Examiners' Report
Principal Examiner Feedback

Summer 2019

Pearson Edexcel International GCSE

In Mathematics B (4MB1)

Paper 02R

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Paper 02R

Introduction to Paper 02R

On the whole students were well prepared for this paper and made a good attempt at all questions.

Topics new to the specification were well answered as were the problem solving and reasoning questions.

The question paper did highlight some common problem areas which should receive special attention by centres:

- Knowing that 13 is not included in the set of numbers less than 13
- Dealing with quadratic inequalities
- Writing inequalities on number lines was poorly done
- Knowing that picking 2 counters from a bag means picking without replacement
- Reverse percentages
- Order of matrices for transformations
- When a graph question says 'use your curve' it means do not use your calculator
- Problem Solving using differentiation

Question 1

On the whole this question was fairly well done by the majority of students. Common errors for the Venn diagram were not putting numbers outside the circles for the set $(A \cup B \cup C)'$ or including 13 in this set. Some wrote numbers in more than one area of the Venn Diagram, then continued to list repeated numbers in their answers to b – d. For the questions on the elements in the various sets, follow through marks from an incorrect Venn diagram were awarded and many students benefitted from this. Some

students got mixed up with the signs for intersection and union of sets. Some students did not realise they needed to give the number of elements in the sets for (e) and (f) and just listed the sets and added the numbers in the set instead of counting them. However, a good number of students did get these correct.

Question 2

This question on inequalities was able to differentiate between students of different grades, in particular the quadratic inequality had a very mixed response. All but a few were able to gain 2 marks for solving the linear inequality but not all of these were able to correctly show the inequality on the number line; mostly this was due to showing a short line rather than an arrow so that it did not clearly show that x was greater than or equal to 2.

For the quadratic inequality, some students fell at the first hurdle of expanding the brackets correctly – we did allow one error only so that some not fully correct expansions were able to pick up the first method mark which was generally a sign error. For those who got an incorrect quadratic but nevertheless a three term quadratic, they could gain a method mark for the correct method to solve their quadratic. Of those who got as far as finding the correct critical values, many could not gain the accuracy mark as they wrote that $x < -1$ and $x < -3.5$ showing the vast majority of the students did not seem to have the rule of thumb that quadratic inequalities are either inside or outside of the critical values.

Showing the quadratic inequality on the number line was much less frequently correct than showing the linear inequality on the number line with some even putting the end at −2.5 rather than −3.5

Question 3

On the whole this question was done very well with many instances of full marks.

However, some students got mixed up with the tree diagram, firstly thinking it was a replacement probability and secondly getting some probabilities out of 13. It was pleasing to see very few decimals appearing on the tree diagram which was good as some would have been inaccurate.

Part (b) was almost always correct and even if not fully correct gained a follow through mark from an incorrect Venn diagram for the method mark. Part (c) was done very well with many instances of a fully correct answer.

Question 4

Most students scored high marks across this question.

Part (c) was the most poorly done part with students adding on or subtracting 12% from the current figure rather than realising that they needed to divide the current figure by 1.12

Students sometimes failed to do part (d) correctly because they failed to read the question carefully and did not read the word 'not'.

For part (f) some students did not use the most direct method of 114 divided by 360 and then multiply by 4200. Instead they found the percentage of a circle 114° is and then multiplied 4200 by this percentage. As the percentage was 31.666... they were often inaccurate and so were able to gain the method mark but not the accuracy mark.

Question 5

This transformation question was fairly well done with a fair few students gaining 7 or more marks out of 10. Students tend to find describing a transformation more difficult than actually doing the transformation and this was no different here. Most were able to gain a mark for the word enlargement but then the scale factor or centre were not always present and few got both correct. Any student who gave more than one transformation scored no marks as a 'single' transformation was asked for.

Almost all students were able to correctly reflect triangle *A* and even when they did nothing else for this question it was generally correctly shown. Students often showed a correct triangle *D* with only a few getting the correct coordinates and then plotting them incorrectly.

Finding the matrix for part (d) was more challenging and only the more able students were able to gain full marks.

Question 6

This 3 dimensional trigonometry question was well done and in particular for part (a) we saw a very good response. Part (b) could be done in a variety of ways with the use of different triangles. A few students were not using right angled triangles, although they thought they were and a common mistake was to use *PM* or *MQ* as 12 cm rather than 6 cm.

Question 7

On the whole, students gained full marks for part (a) and part (b) with most showing a smooth curve that went through all the correct points.

Students who used their graph as directed in the questions for parts (c), (d) and (e) also did well and generally got the marks at least for parts (c) and (d). Anyone showing evidence of a calculation or a value that was not read from their graph was not awarded the marks. For part (e) we saw some very good working showing the method to find the equation of the straight line to be drawn and then drawing this correctly and reading off values. A minority of students never showed this working and had drawn an inaccurate straight line by finding the values on their calculators and joining the points; these students gained no marks.

Question 8

Students were generally able to gain full marks for parts (a), (b) and (c). Those not getting (c) correct sometimes tried to rearrange their equation before putting the terms over a common denominator, this nearly always led them to make mistakes; others multiplied both the numerator and denominator by 3 in the first step of the solution. Most were able to find the correct inverse function in part (d) but students must be reminded to put their answer in terms of x and not y and the inverse in the form requested. Students found part (e) harder, but nevertheless made a good attempt with several fully correct answers seen.

Question 9

Students often gained full marks for part (a) of this question but found (b) rather challenging.

Students did not realise that the height of the trapezium on the side face of the frustum was not the same as the height of the pyramid, therefore using 10 as the slant height. If students added in the area of the top and the base they could pick up 1 mark and this was a very frequently occurring total for part (b). Some students tried to take away the full surface area of the small pyramid away from the full surface area of the larger pyramid, in doing so, they had subtracted the area of the base of the small pyramid, whereas it needed to be added.

Question 10

Many students gained 3 marks for correctly differentiating the displacement, equating the result to zero and then solving. Some gained no more marks as they substituted the two values gained into the displacement formula or used $t = 5$ and $t = 0$ substituted into the formula and subtracted. Some students made no attempt at this question or a poor attempt which involved substituting numbers into the original displacement with no attempt at finding ds/dt. This suggested that this topic was not taught.

Question 11

This question was set at the highest level for the paper and therefore it was not surprising that students found it challenging. There was a mixed response and it was

good to see students gain even just a mark or two for doing some good work on vectors. Many overlooked the fact that any vector in the direction **b** must have a zero **a** component. A pleasing number worked accurately right through the problem and gained the correct solution for 6 marks.

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