Examiners' Report

Principal Examiner Feedback

January 2023

Pearson Edexcel International GCSE

In Mathematics B (4MB1)

Paper 01

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Introduction to Paper 01

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:

- How to write an answer in standard form
- Equations of parallel lines.
- Questions that involve the demand to show all working
- Speed/time graphs
- Formula for the volume of a sphere and cone
- Reading information from bar graphs
- 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

Question 1
This was a good start to the paper. Students were clear on the requirement to substitute $n = 2$ and 4 into the nth term expression with the majority of students identifying 19 and 91 correctly. However, a minority simply wrote these two values down rather than attempting to find the difference.

Question 2
This was a straightforward question for the majority of students with most adopting the table approach to find the prime factors of each number. Answers were well presented with the product of the prime factors then listed for each number and the repeated factors indicated. The main errors were either missing out a factor, listing their answer as 3, 5 or finding the Lowest Common Multiple.

Question 3

Many correct answers were seen here. Where full marks were not achieved was invariably because the resultant expression was correct, but only partially factorised.

Question 4

A minority of students incorrectly converted their mixed numbers to a correct fraction or did not invert the 5/2 before multiplying and as a consequence, both marks were lost. Of those that did carry out the process correctly and ended up with a fraction of 26/15, a significant number failed to turn this into a mixed number and therefore lost the final mark.

Question 5

The inequality was solved correctly by the vast majority of students. However, it was observed that many, whilst correctly solving the inequality in their working, then put the answer of 7.5 and not $x \leqslant 7.5$ on the answer line. It was rare to see the inequality the wrong way round or an incorrect numerical value seen.

Question 6

Many students were able to show a mantissa and exponent which equated to the required answer but not in Standard Form with 23.1×10^{147} proving to be a popular answer. The scheme allowed answers of the form 2.31×10^{n} where $n \neq 148$ or $a\times10^{148}$ where $1 \leqslant a < 10$ for the method mark and this proved fortuitous to a significant number of students. A correct Standard Form answer was seen on about half of the student's responses.

Question 7

Students did not score particularly well on this question with many using 1.04(%) rather than 0.96(%). Many students got off to an incorrect start by failing to work out the sale price ($1320) of the holiday. For method, students were able to use their Sale Price and divide by 0.96 but a significant number either evaluated 96/100 of their Sale Price or 1.04 of their Sale Price. Whilst many students scored one mark for this question, only about a fifth of students scored full marks.

Question 8

Students found this question challenging with many simply not knowing what to do and as a consequence, a significant number of blank answers were seen or just rearranged the original equation. As a consequence the vast majority scored no marks. Of those that scored any marks, many identified the correct gradient of –4 in their final answer but, surprisingly, the vast majority of students did not attempt to substitute (2, –6) into any equation.

Question 9

The students who identified the single transformation as an enlargement often failed to achieve full marks. The most common error was giving the scale factor as either 0.5 or giving the scale factor of *A* from *B* as ±2 rather than vice versa as requested. Students who missed the fact that a single transformation was required and combined an enlargement transformation with a rotation transformation were awarded 2 marks if it was fully correct otherwise it was marked on the original scheme.

Question 10

It was evident that a significant number of students either used their calculator (or chose not to show their working) and answers of 588 or $\sqrt{588}$ (which was allowed) were prevalent but only earned one mark for a final correct value. The question requested working was shown clearly but nearly half the students scored no marks as no decomposition of the surds was seen and many students simply wrote down $20\sqrt{3}-6\sqrt{3}=14\sqrt{3}$

Question 11

Part (a) was well answered. The most common error was to state $a^1=0$

Part (b) was well answered

Part (c) was well answered with about three quarters of students scoring at least one mark.

Question 12

While about a third of students scored 2 or more marks here, it was disappointing that giving the correct reasons proved to be the downfall e.g. *alternate angles* or simply *cyclic quadrilateral* were popular incorrect or incomplete reasons.

Question 13

The most common mistake was to use no bounds and simply evaluate $\frac{8.91-5.82}{9}=0.343$

Students who realised bounds were needed were often able to correctly identify at least one upper or lower bound. However few used $\frac{LB-UB}{UB}$ choosing to either subtract 5.815 or divide by 8.5. In both cases, the second and subsequent mark was not earned.

Question 14

This question proved to be challenging to the majority of students. There were many blank scripts and of those who did attempt the question, many got no further than identifying either the interior or exterior angle of a pentagon. Whilst this earned the student one mark very few than went on to use the facts given in the question with regard to *AB* being horizontal and *EG* being vertical. A common error was making the incorrect assumption that AEF was a straight line or using the given angle of 69° in a variety, but erroneous ways. As a consequence, incorrect workings such as $180-69=111,\ \ 108+69=177$ and even $\frac{360}{69}$ were seen often leading students no closer to the required solution. Of those students who scored full marks identifying $\angle GEA=18^\circ$ or the angle between the vertical and *DE* as 54° proved to be helpful to.

Question 15

Around half the students were able to quote the formulae for a sphere and a cone successfully. Of those that did give the right formula, multiplying the right side of their equation by 1.5 proved

to be challenging. Students who were able to get the correct equation to solve generally went onto do so correctly.

Question 16

The first challenge in this question was to identify what was meant by *P is inversely proportional to the square root of W*. Many incorrect attempts were seen with $P = k\sqrt{W}$, $P = k/W$, $P = \sqrt{W}/k$ and $P = k/(\sqrt{W^2})$ being the most popular incorrect expressions. Just under a half of students knew what was required and managed to gain the value of *k* as 2240. The method to find *W* proved to be more challenging with many who got to $\sqrt{W} = \frac{2240}{800}$ choosing to find square root rather than squaring.

Question 17

Students demonstrated very poor knowledge of matrix transformations in this question. The matrix for the reflection in $y = -x$ was given incorrectly in the majority of cases. Some picked up the second method mark for the correct order of multiplication but very few were able to use the correct reflection matrix and the correct order to achieve the correct answer. This is an area of the specification on which students continue to perform poorly.

Question 18

More than half of the students scored no marks on this question by either leaving the script blank or not realising that they needed to identify a correct linear scale factor and/or a correct surface area scale factor. Even with a correct surface area of 25/16, a significant number of students were unable to from a correct equation.

Question 19

Students who knew what was required were able to gain marks on this question. The main errors were not realising there was a scale so the lengths needed to be halved or bisecting the line *AB* rather than XY. Another common error was to draw an incomplete locus, particularly the line bisector, which was often short and did not cross *AB* or *CD*

Question 20

In part (a) common errors for the mode were identifying frequency, 6, instead of the modal value of the number of visits and 2 as being in the 'middle'.

In part (b) common errors were the 'middle number of number of visits column, 2, and the middle from the set of frequencies, 4 and 9.5 from evaluating $\frac{\Sigma f}{2}$

Part (c) was generally well answered but there were still a significant number who got no further than identifying 34.

Question 21

In part (a) there was a good understanding of the need to calculate the gradient with the correct calculation and answer. A common misconception was to divide by 8 rather than 2 and many students quoted $a = \frac{(v-u)}{t}$ rather than calculating the gradient.

In part (b), many simply ignored anything on the diagram referring to *u* and instead decided that the answer needed to be 65/8 = 8.125. This proved to be a very popular, but erroneous, answer. Few students realised that there was a requirement to work out the area under the given graph in terms of *u* and equate it to 65 as a consequence, 7.5 proved to be a correct, but elusive, answer.

Question 22

Reading data from the bar chart proved to be challenging.
In part (a) around half of the student's scored zero marks. Of those who attempted an answer many scored just one mark as their numerator was often incorrect with 13, 5 and 3 proving to be the most popular incorrect values.
In part (b), students who realised that they needed to find the mean of grouped data were generally able to gain some marks few used the midpoints of the intervals in their calculation.

Question 23

It was pleasing to see that there were many responses to this question with few blank pages. Many were able to factorise at least one of the quadratics but many did not use the correct order of operations, choosing to carry out the subtraction before the division. Those who used the correct order of operations generally knew they needed to flip the fraction and multiply so picking up the 3rd M1. Few candidates were able to gain a correct single fraction in any form and of those who did few were able to simplify it correctly.

Question 24

In part (a) the majority of students scored full marks although there is a significant number who tried long division rather than using the factor theorem. In part (b), the majority of students attempted a solution with many using long division to arrive at a quadratic expression $18x^2$... which earned the first mark. Indeed, those who made no algebraic mistakes found the correct quadratic expression but then many stopped with no attempt to factorise. Of those who continued, many went on to factorise correctly leading to the required answer. Some students then felt they needed to solve the cubic and, as a consequence, lost the final mark.

Question 25

This was a well answered question with students exhibiting a clear understanding of the requirement to differentiate the displacement to gain the expression for the velocity. Some students, however, spoilt their efforts by then continuing their working to arrive at a numerical value of *v* for this part of the question. In part (b) most students realised that they needed to equate their $v(t)$ to zero and the required answer of $t = 3$ invariably followed. Only a small number realised the need to substitute the *t* value back into *x* rather than *v*. This kind of relatively straightforward differentiation question appears to have been well practised by students.

Question 26

In part (a) many students incorrectly assumed that $\angle ACB = 90^\circ$. They then went on to work out *BC* earning the first mark in part (b) and then used Pythagoras to find *AB*

In part (b), identifying the length of *BC* as 15 earned the first method mark (although this was frequently seen in part (a)). Students who realised they needed to find an angle and were able to use the cosine rule with the required sine formula to gain the method marks.

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