Examiners' Report
Principal Examiner Feedback

Summer 2022

Pearson Edexcel International GCSE

In Mathematics B (4MB1)

Paper 01R

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Introduction

In general, this paper was well answered by the overwhelming majority of candidates. Some parts of questions did prove to be quite challenging to a few candidates and centres would be well advised to focus some time on these areas when preparing for a future examination.

To enhance performance, centres should focus their candidates' attention on the following topics:

- Showing clear working particularly when it is requested in the question
- Congruent triangles and proofs
- Circle theorems (including reasoning)
- Magnitude of a direction vector
- Pythagoras in three-dimensions
- Stationary points
- Direct and inverse proportion

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

Almost all candidates gave the correct answer of 1.2092. Occasionally, candidates gave an answer to more or less than the required 5 significant figures (or made an error when evaluating the fraction on their calculator).

Question 2

Most candidates scored the first mark for equating the given linear expression in n to –123. Several candidates who did obtain $n = 32.5$ failed to explain why this value would therefore indicate that –123 was not a term in the sequence (and instead they simply said that it wasn't a term in the sequence). The most common incorrect method was to substitute –123 for n.

Question 3

While most candidates correctly gave the value of x as 43 it was clear that many candidates did not engage fully with given diagram and instead gave a value of x that was greater than 90 degrees.

Question 4

Examiners were pleased to report that almost all candidates showed sufficient working in multiplying the given two mixed numbers together (and it was rare for examiners to report instances of candidates simply obtaining the answer directly from a calculator). The most common error was to give a final answer as an improper fraction rather than the required mixed number (in its simplest form).

Question 5

Apart from the standard/common errors when expanding brackets or re-arranging the terms, most candidates correctly made h the subject. Examiners accepted an un-simplified answer of $h=\frac{4g+14}{2}$ but not $h=\frac{4g+2}{2}+6.$ Finally, a few candidates misread the demand and made g the subject instead.

Question 6

It was pleasing to note that most candidates scored at least one mark in this question for simplifying the given inequality to either $8x>-2, -2<8x$ or $-8x<2.$ Those candidates who had isolated the x term with a positive coefficient were usually more successful in scoring both marks than those that had simplified to $-8x<2$ as many failed to reverse the inequality sign when dividing by a negative value.

Question 7

This question was answered extremely well with most candidates correctly writing down the two natural numbers from the list. The most common incorrect answers were to include one of either –3 or $\frac{5}{2}$.

Question 8

Most candidates scored at least one mark in this question for using the correct formula for the volume of a cylinder with a radius of either 4 or 8. Of those candidates who did use a correct radius of 4, many did not give their answer to the nearest cm^3 as requested.

Question 9

Although it was clear that most candidates appreciated the required method for changing the given value from microseconds into hours many candidates failed to give their final answer in the requested standard form (and many instead gave an answer of 125 000). A few candidates clearly misread the question and instead changed the given value from microseconds into seconds (or did not appreciate how to correctly convert from seconds into hours).

Question 10

The responses to this question were mixed. While many candidates realised that the most efficient way of tackling this problem was to divide the given value by 1.15 a significant number either increased the given value by 15% or reduced the given value by 15%.

Question 11

Almost all candidates in part (a) correctly stated the modal value as 25 and in part (b) many correctly summed all seven values and took this total away from 8×22.5 to correctly obtain the mark for the 8^{th} test. The most common error in part (b) was to work out the mean of the seven values and to then either assume that this was the mark for the 8^{th} test or to calculate the mean of this value with the given 22.5.

Question 12

Both parts of this question were answered extremely well with most candidates correctly obtaining a value of –27 in part (a) and factorising completely the given expression in part (b). The most common errors in part (b) were to only partially factorise and therefore a few candidates left their expression as either $3(4xy - 5y)$ or $y\ \ 12x - 15$.

Question 13

Examiners were very impressed with most of the candidates' responses to this question, and it was clear that many had correctly learnt the formula for the area of a trapezium. Occasional sign slips were seen in the solving of the resultant linear equation but overall a majority of candidates obtained the correct answer of 2.6.

Question 14

Although several candidates did leave this question blank (possibly due to not having the required equipment for this type of construction question) examiners noted that many candidates correctly constructed the perpendicular bisector of *AB*, and the angle bisector of *BAC* (with corresponding construction lines) and then shaded the required region. Occasionally, some candidates did not show all required construction lines, and some did not shade the required region in full (and in some cases candidates misinterpreted their own construction lines as being part of the boundary of the required region).

Question 15

It was pleasing to note than many candidates scored at least two marks in this question for correctly writing down two of the inequalities that defined the given shaded region. Those two inequalities were nearly always the ones corresponding to the two lines given in the question. It was mainly the inequality relating to the boundary of the region created by the x-axis that caused any significant issues. Several candidates gave this line as $x = 0$ but examiners did note that this was also given as $y = x$.

Question 16

Most candidates found this question on proof rather demanding with most attempting to prove the congruency of the two triangles by SAS with the majority only scoring one mark for stating that *AC* and *CE* were equal due to both being sides of a square. While some candidates did state the correct reason for why angles *BC* and *CD* were equal most could not give a fully correct reason for why angle *ECB* was equal to angle *ACD* (while others simply stated, without justification, that *AD* and *BE* were equal). Finally, candidates are reminded that at the end of the proof they must state SAS (or equivalent).

Question 17

As always in this type of question (rationalise the denominator of a surd) several candidates showed no working but simply stated the correct answer directly from their calculators and so scored no marks. Those that correctly multiplied numerator and denominator by $\sqrt{3}-1$ were usually successful (although in this type of question candidates are reminded to show all relevant working which includes the expanding of brackets and simplifying of any relevant surds).

Question 18

Although many candidates appreciated the required method for finding angle *OQP* (using angles on a straight line, the angle at the centre is twice the angle at the circumference and base angles of an isosceles triangle are equal) many incorrectly believed that the required circle theorem involved either angles in the same segment or angles in a semicircle. Of those that correctly obtained a value of 28 only the most able could give reasons for each stage of their working.

Question 19

This question was done well with many candidates correctly finding the required perimeter of the shaded region. The most common errors were to either use the formula for the area of a sector of a circle (rather than arc length), apply an incorrect trigonometric ratio (in this case using sin or cos instead of tan) or to imply that the tan ratio is adjacent divided by opposite. Several candidates did not read the question carefully and instead found the perimeter of *OADC* or used less efficient methods (for example, finding the length of *CD* by first finding *OD* and then using Pythagoras).

Question 20

This question on histograms was answered extremely well with many candidates scoring all four marks. Occasionally, in part (b) candidates failed to give an appropriate scaling for the frequency density axis and a few candidates extended the final bar to the end of the time axis instead of stopping at 190.

Question 21

Part (a) was answered well with many giving the correct coordinates of point *B*. The most common errors were to either add the given direction vector to the coordinates of point *A* or to subtract these two quantities the wrong way round and given an answer of $(-4, 6)$. The responses to part (b) were mixed and while some did make a correct start and found an expression for the magnitude of the direction vector from *A* to *C* very few who correctly stated the equation as $(m-3)^2+(n+2)^2=25$ could successfully continue and make *m* the subject. Those that expanded the brackets were rarely successful and even those who re-arranged and took the square root many gave an answer including $\pm$ which in this case was incorrect (as the question explicitly stated that *m* had to be greater than 3).

Question 22

This question differentiated well and although a number of fully correct solutions were seen to both parts many candidates made little (or no) progress. While some could correctly find an expression for *AC* (or AC^2) and hence *L* (or L^2) in part (a) many then found the required algebraic simplification of this expression to be far too difficult. In part (b) some candidates scored at least one mark for correctly stating the volume of the cuboid in terms of *k* and *x*.

Question 23

The responses to this question were mixed. While many candidates could correctly find the value of *y* and hence go on and calculate the value of *x* many could not see how to then calculate an estimate for the number of times the dice would land on an odd number (and some simply worked out the probability of obtaining an odd number). Surprisingly, examiners commented on the number of times that candidates seemed to misread the question and instead work out the expected number of times the dice would land on an even number.

Question 24

Parts (a) and (b) were an excellent source of marks for the majority of candidates with only sign and arithmetic errors causing any real issues in these parts. The responses, as expected, were far more mixed in part (c) with only the most able appreciating the need to either use the inverse of matrix **B** or to set up four equations in four unknowns. Of those candidates who did find $\mathbf{B}^{-1}$ many then incorrectly calculated **C** using $\mathbf{AB}^{-1}$ rather than $\mathbf{B}^{-1}\mathbf{A}$.

Question 25

Many candidates scored at least one mark in part (a) for correctly applying the intersecting chord theorem and obtaining $5y = 15x$. Only the most able could then apply the cosine rule and obtain the correct three term quadratic in *x* and solve this to find the required values of *x* and *y*. Candidates are reminded that when questions ask for ‘clear working’ then all relevant methods should be shown (including how they have solved their quadratic equation). Although several candidates correctly found the value of *n* in part (b) the majority left this part blank.

Question 26

Most candidates realised in part (a) the need to expand the brackets and differentiate the given curve, and examiners noted that this was done extremely well. However, from this point many candidates incorrectly set the derivative equal to zero rather than substituting into the derivative the value of –1 and putting this expression equal to – 8. Those that did handle the first few stages of this problem correctly usually went on to derive the given quadratic equation. Part (b) was done extremely well with many correctly completing the square and scoring all three marks. The responses to part (c) were very mixed (with many candidates leaving this part blank) and examiners had the impression that most candidates failed to realise (due to the context of the question) that all they had to do in this part was set the expression from part (b) equal to zero and solve.

Question 27

It was pleasing to note that many candidates scored the first two marks in this question for correctly setting up an equation relating *x* to *w* and also an equation relating *y* to *w* (using constants of proportionality). Unfortunately, most candidates then went on to substitute in the given values instead of eliminating *w* first and therefore very few obtained the correct answer of $xy^6 = 16$.

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