was sold for and subtract it The last part, (d) was successfully solved by over half of candidates.

Question 11

The calculation of missing values and drawing of the quadratic curve were generally well managed by students. However, the drawing of the two linear graphs proved more challenging and some candidates did not draw their lines on the same graph as the curve making the use of their diagrams to assist in solving the latter questions more difficult.

Many students found part (a) a challenge. Many drew no lines whilst others did not extend their lines over the required range of x-values. The most successful students used a series of values to identify points on the graphs.

In part (b) even where lines were drawn correctly, candidates seemed to prefer to use algebra to find the point of intersection rather than read from their graph as requested by the question. On a number of scripts, the candidate gave a solution for x but forgot to find the value of y.

In part (c) the majority of candidates used the "otherwise" stated in the question and used algebra rather than determine the solution from the graph drawn.

Parts (d) and (e) proved to be a good source of marks for most students. While plotting of points was generally secure, some joined their points with straight lines or failed to spot the lack of symmetry in their graph due to plotting one point incorrectly

Part (f) was not managed very well by students. The majority were not secure in manipulating the given expression into a combination of the quadratic and a straight line. If that was determined correctly, then at least one mark would generally follow with solutions taken from their graph. The most common alternative answer was to solve the given quadratic with a calculator rather than using their answer to parts (a) and (e) as requested by the question. This could gain the final mark if a correct range was given but student would be advised to use the graph when asked to in order to gain all marks

Question 12

It is pleasing to see that nearly all candidates understood what was required on part (a) and gained the marks. Part (b) was not so successful with candidates not appearing to understand what is meant by range in this situation. In part (c) the majority of students demonstrated they knew what was required and gained full marks. The main error seen was numerical slip in their calculation. Part (d) was also well answered with errors being made in the manipulation of the expressions rather than through misunderstanding what they were trying to do. Students who knew what was meant by domain answered part (e) successfully. Over 50% of the students knew what was required in part (f) where the errors were usually made in the algebraic manipulation of the initial expression for ff(x). Most candidates who attempted part (g) found hm(x) and gained M1. This was usually followed by many lines of working with only a minority gaining the correct answers at the end.

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