Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

Summer 2024

Pearson Edexcel International GCSE
In Mathematics B (4MB1) Paper 01R

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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.
There was some evidence on question 11 that a few students did not have access to a pair of compasses so construction lines.

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

- Learning the relationships between different units e.g. mm, cm, m and km.
- Constructions and loci
- Learning the notation used on drawings to indicate sides are the same length
- Using bounds
- Learning the chord theorem
- 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 to be quite challenging. Many students appeared not to know how to find how many millimetres there are in 3 metres. For many of those students who did know what to do 0.025 was often given as the final answer rather than giving it as a fraction. Other students realising that something had to be done with the 75 and the 3 simply wrote $\frac{75\times 3}{1000}$ (= 0.225)

Question 2

Another question that was answered well by the vast majority of students. Issues only arose when candidates didn't copy the formula correctly when substituting, often dropping the '2' from $2k^2$, or following an incorrect order of operations. It was also quite common to see candidates try to write as a single fraction with a common denominator, and this sometimes led to errors.

Students fared a little better with their responses to part (a) than to part (b). Indeed, it was rare to see an incorrect answer to part (a) with 5.142 proving to be the most popular incorrect answer. In part (b), a significant number of students simply wrote down the first 3 figures as 628 and did not consider the size of this number compared to the one they started with.

Question 3

A popular question with many correct answers seen as students are well drilled in simplifying algebraic expressions involving indices.

Question 4

(a) A plethora of correct answers

(b) Many students simply did not go far enough in their explanations. For those that successfully solved their equation to arrive at either $n^2 = -9$ or, a significant number then failed to draw a conclusion. Of others, who identified that 107 was the first term, many did not go on to indicate that the sequence increased.

Question 5

Although some students incorrectly added the powers of 10 on the numerator, others were more successful with obtaining the first mark with 20 600 000 or 20.6 × 106 proving to be a popular statement. The correct, standard form answer of 2.06 ×107 was evident on a significant number of scripts.

Question 6

Although there was the occasional answer of $6^3a^{12}c^3$ on the whole students provided the correct answer here reflecting the cohort's ability in manipulating algebra.

Question 7

Students seem to be well-drilled in processing fractions and there were a significant number of students who not only arrived at the required answer but also showed the penultimate step prior to this answer, thus earning both marks.

Question 8

Many students scored full marks here as they confidently showed how to differentiate for any integer values. For those who did not gain full marks the most common error was not rewriting $\frac{16}{x^2}$ as $16x^{-2}$ before attempting to differentiate.

Question 9

It was pleasing to see that around 40% of students were able to state a correct upper or lower bound for the values given although a few students calculated $\frac{40}{2.2-0.6}$ and then tried to impose bounds on this answer stating 25.5

Identifying the Upper Bound for *X*, many simply followed the mantra: maximum bound for the numerator and minimum bounds (for both) the denominator values. As a consequence, 25.3 proved to be a popular, but erroneous answer. Knowing that the question involved finding $\frac{\text{Upper bound of } a}{\text{Lower bound of } c - \text{ Upper bound of } f}$ proved elusive to the majority of candidates.

Question 10

A significant majority scored two marks for the inequalities: $y \geqslant -1$ and $x + 2y \leqslant 8$ but found finding the third equation/inequality challenging. Of those that did manage to find the equation of the third line correctly as $y = 2x + 3$, a significant number wrote down the incorrect inequality.

Question 11

With a significant number of students able to construct and draw a perpendicular bisector, most marks were lost here for incomplete circles in part (a) and incorrectly shaded regions in part (c).

Question 12

This question was well answered with roughly 75% of the students gaining full marks. The majority of the remaining students were able to find *AB* (or *AC*) as 8.9… for 2 marks but then assumed that triangle *BAC* was a 30°, 60°, 90° right-angled.

Question 13

The majority of students demonstrated good knowledge of basic trigonometry and were able to find the lengths *PR* and *QR*. The majority of students then went on to find the required area accurately. The weaker students sometimes used an incorrect formula for the area of the triangle or the semicircle.

Question 14

Students prepared for this paper generally do well on solving simultaneous equations and this year's cohort was no exception. The odd numerical error was evident on some scripts the two standard methods of solution: balancing and eliminating a single variable or making one variable the subject of an equation and substitution being seen.

Question 15
This question proved to be a good source of marks for most students with the majority of students correctly removing the surd and the subsequent bracket when the denominator was removed. Re-arranging to make *y* the subject proved the most challenging part with the most common error at this stage being a sign error.

Question 16
Students who were able to quote the intersecting chords theorem accurately usually went on to gain few marks. For those who misquoted the theorem the most common error seen was writing or using $\frac{PB}{AP}=\frac{PD}{CP}$ leading to CP = 5.33…

Question 17
In part (a) whilst confident students were able to evaluate $\overrightarrow{OA}-\overrightarrow{BA}$ correctly for the two marks, many others simply evaluated $\overrightarrow{OA}+\overrightarrow{BA}$ or $\overrightarrow{BA}-\overrightarrow{OA}$. A minority of student left it blank but found $\overrightarrow{OB}$ in (b) indicating they were perhaps not familiar with the words "position vector".
Students who failed to score in part (a) were able to recover in part (b) either using their answer to (a) or by using the correct vector. In (b) many demonstrated they knew what was required with the majority going on to gain full marks.

Question 18
As has often been the case a significant number of students focused on the median being the 'middle' and gave the incorrect answer of 20 < *h* <= 30 in part (a)
In part(b) it was pleasing to see that many students were well drilled in finding an estimate of a mean for a grouped frequency distribution and, except for the odd arithmetical calculation, such students were able to give $\left(\frac{\sum frequency \times mid-class\ value}{80}\right)$ to earn at least three out of the four marks here. Whilst the error of dividing by 5 rather than 80 was seen occasionally, the vast majority of students scored gained full marks.

Question 19
This was a low-level problem-solving question with over 75% gaining full marks. The next most common score was zero with these candidates usually leaving it blank. Between these two scores, there were a significant number of students who seemed to be able to find the value of *x* and correctly work out the number of students who favoured vanilla ice cream in class 8Y. Then seemingly these students did not know where to go from there.

Question 20
In part (a) the most common error here was made when trying to remove the denominator of 2 with $7+3y+5=8y-14$ being the most common incorrect first step. Those students who started by subtracting 5 from both sides to start with fared better and generally went on to gain full marks. In part (b), students fared as well as they did in part (a). Most errors were as a result of poor arithmetic although on some scripts students simply substituted $x = -35$ and, as a consequence, $8\times-35-2\times-4.5$ was a first step which led to no marks.

Question 21
This volume question was very challenging to the vast majority of students. There were many blank scripts but for those who did attempt the question, identifying the two surface areas of the hemispheres correctly proved problematic and it was rare indeed to see $\left\{2\pi r^2 \textbf{ and } 2\pi(3r)^2\right\}$. Of those students who did identify the two curved surface areas correctly, many then formed an equation with/without the surface areas of the flat surfaces of both hemispheres. This was done with a modicum of success and it was rare to see the correct equation of $2\pi r^2 + 2\pi(3r)^2 + \pi(3r)^2 - \pi r^2 = 567\pi$ ($28\pi r^2 = 567\pi$). Any students with this equation invariably went on to gain correct answer.

Question 22
In part (a) $5\sqrt{2}+11\sqrt{2}=16\sqrt{2}$ proved to be a popular answer, which is in the form $a\sqrt{b}$ and not in the required form of $a\sqrt{a}$

Candidates would be advised to check the form required carefully.

In part (b) the question says "Show each stage of your working" so students who simply wrote down the answer found by doing the calculation on the calculator earned no marks. Others did not show the important first step of multiplying the numerator and denominator by $\sqrt{5}+1$ and went straight to $\dfrac{12(\sqrt{5}+1)}{5-1}$ or $\dfrac{12\sqrt{5}+12}{4}$

Question 23
In part (a) a few students chose to ignore the request to use the factor theorem, losing themselves the marks in the process but those who heeded the instruction usually went on to complete this part successfully.

Part (b) proved to be surprisingly challenging to students. So much so, that there were a significant number of blank responses and even some of those that responded did not know how to do a long division of a cubic expression. Others simply went straight to the factorised cubic and either left there answer there or wrote down the ‘required’ answers.

Using a calculator to solve the equation and just writing down the answers or finding the answers and attempting to write it in factorised form is not sufficient for "showing clear algebraic working" There must be a complete method including them demonstrating the division by (x + 4)

Question 24

This question proved to be a challenge for all but the most able students. Whilst a significant number of students did not know where to start and left it blank a few realised that they needed to write down an expression for the probability that the first sweet drawn is pink and identified (in some cases) a correct numerator of $x + 25$. Unfortunately, finding the correct denominator proved more elusive. The most successful approach was to form the equation $\frac{x+25}{2x+25}\times\frac{x+24}{2x+24}=\frac{7}{19}$. Once this equation was formed the subsequent algebra, to find the required quadratic, was generally good and led to the required probability.

Question 25

Despite the fact that this question was tackled well by a significant number of students, there were also many who scored 0 marks. This zero score was often down to either a blank response or an assumption that *ABCD* is a kite and *DB* bisects angle *ADC* and angle *ABC* or angle *CAD* is a right angle.

Some students at least started by determining the length of the perpendicular from *C* (*CP*) to *AD* and then the area of triangle *CPD* but then had nowhere else to go. Those students who split the shape into 2 triangles by joining *A* to *C* were able to correctly work out the area of triangle *ABC* and the length of *AC*. The third mark, to find information, which was not already known, about triangle *ACD* proved more elusive but there were some good attempts at the use of the sine rule to find the other two angles or the cosine rule to find the length *AD*

Question 26

For the last question on the paper, it was pleasing to see around 90% of students making an attempt at this question and in doing so many were able to gain at least 1 mark. The vast majority of these students were able to determine a correct single fraction for the two terms in brackets. Many attempted to factorise the right-hand expression but a significant number managed to lose the factor of five in the numerator which invariably resulted in the final answer of $\frac{10}{x+3}$

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