Examiners' Report
Principal Examiner Feedback

January 2022

Pearson Edexcel International GCSE

In Mathematics B (4MB1)

Paper 02R

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Introduction

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

Most questions were well answered and students coped well with the problem solving and reasoning questions.

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

- Dealing with quadratic inequalities
- Knowing when to add and when to multiply with probabilities
- Writing inequalities on number lines
- Reverse percentages
- When a graph question says ‘by drawing a straight line on your graph’ it means do not use your calculator to find the solutions.
- Knowing that the slant height of a pyramid is different to the perpendicular height.

Question 1

This question was quite well done with many of the students taking this paper gaining full marks for this question. In (a) the mistake to make was to thing they had tro find f(81) rather than the value of x for whichi f(x) = 81

For part (b) the majority knew what to do but we saw the occasional answer of zero or 1.5

For (c) the most common error was to find gf(4) rather than the required fg(4)

Question 2

Several students were able to show their ability with inequalities and gain a completely correct solution for (a). Others were unable to work with a double ended inequality and somehow managed to make it into a single ended inequality with varying answers.

The quadratic inequality of part (b) was reasonably well answered with many correct solutions and some students identifying the correct critical values for 2 marks. Some students did not see the advantage of making the quadratic equal to (or less than) zero. We saw few students drawing a graph to help them identify the solution set, although it is the working we would suggest might help some. In (c), identifying the set of values of *x* for which both inequalities were true was tricky for some. Some just showed both inequalities without realising the need to find the values where they are both are true.

Question 3

Some students misread the question and rather than using Box **B** they took 2 bricks from

box **A**

Others thought that when a brick was taken from Box **B** it was the second brick and so used probabilities over 19 rather than 20

For parts (b) and (c) we allowed follow through from an incorrect tree diagram and some students were able to benefit from such marks.

Some students found the higher graded part (c) much more difficult and while they could often get full marks on part (a) and (b) they were unable to gain marks on part (c)

Generally, the sort of mistakes we saw with probability were adding when students should have multiplied and vice versa.

Question 4

Part (a) was mostly done well – a few basic mistakes in finding 2A such as -7 x 2 = 49 but as long as a matrix with only one mistake was given for **D** then 2 marks were awarded.

In part (b) we saw a good number of correct answers, but some thought that when you square a matrix you multiply differently eg multiplying each term by just one value rather than a row by column approach. The most common error was to just square each term of **A**

In part (c), students who used the formula at the bottom of the page performed well on this question. However, some knew nothing of inverse matrices and we saw the reciprocal of every term written or writing 1 divided by the whole matrix or multiplying each term by –

In part (d) some multiplied the matrices in the incorrect order and tried AC rather than CA, ending up with a matrix of the incorrect order for which there were no marks.

Overall though, this part was done well.

Students must be careful when copying out the given matrices and also when working from line to line with their own matrices as mistakes such as misreading a number and missing a negative value were seen.

Question 5

Overall part (a) was well done, but some students tried to rearrange the equation and came up with an equation with a negative gradient. A very successful method, seen used by several students, was not to rearrange but to find the value of x when $y = 0$ and the value of y when $x = 0$…occasionally, using this method the top right hand end of the graph became slightly inaccurate.

Some students did not understand the relationship between parts (a)(i) and (a)(ii) and tried solving the simultaneous equations algebraically. A few used the graph but only gave the correct x value.

Part (b) was generally very well done. A few students made a mistake when expanding but were still able to gain 3 method marks if there were only slight errors. Some students failed to give both the pair of x values and the corresponding pair of y values, just giving one of the x values or the y values, thus losing the final mark.

Question 6

This transformation question was done very well by the majority of students, where most were able to at least gain some marks across the question. For part (a) we saw a few students reflecting shape A in the y axis rather than the line $x = -1$

For part (b) a small number of students rotated triangle A around the point with coordinates (0, 0) rather than (1, 0). For part (c) most were able to correctly translate the shape but others made mistakes and sometimes the result was not even a translation. Transforming shape A by the matrix in part (d) was very successful for a large number of students with very few errors seen by those that attempted this part. In part (e) the full description was not always seen but most knew the transformation was a reflection even if they were unable to state the line of reflection.

Question 7

For part (a) many students were able to clearly show us that 336 of the people were not catching a plane to Dubai. Those who lost marks often just wrote 30% of 480 which was basically what the question stated. To clearly show the working for percentages, students needed to show 0.3×480 and then $480 - 0.3 \times 480$ or alternatively 0.7×480 or equivalent eg $480/100 \times 7$ We needed to see a clear sum to show what was required.

Nearly everyone was able to do the ratio part of the question in (b) and gain full marks.

Most students gained full marks for part (c) , but those who lost marks generally found the increase as a percentage of 730 rather than 680

Part (d), the reverse percentage question was the least well done part of the question. Many found 4% of 468 and added it to 468 rather than realising we were asking for the price in 2020 ie students needed to divide by 1.04 or equivalent.

The currency conversion part of the question in part (e) was done very well. Inaccuracies in working lost some students the final mark and it must be remembered not to prematurely round intermediate answers. Some students multiplied by 0.57 rather than dividing.

On this question as a whole, the single biggest cause of loss of marks was lack of working, eg giving the answer 7% for (c) but not showing where it came from.

Question 8

It was good to see so many students being able to fill in the table correctly and plotting and drawing a correct graph.

Many were able to show that the minimum point was the one we gave them. A few used the x value to find the y value and then the y value to find the x value – this is not in the spirit of a 'show that' and of course we were expecting differentiation or completing the square, which we did see on a pleasing number of occasions.

Students were often able to use the line $y = 3$ to solve the inequality in part (d) and to get the correct solution set.

Unfortunately in part (e) a few students did not follow the instruction 'by drawing a suitable straight line on your graph' solve the given equation. We saw the quadratic formula used as well as calculator solutions that gained no mark without the suitable straight line that was requested in the question.

Question 9

An excellent response to this tricky vector question.

Most understood the need to use a vector method and to show their working as was requested in the question. The few responses that used similar triangles only achieved marks for any vector work. A good number who were not able to complete the question gained a few marks for suitable vectors. There were a few students who gave the answer as the vector OD and not AD – it is a good idea to read the question at the end to check you have found what has been asked for.

Question 10

It was surprising how many students could not find the angle *x* and angle *PTR* using simple circle theorems. Some thought that both angles were equal to 129 and others used complicated looking calculations involving 360 degrees.

For (c) it was pleasing to see a good number get this fully correct. Others were unable to find the correct angle so it was difficult to make a start. Many did not see the significance of the formula for the area of the triangle at the bottom of the page. Some used a different angle for the area of the sector and the area of the triangle, clearly they did not understand how to find the shaded area.

Question 11

We saw a pleasing number of full marks across this difficult question. In part (a) the mistakes that we saw nearly all involved working with 3*r* as the slant height of the cone. A minority also forgot that the total surface area of a cone involves the circle that the shape is sitting on. Most students who were able to give a correct initial equation went onto gain full marks for this part of the question.

For part (b) the volume of the pyramid was required and the perpendicular height and the area of the base (found by $1/6^{th}$ of the base being found and multiplying by 6) were required. There were a pleasing number of fully correct responses. Students gaining part marks often showed a correct method to find the perpendicular height and/or the side of the base of the shape. Some students could not deal with the 3D nature of the shape and thought that

angle *AFD* = 40 meant that angles *AVF* + *FVE* + *EVD* = 40 degrees and used this incorrect method to try to find the side of the base.

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