Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

November 2020

Pearson Edexcel International GCSE

In Mathematics B (4MB1)

Paper 01R

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International GCSE Mathematics – 4MB1

Principal Examiner Feedback – 4MB1 01

Introduction

While examiners did report many excellent responses to questions, some candidates did seem under-prepared for this paper with examiners reporting many blank responses to the later questions on the paper.

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

- Problems involving geometry
- Questions that involve the demand to show either all working or clear algebraic working (most notably questions 8, 10, 13, 21 and 25 on this paper)
- Similarity
- Vectors
- Unstructured algebraic questions
- Sequences in context

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

Most candidates correctly considered either $\frac{2563}{11}\times 5$ or $\frac{2563}{11}\times(13-8)$ when calculating how much more rent Ali paid than Beth.

Question 2

While most candidates scored at least one mark for factorising the denominator to obtain the expression $\frac{8(2x+3)^2}{4(2x+3)}$ many did not realise that this would simplify further to either $4x+6$ or $2(2x+3)$. Instead many left their answer as either $\frac{8(2x+3)^2}{4(2x+3)}$ or $\frac{2(2x+3)^2}{(2x+3)}$ or $\frac{8(2x+3)}{4}$.

Question 3

While nearly all candidates correctly re-wrote the two mixed numbers as improper fractions and then went on to write $\frac{16}{3} \div \frac{13}{5} = \frac{16}{3} \times \frac{5}{13}$ many went straight to the answer of $2\frac{2}{39}$ and so scored only 2 of the 3 marks available (so ignoring the request to show all working and missing off the vital step of showing that $\frac{16}{3} \times \frac{5}{13} = \frac{80}{39}$). Also, some candidates gave their answer as an improper fraction even though the question specifically asked for a mixed number.

Question 4

The most popular method of working out Ashley's average speed in kilometres per hour was to convert the 3 hours and 36 minutes into 3.6 hours and to convert the 11 520 metres into 11.52 kilometres and then consider the fraction $\frac{11.52}{3.6}$ (leading to the correct answer of 3.2). The most common errors were in converting the metres into kilometres (for example, 11 520 m = 1.152 km) or using 3.36 hours.

Question 5

While most candidates could correctly work out Liam's salary after one year (by considering 45500×1.055) many struggled to work out the salary after 3 years (with the most common error being to work out the pay increase of each subsequent year with the initial salary amount rather than the salary after 1 year). Some candidates did not realise that the percentage increase was not constant for all three years or misread the question and worked out Liam's total salary after 3 years.

Question 6

While most candidates correctly calculated the gradient of **L** as 1.5 in part (a) some candidates incorrectly stated the gradient as 3 (the coefficient of x in the original equation) or, after correctly re-arranging the equation as $y = \frac{3x+5}{2}$, stated the gradient as $1.5x$. For those candidates who did correctly re-arrange the equation of the line in part (a) most then correctly stated the y-intercept in (b).

Question 7

The two most common errors in this question were to either assume that the cards were replaced between selections so therefore calculating the probability as $\left(\frac{1}{10} \times \frac{1}{10} \times \frac{2}{10}\right)$ or not realising that there were two letter L's in the word PICCADILLY and so calculated the required probability as $\left(\frac{1}{10} \times \frac{1}{9} \times \frac{1}{8}\right)$.

Question 8

While many candidates correctly calculated the two critical values of the quadratic inequality $6x^2 - x - 12 > 0$ as $-\frac{4}{3}$ and $\frac{3}{2}$ (by either factorising or via the quadratic formula (as the question specifically asked for a non-calculator method)) many did not realise that the correct answer was therefore $x > \frac{3}{2}$ or $x < -\frac{4}{3}$. Instead many candidates either gave their answers without any inequality signs, had both inequality signs pointing in the same direction $\left(\text{e.g. } x > \frac{3}{2}, x > -\frac{4}{3}\right)$ or did not give the answer as two separate inequalities $\left(\text{e.g.} -\frac{4}{3} > x > 2\right)$.

Question 9

The question was done extremely well with nearly all candidates knowing the correct method to find the inverse of function f. The most common errors were algebraic slips (when re-arranging the equation) or not giving the final answer in terms of *x*.

Question 10

Most candidates did as requested and did not use a calculator and stated that the expression $\frac{6-\sqrt{8}}{2+\sqrt{8}}$ could be simplified by considering $\frac{6-\sqrt{8}}{2+\sqrt{8}} \times \frac{2-\sqrt{8}}{2-\sqrt{8}}$ (or equivalent in terms of root 2) and showed all subsequent working to arrive at either $-5+2\sqrt{8}$ or $-5+4\sqrt{2}$. However, the question specifically asked for an answer in the form $a+\sqrt{b}$ so many lost the final mark for not giving the answer of $-5+\sqrt{32}$.

Question 11

While most candidates who attempted this question on completing the square correctly obtained the values of *a* and *b* the value of *c* caused the most difficulty with the most common error seen being $-3x^2+6x+2 = -3(x-1)^2 - 1 + 2$ instead of the correct

$$-3\left[x^2-2x\right]+2 = -3\left[(x-1)^2-1\right]+2 = -3(x-1)^2+3+2 = -3(x-1)^2+5.$$

Some candidates decided instead to consider the expression $3x^2-6x-2$ and while they correctly obtained the expression $3(x-1)^2-5$ many forgot to change the signs and scored only 1 of the 3 marks available.

Question 12

This question was answered extremely well with many correctly completing the table and pie chart. However, some candidates clearly did not read the question carefully and completed either the table or the pie chart (but not both).

Question 13

Candidates struggled with this question. While most scored the mark for dealing with the condition that the mean age of the five children was 10.6 years many did not realise that the condition that two of the children had the same age meant that $b = \frac{b}{2} + a$ and instead thought that $\frac{b}{2} + a = 2b + a + 3$. Of those that correctly stated both equations the majority solved this pair of simultaneous equations correctly but a small minority did not give clear algebraic working (as required).

Question 14

While most candidates who correctly attempted this question used the tangent ratio to calculate *BD* and then the sine ratio to find *BC* many used the sine rule in both the triangles *ABD* and *BCD* (and were not always as successful). Candidates are advised that in questions involving right-angled trigonometry that it is almost always easier to apply the trigonometric ratios than the sine/cosine rules. Although not penalised on this occasion many candidates did not give the answer to the required one decimal place.

Question 15

Part (a) was extremely well answered. If marks were lost in this part, then it was mainly due to sign errors or the failure to multiply every entry by either 3 or 2 in the corresponding matrix. Part (b), however, was less successful. Very few candidates realised that $\mathbf{Q} = \mathbf{QP}^{-1}\mathbf{P} = \begin{pmatrix} 0 & 1 \\ -10 & -17 \end{pmatrix}\begin{pmatrix} 5 & -3 \\ -3 & 2 \end{pmatrix}$ and instead thought that the inverse of matrix **P** was required to work out matrix **Q**.

Question 16

This question on intersecting secants was a good source of marks to most candidates with many correctly stating that $5.5 \times 2.5 = 2 \times PL$ followed by the correct value of 6.875 for *PL* (so scoring at least the first two marks). When errors occurred in calculating the area of triangle *LKP* it was usually down to either assuming that angle *LKP* was right-angled or incorrectly stating *PL* as 2. Those that did use $0.5ab\sin C$ for the area of the triangle were mostly successful.

Question 17

All three parts of this question were an excellent source of marks for candidates and nearly all scored full marks in (a) and (b). The most common error in (c) was a failure to give the answer in standard form as requested.

Question 18

In part (a) a minority of candidates failed to simplify $12w^9y^0$ to $12w^9$. In part (b) it was the failure to correctly deal with $25^{\frac{3}{2}}$ rather than the $\left(x^4\right)^{\frac{3}{2}}$ term which led to the loss of marks in this part.

Question 19

This question was left completely blank by many candidates who did not see how to make a start to find the length of *FE*. Very few candidates realised that the key to tackling this problem was to consider the similar triangles *CEF* and *ABC* and the similar triangles *AEF* and *ACD* which would first lead to the result that $CF = \frac{7}{3}AF$. From here only the most able realised that $FE = 3 \times \frac{FC}{AC}$ where $AC = AF + FC$ which would then give the correct answer of 2.1.

Question 20

While there were many excellent attempts to find the region **R** (by constructing: a circle of radius 4 cm with centre *B*, the angle bisector of *ADC* and a line 3 cm from, and parallel to, *CD*) candidates are once again reminded that for construction questions they must use a ruler, a pair of compasses and show all construction lines. For those candidates that had a correct diagram the most common error was to shade a region that also included part of the inside of the circle with centre *B*.

Question 21

It was surprising to examiners that a handful of candidates realised immediately that angle x was simply $\dfrac{180 - \frac{1}{2}\left(\frac{360}{11}\right)}{2}$. Instead most candidates worked out that each interior angle of the hendecagon was $180 - \frac{360}{11}$ and together with the formula $180(n-2)$ with $n = 7$ (for the sum of the interior angles of the heptagon) correctly stated that $x = \frac{1}{2}\left(180(7-2) - 5\left(180 - \frac{360}{11}\right)\right)$ giving the correct answer of 81.8 (correct to 3 significant figures).

Question 22

Part (a) was answered extremely well with most candidates correctly using the area of a sector formula to work out the area of the shaded sector *OACB*. The most common error in part (b) was the failure to add the lengths of *OA* and *OB* to the length of the arc *ABC* to find the perimeter of *OACB*.

Question 23

As always with this type of problem on proportionality several candidates misread ‘inversely proportional’ as ‘proportional’ and ‘square root’ as ‘square’. Of those that did state mathematically the two proportionality statements correctly as $y = k_1 x^3, x = \frac{k_2}{\sqrt{w}}$ many then went onto find the two constants (in this case k_1 and k_2) and combine the two equations (by eliminating x) to find a formula for y in terms of w, which if correct was $y = \frac{8000}{w^{\frac{3}{2}}}$.

Question 24

While many candidates had little idea where to start on this unstructured question on sequences those that did realise that the information given in the question meant that mathematically $\frac{10x-10}{2x+1} = \frac{35x-5}{10x-10}$ it was extremely pleasing that from here so many candidates removed the fractions, re-arranged, and then solved the resulting three-term quadratic equation in x correctly. The most common error of those that did obtain a correct equation in x was to only find the value of x and not the corresponding value of d as requested.

Question 25

For the majority of candidates, the only mark scored in this question was finding the resultant vector $\overrightarrow{AC}$ as $\begin{pmatrix} 3+x \\ -2+5x \end{pmatrix}$, although surprisingly a number of candidates multiplied the two vectors $\overrightarrow{AB}$ and $\overrightarrow{BC}$ together (in their attempt to find $\overrightarrow{AC}$). For those that did correctly make the link between a vector and its corresponding magnitude most went on to find x and were successful in writing down the required column vector for $\overrightarrow{AC}$.

Question 26

While nearly all candidates who attempted part (a) did so correctly (by differentiating the given expression for h) only the most able in part (b) realised that the maximum height reached by the ball was 81 metres. While many correctly found the equation linking t and k (by setting their answer to part (a) equal to zero), the most common error in this second part was to equate the expression $1+\frac{1}{10}k^2-\frac{5}{100}k^2$ to either 161, 160, 80.5 or 80 rather than the correct 81.

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