Examiner's Report

Principal Examiner Feedback

Summer 2018

Pearson Edexcel International GCSE

In Mathematics B (4MB0) Paper 02R

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Introduction

On the whole, students were well prepared for this paper and the majority were able to answer most of the questions. Generally, students showed adequate working and showed logical methods, but in some cases this needs improving.

In particular, to enhance performance, centres should focus their candidate's attention on the following topics, ensuring that they read examination questions carefully:

- Work on transformations especially how to transform and describe shapes without matrices
- Pay attention to the most direct method to solve problems
- Think carefully about the meaning of answer and, for example, check calculations if an area is negative
- Work on reasons for angles, ie circle theorems and other angle reasons
- If a particular method is requested, then note that any other method is unlikely to gain marks, such as being asked to draw a tangent to find a gradient but then using differentiation

Question 1

This question was done very well with elimination method being the most popular method. We also saw a good number of responses using the substitution method where with careful working most were able to gain the correct answers. A correct method was sometimes marred by poor final arithmetic, losing the accuracy marks, particularly when calculating y first.

Question 2

(a) This part was done well on the whole, but a number of students gave the first entry in the 3×1 matrix as 8 rather than -8. A number of students were unable to do matrix multiplication and ended up with a 3×3 matrix.

(b) This part of the matrix question was done very well and full marks were awarded to many students. Common mistakes were problems multiplying the matrix product BC, and some students giving lambda as a 2×2 matrix rather than a single value.

Question 3

(a) This part was done very well with almost all students being awarded the method mark. Some students lost the accuracy mark because they ignored the rounding instruction and did not give their answers to 2 decimal places. It must be stressed to students that if they ignore rounding instructions, they risk losing marks.

(b) A good number of students benefitted from being awarded all of the marks for this part. A small number lost marks for working in dollars instead of pounds as instructed. Some students appeared to be struggling with calculating percentages with a failure to understand what they needed to do to get a percentage change. Some students failed to realise the term 'compare' meant they needed to make some sort of statement on the relative values of the percentage decreases or at least have both percentages written together; this lost the final accuracy mark.

Question 4

Most students were able to get the correct expressions for parts (a) and (b). A few students made an error in the equation for part (c) by being unsure where to put the 5 so sometimes it was on the wrong side of the equation and in some cases they showed multiplying by 5 instead of adding it on. Those students who showed a correct equation then often went on to show a high quality of accuracy and ability in algebraic manipulation; follow through marks were available to the student who put added or subtracted the 5 to the wrong side of the equation which was beneficial to some. Many correct solutions were seen, with the vast majority discarding the negative answer in favour of 8.28 Marks lost on this question were often only minor arithmetic errors or a complete lack of understanding.

Question 5

There were quite a lot of poor attempts for this question. Many did not read the question carefully enough and even the most able showed they did not understand the question fully. In the first 3 parts (a), (b) and (c), where a significant number of students gave the correct answers for (a) and (b), it was not uncommon for them to fail to realise the connection between (c) and the previous answers.

Part (d) was left blank by a significant minority or a combination of routes identified using letters were seen but no calculations using probabilities were given. Of those who did make an attempt, many picked up the first two method marks, the first for the probabilities for B,O,D or B,C,D and the second for the probabilities for B,C,O,D or B,O,C,D or equivalent.

Question 6

Most students were able to gain full marks on parts (a) and (b), showing good skills in matrix multiplication of coordinates.

In general, part (c) was not well done with the negative scale factor causing problems. Students also made mistakes such as using the incorrect centre of enlargement with (−4, 0) used far too frequently. Some students were able to correctly find the coordinates (2, −4) and (3, −4) but then incorrectly plotted the other point as (2, −6) rather than (2, −2). It did appear that students feel more comfortable using matrices rather than a physical understanding of what a transformation does.

For part (d), it seemed that the mathematical names for transformations are not well known by students and 'translation' was not seen as frequently as one would expect. Some students talked about 'up' or 'north' rather than using the correct column vector notation to describe the transformation.

Question 7

(a) On the whole, this part was done well, but there were a handful of students who just divided by x rather than writing the numerator with x as a common factor.

(b) This part was reasonably well done but a number of students did not see the connection from (a) to this part and tried to differentiate the original function; for those that did this, they tended to get quite confused. Some made the original function equal to zero and tried to solve it. Those students that were tempted to use techniques more advanced than necessary, particularly the quotient rule often demonstrated that this is an approach needing to be taken with caution. Looking for the simplest method is often the way to improve grades, rather than try more sophisticated techniques than required for the specification. Only the very strong students gained full marks.

Question 8

For part (a) the answer of 10 (the number taking Music, Geography and History) was seen as frequently as the correct answer of 151 (the number studying at least one of Music, Geography and History); students must read carefully what is required in a question.

For part (b) we saw many correctly completed Venn diagrams.

For part (c) there were many correct answers for the value of x, the types of mistakes made were forgetting to include the value of 49 from outside the overlapping circles or being careless with including all terms in the Venn diagram.

Some students made mistakes for part (d) by multiplying 23 by 2 but forgetting to add on the 10, or dividing their numerator by 100 and not 120.

Question 9

We saw a lot of good work on this question, although the wording of some reasons in part (a) left much to be desired, and sometimes reasons were absent or only partial. It is essential that if asked to give reasons, then a student must give a reason for each stage of their working. There was evidence of misuse of circle theorems, eg angle $ACB = 50°$ because the angle at the centre is twice the angle at the circumference. Parts (b), (c) and (d) were answered reasonably well although in part (d), some students did not realise they needed to subtract the area of the sector of the circle away from the answer to (c). Some students with follow through marks had a sector bigger than the area of $OACB$, but did not appear to think there was anything strange about this.

Question 10

This type of question on vectors is always challenging to students and this one was no exception. Whilst part (a) was done well, the most common errors seen in parts (b) and (c) were $\overrightarrow{OP} = \mu$"$(\mathbf{a} + 2\mathbf{b})$" and $\overrightarrow{OP} = \mathbf{a} + \lambda$"$(\mathbf{b} - \mathbf{a})$" .

For those students who did get the latter correct, the final accuracy mark was often lost because their answer was not given in the correct simplified form, ie with the terms in **a** grouped.

A minority of students did not know what to do in part (d) but the majority seemed well able to find the required values.

Only the most able (and the brave) students pursued this question to the end.

A minority of candidates found the required answer for the length of OP, but a greater number simply wrote down $OP = \dfrac{6 + 2 \times 8}{3} = 7.33$ earning no marks.

Some very good candidates tackled part (f) particularly well.

Varying good methods were seen, particularly those candidates who identified correctly the lengths of AP and/or CP. Then using a correctly calculated angle (BAO, ACO and even APC), such candidates arrived at the required answer. Whilst the number of correct methods were impressive, this part of the question, (and part (e)), proved to be quite a discriminator.

Better annotation of their work in (e) and (f) would help both marker and candidate in spotting the marks that were on offer.

Question 11

For part (a), there were mostly correct responses, but a few entries lost a mark due to rounding errors.

We saw a lot of good careful plotting and drawing of graphs in part (b) where full marks were often awarded.

In part (c) a significant minority of students gave us the value of x at which the minimum value of the expression was found or both the values of x and y which was a choice of answers.

For part (d), marks were only available for the student who did as instructed and drew a suitable tangent. Some preferred to use calculus and although a correct answer was often given, no marks were awarded as we were not testing this topic here. Students who drew a tangent and used values from this to find the gradient were often a little inaccurate and so lost the final accuracy mark, but gained 2 marks for a tangent and correct working.

In (e) only the most able were able to rearrange the equation and give us the required $4x + 4$ and then draw the line $y = 4x + 4$. Some tried to confuse us by not showing $4x + 4$ at all and using their calculators to find x values which they then plotted on the graph and drew a line through which was generally a little inaccurate; no marks were awarded unless we saw $4x + 4$ at some stage.