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Examiners' Report/ Principal Examiner Feedback

January 2015

Pearson Edexcel International GCSE in Mathematics (4MB0) Paper 01

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There was no evidence to suggest that candidates ran out of time in answering the paper as attempts (erroneous though they were) at many of the latter questions were made. Some questions proved to be quite challenging to many candidates and centres would be well advised to focus some time on these areas when preparing candidates for a future examination.

In particular, to enhance performance, centres should focus their candidate's attention on the following topics, ensuring that they read examination questions very carefully. 50% or more of candidates scored zero marks on the questions set on the topics below:

- Geometry/Symmetry
- Differentiation involving negative indices
- Determinant of a matrix
- Sine and Cosine rule
- Representing an interval on the number line
- Inequalities defining a region
- Perpendicular bisectors
- Subsets
- Minimum values and range of functions

As well as these topics identified in this paper, candidates should be encouraged, wherever possible, to check arithmetical answers before progressing to the next question. They should also be encouraged to manage their time so that accessible marks towards the end of a paper are not missed.

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 (such as the product rule for differentiation) and, where used correctly, the corresponding marks are always given.

Question 1

A significant number of candidates did not show any working in this question and so, despite a correct answer, earned no marks. At the very least, candidates were either required to convert both mixed fractions to top heavy fractions, change the sign to multiplication and invert the second fraction or convert both fractions to decimals to earn method. Of those candidates who did show method, the vast majority provided the required answer for the final mark.

Question 2

Many candidates gained one mark for correctly differentiating 4x. However, the second mark proved elusive to the majority of candidates as $+\frac{1}{2x^2}$ was not often seen. Indeed the most frequently seen response to the differentiation of $-\frac{1}{2x}$ was $+\frac{2}{x^2}$.

Question 3

Most candidates realised that they needed to find prime factors of the three given numbers and this process was tackled with a varying degree of success. A minimum of two correct sets of factors was required for method. The required answer proved to be elusive to a minority of candidates as either a multiple of 1260 was given or, in some cases, the Highest Common Factor was given as the candidate's answer.

Question 4

This question was not answered well as many candidates seem to focus on the number of sides of the octagon or the number of straight lines drawn as diagonals. As a consequence, answers of 3 and 8 proved to be popular but incorrect answers.

Question 5

Except for a few errors in signs, many candidates realised that they needed to write down $4x \times 2 - 3 \times 6$ but this mark was lost if it was either embedded in $\frac{1}{8x-18}$ or equated to zero. If part (a) was correct, part (b) usually followed with required answer of $x = 3$.

Question 6

The majority of candidates successfully evaluated the $\frac{\text{difference in } y}{\text{difference in } x}$ for method. The requirement for the final mark was for either the fraction $\frac{5}{6}$ or 0.833. Answers left in the form $\frac{-5}{-6}$ did not gain this final mark.

Question 7

Despite many candidates showing correct method of finding $\frac{408 \times 5}{8}$, a significant minority of candidates seemed to be confused with what to do with the given data and some simply calculated either $\frac{5}{13} \times 408$ or

$\frac{8}{13}\times 408$ earning no marks at all. Curiously, a significant number of candidates who showed correct method wrote down an answer of 225 rather than the required answer of 255.

Question 8

This question tested the use of the calculator and many candidates successfully arrived at the required answer of 200 000 000 for part (a). Some candidates, however, calculated $\frac{4.4\times 10^{5}}{2.6\times 10^{-3}}-4.0\times 10^{-4}$ and consequently lost this mark. In part (b), the candidate was required to write their answer to part (a) in standard form. A correct mantissa earned (B1 ft) and a correct exponent earned (B1 ft). Unfortunately for some candidates, whilst 0.2×10^{9} is equivalent to 200 000 000, no marks were earned for this answer.

Question 9

The majority of candidates recognised the pattern of the sequence in part (a) and many correct answers of 81 and -243 were seen. Problems arose in part (b) where the candidate was asked to explain how they found their answer. Simply recognising that the next term was found by multiplying the current term by -3 proved too much for many and surprisingly not as many as expected scored the (B1) mark here.

Question 10

Whilst many candidates recognised that they needed to draw a line connecting -5 and -1, only about half of such candidates used correct terminology for the end points and therefore only gained one of the two marks available. Indeed, many simply used a filled in circle at both end points rather than an open circle around the point -5. Part (b) was tackled a little better with many correct responses seen.

Question 11

This question was very poorly answered with the vast majority of candidates scoring no more than one mark. The key to this question was using and stating 'angles in the same segment' to earn the first mark. Without this mark, the final mark was not available. Candidates were awarded an independent B mark for correctly using and stating 'angle sum of a triangle' but this, for many, was the only mark obtained in this question. Despite in previous reports advising candidates NOT to make assumptions (without evidence) from the diagram, many candidates simply assumed here that BD was a diameter. Centres would be well advised to spend more time on this type of question.

Question 12

As this is an equality question, simply writing down the equations earned no marks at all. Weak inequalities were allowed and many scored B1 for $y\leq 2$ and B1 for $y\geq 4-2x$. The third inequality, $y\geq x-2$, proved to be more elusive with more candidates getting the sign the wrong way round than getting the answer correct.

Question 13

A significant number of candidates either did not know what is meant by a subset or simply wrote down all the subsets of A. Where candidates recognised that there were six possible subsets the responses were usually correct except for minor errors of missing commas or repeated pairs.

Question 14

Many correct answers were seen here as candidates correctly totalled the number of bricks to 1000 and calculated $\frac{350}{1000} \times 360$ for the required answer of 126°. A mark was sometimes lost where a candidate simply worked out all of the angles but did not, in their list of angles, identify the required angle.

Question 15

Although some candidates lost marks for simply identifying, by the use of ruler, the midpoint of *CA* and then only drawing one pair of arcs, the large majority of candidates earned both marks for the correct construction of two pairs of arcs and drawing an accurate bisector for part (a). However, many incorrect answers of 3.6 cm were seen in part (b) as such candidates clearly identified (incorrectly) *X* as the midpoint of *CA* rather than the point of intersection of the perpendicular bisector and the line *BA*.

Question 16

Despite algebraic manipulation being generally good by candidates who take this paper, a significant number of candidates could not handle the removal of brackets correctly in the expression $2 - x(1 - x)$ and many first steps showed the result as $2 - x - 2x + x^2$. As a consequence, these candidates lost all the marks for the question. Of those who removed the brackets many correctly arrived at the required answer of $x + x^2 - x^3$. A minority of candidates went on to do more work with this answer. Where this extra work was incorrect, the final mark was lost.

Question 17

In part (a) (i), much wrong working was seen as many more candidates wrote down 2.45 ($\sqrt{6}$) rather than the required answer of -6. In part (ii) the opportunity of a follow through mark enabled a significant number of candidates to recover although this was sometimes spoilt with either an inequality in *x* rather than f(*x*) or simply a strong inequality being used. Many of the more confident candidates scored the mark in part (b), but weaker candidates were unable to answer this part of the question.

Question 18

A large majority of candidates simply read the horizontal scale incorrectly in this question, interpreting the numbers given on the axis as hundreds rather than clock times 0f 7am, 9 am, 11 am and 1 pm. As a consequence, many incorrect answers of 150, 0.875 (175/200), and 1220 were seen for the three parts of the question.

Question 19

This was probably the best answered question on the paper with many candidates showing that they clearly understood matrix multiplication. Despite some arithmetical errors in determining **AB** or **BA**, candidates were able to recover with follow through marks for their final answer.

Question 20

Approximately half of the candidates simply misinterpreted the demand of the question and either used $y = kx^2$ or $y = kx$. These candidates earned no marks for the question. Of those who did proceed

successfully with $y = \frac{k}{x^2}$, most achieved the first three marks but failing to give the two required answers (± 2) by some meant that the final mark was lost.

Question 21

About half of the candidates scored no marks for this question as 60^o proved to be a popular, but erroneous, answer to part (a). Even with an incorrect answer to part (a), many candidates missed the opportunity to draw extra lines on the given diagram to help in finding at least one correct angle on the diagram. It is clear from responses to this question and to Question 11, that candidates often struggle with basic geometry.

Question 22

The majority of candidates clearly understood the concept of the mode and many correct answers were seen in part (a). Arranging the given numbers into ascending order earned method in part (b) but $\frac{5+6}{2} = 5.5 = 6$ did not earn the accuracy mark. Writing $\frac{11+1}{2} = 6^{\text{th}}$ term (M1) giving an answer of 6 did earn the required accuracy mark. Of the three parts to this question, this part proved to be the most challenging. Many candidates recovered in part (c) and correctly determined the value of the mean, earning both marks.

Question 23

Incorrect assumptions about the diagram or simply not knowing where to begin meant that about half of candidates scored no marks here. Of the remaining candidates, most produced full solutions in a variety of well-constructed approaches. Most earned method marks here but a significant number of candidates lost the final mark due to poor early rounding. Of those candidates who dropped a perpendicular from *A* to *BC*, most only scored part marks for the question.

Question 24

About half of the candidates did not seem to know where to begin with this question and many scripts showed no response at all. Of those that did make an attempt, many erroneously wrote down the area of the rectangle as $2 \times 50 = 100$ and the area of one triangle as $0.5 \times 5 \times 6$ showing no consideration of needing the height of one triangle. About one quarter of candidates fully understood what was required and scored full marks. However, some lost the final two marks because they found $\frac{10000 - 3600}{10000} \times 100$ - the complement of the required answer.

Question 25

As in the previous question, about half of the candidates did not seem to know where to begin and many scripts showed no response at all. Most errors in part (a) stemmed from either a misquoted formula of the form $60^2 = 50 \times AB$ or some form of Pythagorean attempt usually involving 50^2 and 60^2. In part (b) it was common to see an addition sign rather than a negative sign in the use of Pythagoras, or using 122 rather than 72. The candidate's solution for the diameter was regularly given as the final answer. This meant that the last mark (an independent B mark) for giving their diameter/2 correct to 3 significant figures was clearly lost.

Question 26

Some reasonable attempts were made at this question with the majority of candidates scoring at least 2 marks. Many candidates correctly differentiated in part (a) but not all made realised that the requirement of "at rest" meant that they needed to equate their answer to part (a) to zero. Instead, many incorrect answers centred around a substitution of t = 0 or determining the value of t where $dv/dt = 0$. Many used the calculator for solving their quadratic but did not back up with any formula statement. Whilst a correct answer of 11.9 earned the marks here, an incorrect answer from a correct or incorrect quadratic would earn no marks as method was clearly missing. Candidates should be reminded to show all their working for all questions.

Question 27

With nearly half of candidates scoring no marks at all, many scripts were left blank. 75% of candidates scored 3 or less marks due to problems with part (b). In part (a) it was common to see candidates either assume that triangle ABC was right angled, or misquote the cosine rule, or find one of the other angles in the triangle.
In part (b) there were many ways in which the candidates lost marks – the positions of both Y and the right angle were seen in many different places indicating that a significant number of candidates did not fully understand the question with often the right angle being incorrectly placed at C. In all only about 12% of candidates were able to successfully tackle this question.

Question 28

Most candidates made a very good attempt at part (a). Whilst some made a sign mistake giving k=19 (which then made part(b) difficult for these candidates), 65% of candidates obtained full marks for part (a). For those candidates who obtained k = -19 in part (a), the majority went on to show much correct working in part (b) emphasising that a large number of candidates have very strong algebraic skills. As a consequence, nearly a third of candidates scored full marks on this question.

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