Pearson Edexcel

# Examiners' Report
# Principal Examiner Feedback

## November 2020

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

**Edexcel and BTEC Qualifications**



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**International GCSE Mathematics – 4MB1**

**Principal Examiner Feedback – 4MB1 01**

**Introduction**

Due to the unusual nature of this exam series overall the distribution of marks was lower than usual with a significant positive skew. A significant number of candidates produced responses which suggested they were under-prepared for this paper with a number of questions being left blank by a large number of candidates. Despite this there were still a number of candidates who showed strong algebraic skills who made good attempt at the more demanding questions.
Some questions did prove to be particularly challenging to most candidates particularly Q15, 22, 23, 26 and 28.
Centres would be well advised to focus some time on these areas when preparing for a future examination.

In particular, to enhance performance, centres should focus their student's attention on the following topics:

• Reasons in geometric problems, particularly in relation to the appropriate details required.
• Probability in unstructured questions
• Simplifying Algebraic Fractions
• Problems involving Upper and Lower Bounds
• Scale factors involving area
• Vectors
• Problems involving sectors of circles
• Linking stationary points to zeros of derivatives
• Unstructured problem questions involving linking multiple topics

In general, candidates 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, candidates 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 candidates 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**

An accessible question which most candidates answered correctly. The most commonly seen error was treating the inequality as an equation which still allowed the candidate to gain 1 mark. A number of candidates gained the correct answer but then changed the direction of the inequality, possibly mistaking the fact that the answer was negative.

**Question 2**

Another accessible question which most candidates answered correctly. Some candidates had no errors in their working but lost marks due to showing insufficient working, in questions with the demand "show that" it is imperative that the candidate shows sufficient working to enable the examiner to be sure the candidate has understood the method. Commonly seen errors included:
failing to invert the $\frac{5}{21}$ , or expressing $4\frac{2}{7}$ as $\frac{8}{7}$ or even $\frac{8}{28}$.

**Question 3**

This question was well answered. The majority of students were able to find both the terms although some did not find the difference. A small number only found one term of the sequence although this did allow them to gain one mark.

**Question 4**

A number of candidates, approximately one quarter scored one mark on this question. It seems surprising that candidates managed to obtain one answer correctly but not the other. A small number of the candidates gained one mark for having the correct answers transposed. A significant number of candidates did not use fact that the numbers were given as products of prime numbers and calculated the values of *A* and *B*. Although a minority of these were then able to use the values to find the correct answers many couldn't and those who did often required significantly more working than should be expected for a one mark question.

**Question 5**

Most candidates failed to gain any marks on this question. Reverse percentage questions are often misunderstood and this example was no exception with a significant number of candidates finding 4% of £3.64 which gained the candidate no marks. Of those who showed understanding of the standard method of dealing with reverse percentage questions a significant number left their final answer as £3.50, the original price, rather than finding the value of the increase as required by the question.

**Question 6**

A large number of candidates clearly had no idea how to tackle this question and left the response blank. Commonly seen incorrect answers included 10:5:4 and 21:5:4. Although the first is clearly not helpful had the candidates who answered 21:5:4 realised they needed to adjust the second parts of the ration in line with how they adjusted the first part they could have achieved the correct response.

**Question 7**

Another question which a significant number of candidates left blank. The vast majority of the candidates who scored full marks did this by considering the scale factor of the enlargement between the edges of the sides, this was the most efficient method to consider. A significant number of candidates used the cosine rule to find one angle in each triangle, had these candidates continued to find a second angle in each case this would have been sufficient but with only one angle this does not prove similarity and so only gained one mark, despite requiring significantly more working. A small number of candidates tried to work in arguments relating to areas, this is unlikely to be useful in a question of this nature.

**Question 8**

Most candidates demonstrated the ability to differentiate at least one term, mostly correctly gaining $4x^3$. Although most candidates did score full marks a significant number failed to deal with the term $\frac{8}{x^2}$ correctly, showing an inability to write this in the form $8x^{-2}$.

**Question 9**

Around half the candidates scored full marks on this question. There were a significant number of candidates who simply added the frequencies given and/or divided by the number of classes. Candidates who multiplied 0 by 5 and arrived at 5 were awarded two marks out of a possible 3 as they invariably arrived at an incorrect answer of 1.95. This was also a commonly seen error.

**Question 10**

The majority of candidates failed to score any marks on this questions. This was often due to gaps in their working, when asked to answer "without using a calculator" jumping straight to a result which could be obtained on a calculator will ensure that the candidate fails to score any marks, the first line of working as $6\sqrt{5} - 3\sqrt{3} - 2\sqrt{5} + 7\sqrt{3}$ commonly seen is a particular example of this. Those candidates who did show a breakdown of 180 and 147 in an appropriate form usually managed to gain full marks.

**Question 11**

An accessible question which allowed a large number of candidates to gain full marks. Commonly seen errors included failing to multiple all terms when removing the denominator, only multiplying the first term when expanding brackets and sign errors, particularly involving removing 13 from the LHS of their equation.

**Question 12**

A number of factors combined to make this a challenging question. Firstly, candidates needed to recall the volume of a cylinder, to appreciate that this volume needed to be halved and, thirdly, that the diameter was given in the question which then required the candidate to halve it for the radius. A significant minority of candidates used the volume of a cone or a sphere or a surface area formula and consequently earned no marks. Incorrect values of 2.8 and 5.6 were often seen due to failing to half the formula for the volume of a cylinder or the diameter and these candidates gained only one mark for this.

**Question 13**

Part (a) of this question was answered correctly by a considerable majority of candidates.
Part (b) proved to be less accessible. Commonly seen errors included failing to deal with the 125 correctly or failing to apply the power $\frac{2}{3}$ to both algebraic terms.

**Question 14**

A significant test of algebra for which a number of candidates left this question blank. Most candidates who started their solution invariably substituted the expression for $n$ into the equation of $p$. This produced an expression in p with nested fractions. Although handling this complex algebra proved successful to a significant number of candidates, they may have fared better by starting with $n = (2 – 5p)/6p$ which would have avoided the need to deal with nested fractions.

**Question 15**

A majority of candidates failed to consider bounds in this question and so scored no marks in this question. Of those who did consider the bounds many failed to deal with the 190 correctly. Another issue which caused problems for a number of candidates was the need to consider an upper bound for the numerator and a lower bound for the denominator of the fraction. The issue was that the answer needed to be given in the form of hours and minutes correct to the nearest minute, a small number of candidates gained the correct time as a decimal but lost a mark due to this final stage.

**Question 16**

Unusually this question using simple trigonometry was not well answered with just under half the candidates failing to gain any marks. A significant number clearly did not appreciate that they could form and use a right triangle with AC as the hypotenuse often trying to build in 1.4 to their triangle. Of those who did realise that they could use simple trigonometry a significant number failed to use the angle of elevation of 75º correctly, often considering this as an angle to the vertical. This still allowed these candidates to gain 2 marks but is something that candidates are expected to understand.

**Question 17**

Most candidates scored no marks on this question. A frequency density of 1.4 was the key to a correct solution to this question although in a few cases candidates failed to progress beyond this point. Where this was not found, such candidates simply treated the diagram as a bar chart and 10 + 12.5 + 4.5 proved to be a popular, but erroneous answer.

**Question 18**

Most candidates scored full marks here. Applying the ‘square of c’ incorrectly proved to be the downfall of many candidates with a small number of candidates considering an inverse proportion. Very few candidates scored partial marks.

**Question 19**

This question was well answered by the majority of candidates. Candidates seemed clear on the method to be able to answer this question, with substitution the most popular approach for candidates. Again, lost marks were mostly due to arithmetic errors such as failing to subtract terms, involving negatives, when using the elimination method or failing to expand and simplify correctly if using substitution. In general those using substitution methods more often made numeric slips. Once one variable was found candidates knew to substitute their solution into an equation to find the second variable. A small number of candidates had working which was clearly incorrect leading to incorrect solutions and then gave the correct solutions on the answer line. Candidates need to be aware that using allowed calculators to gain the correct solutions will gain them no marks if this is not backed up by correct working.

**Question 20**

This question proved to be a good source of marks for candidates with most scoring full marks. Many responses which did not score full marks lost one or two marks due to minor numerical errors. In a significant minority of cases part (b) was evaluated correctly with errors in part (a) despite part (b) requiring more numeric manipulation.

**Question 21**

This question was generally well answered with a large proportion of students making a good effort at the explanation. However, more attention needs to be paid to minimum wording for these explanations - it appears that some are under the impression that some code words such as simply writing "cyclic quadrilateral" is enough whereas they need to refer to opposite angles and 180°.
There was some confusion over three letter angle notation and some students did not understand which angle was being asked for or label which angle they were finding. Students who gained partial marks more commonly used the fact that *ABCD* was cyclic than the alternate segment theorem. Once again, a logical step-by-step approach and good presentation helped here.

**Question 22**

A majority of the responses to this question were left blank and many of the remaining scored full marks. Candidates who realised that the key was to express each term as a power of 5 usually made good progress many achieving full marks. Commonly seen errors included expressing $20 \times 25^{5n+3}$ as $500^{5n+3}$ or $(\sqrt{125})^{4n+2}$ as $5(\sqrt{5})^{4n+2}$

**Question 23**

Most candidates made some attempt at this question but few demonstrated an understanding of what was required. A number of candidates found the roots of the function, which was a valid first step towards finding the maximum value and so gained a mark, but few candidates went beyond this. The candidates who did score more marks on this question usually used the derivative to locate the maximum value of the function.

**Question 24**

A large number of candidates either did not attempt this question or made attempts which suggest they did not have a compass available during the exam. Most candidates who did make a reasonable attempt at this question were able to score most of the marks. The most common error seen was in part (b) where a significant number of candidates drew arcs from B and C which only intersected once. For a correct perpendicular bisector two intersections are required.

**Question 25**

Nearly half the candidates scored full marks on this question. Part (a) was mostly either fully correct or candidates attempted to write down an answer with no intermediate working which led to errors and with no working seen partial marks were not available. In part (b) many candidates either only partially factorised the expression or tried to subtract the terms often leading to an answer of $7x^2y$.

**Question 26**

The majority of responses to this question were blank and of those where an attempt to answer the question was seen the majority of those responses scored no marks. Many of these responses showed the candidates assumed that the unshaded portions of the diagrams were semi-circles, this invariable led to responses which scored no marks. Realising that the angle subtended at the centre by *AB* was 60º was the key which allowed the minority of candidates who did score on this question to gain any marks.

**Question 27**

This question allowed candidates to show their understanding of probability with many candidates scoring full marks. 0.32 was seen on many scripts and, to a lesser extent, an attempt to divide by 4 was seen. Interestingly, on a number of scripts, 0.32/4 ended up as 0.8 leading some to give a probability of 2.4. Weaker candidates still seem to feel that the sum of probabilities or, indeed, a probability can exceed 1. Some candidates had difficulty with part (b) as they seemed to think that the required value could be found by multiplying 90 by the probability rather than dividing by it leading to a result which is not a positive integer and so should have led to candidates realising they had made an error.

**Question 28**

The majority of responses to this question were blank and of those where an attempt to answer the question was seen the majority of those responses scored no marks. A surprising number of candidates clearly misread the question as given the area of BEG as $4\sqrt{2}$, this did allow the candidate to still gain 4 marks. The key result to allow access with this question was the interior angle of a regular octagon as 135º, many candidates found this and got no further. Those who did manage to go beyond this point using more advanced trigonometry made varying degrees of progress.

**Question 29**

In part (a) many students used the factor theorem correctly and showed that was a factor by substituting 5 into the given cubic and obtaining a value of 0. The two most common errors made by students not showing that the result were 0 or not using the factor theorem at all (for example many used long division).
In part (b) the main methods used to get the line $(x-5)(x^2-x-12)$ was to use long division with the occasional synthetic division or inspection seen.
The majority of candidates were able to factorise their quadratic and with only a minority forgetting to include the $(x-5)$ in their final answer.

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