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Examiners' Report/ Principal Examiner Feedback

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International GCSE Mathematics B (4MB0) Paper 01

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Paper 01

Introduction

There was no general indication that the examination paper was too long, with most candidates making reasonable attempts at nearly all of the questions and with a significant number of these scoring high marks. Overall, the standard of presentation and clarity of work was high. However, it should be emphasized that candidates should be encouraged to include their working on the paper to show how they obtained their answers since if an incorrect answer was given without any working shown, all of the associated marks would be lost. This is particularly important if the question requests that the candidates show all of their working. It would also be prudent for centres to encourage their candidates to answer the questions within the examination paper booklet and not, if at all possible, on any extra sheets of paper. Also, centres should emphasize to candidates who do need to use extra sheets of paper, to clearly indicate this in the answer area of the relevant question in the examination booklet.

It was pleasing to observe that many candidates showed that they have a good understanding of the basic techniques of arithmetic, algebra and geometry and were able to apply them competently. Centres should emphasize to candidates that they should give their answers to the required degree of accuracy as often marks are lost. The question paper did however highlight the following problem areas, followed by their corresponding question numbers, which should receive special attention

- Sets (Q3)
- Highest common factor (Q5)
- Percentages (Q7)
- Circle theorems (Q10)
- Manipulating inequalities (Q11)
- Angles of a polygon (Q18)
- Probability (Q22)
- Problems involving fractions (Q27)

Report on individual questions

Question 1

An error occasionally seen was to have –3 as the first term of the sequence since candidates assumed that the series began with $n = 0$. Fortunately though, many candidates answered this question correctly.

Question 2

Most candidates correctly substituted the two coordinates into the gradient formula achieving M1 followed usually by the correct answer of –3 (A1). However, a minority of candidates incorrectly substituted the x and y values into the gradient formula producing answers of 3 or $-\frac{1}{3}$, thus losing all of the marks.

Question 3

Many correct answers were seen from the abler candidates, however, occasionally an answer of 8, 10, 12, 14 was given resulting in the loss of one B mark as did an answer in which one of the members of the set was missing. A common incorrect answer of 9, 10, 11, 12, 13, 14 was seen frequently, gaining no marks.

Question 4

Most of the candidates arrived at the answer from clear working gaining both marks. However, some made an arithmetic slip and lost the A mark.

Question 5

It was clear from many candidates' attempts that they knew how to find the factors of the numbers but did not know how to use them to find the HCF. Most of these, did identify at least one common factor thus collecting the M mark but losing the A mark. Common incorrect answers seen were $2 \times 3 \times 7$ or $2^2 \times 3^2 \times 7^2$.

Question 6

It was pleasing to see that this algebraic question posed few problems to the majority of candidates. However, a minority failed to complete their working and left their answer as $x(x-y)+z(x-y)$ gaining only the method mark.

Question 7

Many calculations of 15%, 85% or 115% of £55.30 were seen. Unfortunately, such attempts collected no marks.

Question 8

It was pleasing to see that many candidates did not find the algebra required by this question too demanding. Common errors were the cancellation of the term $2x$ or $(2x + 2)$ when combining the two fractions with such attempts usually managing to collect M1, A0 .

Question 9

The majority of the responses were correct, however, differentiating the term $-3x^{-4}$ proved problematic to many candidates and resulted in common incorrect answers of $6x^2 - 12x^{-5}$ or $6x^2 - 12x^{-3}$, which collected only the method mark for one correct term seen.

Question 10

This question was a discriminator. Common errors were the incorrect assumptions that AC bisects $\angle BAD$ or that ΔBCD was an isosceles triangle. Most candidates eventually arrived at the statement that $\angle ADB = \angle ABD = 59°$ but failed to state the associated reason for this, namely that of angles in the same segment, resulting in the most common score of B1 B0 B0 for this question. The abler candidates did manage to collect full marks.

Question 11

Many correct simplifications of the inequality together with the isolation of the term in x were seen, however, many of these candidates failed to produce the required integer value of x demanded by the question usually gaining M1 A1 but A0. Numerous candidates were confused by moving the sign from one side of an inequality to the other, usually losing the method mark. Incomplete attempts at trial and error were seen with such candidates investigating the expression on only one side of the inequality and not both, thus losing the method mark.

Question 12

Many candidates collected full marks for this question with most of the responses that used the fractions $\frac{2}{12}N$ and $\frac{7}{12}N$ usually going on to collect full marks. Some, though, used $\frac{7}{12}N$ and the numerical fraction $\frac{2}{12}$, and had thus, for example, expressions such as $\frac{7}{12}N = 540 + \frac{2}{12}$, which collected no marks.

Question 13

A popular question, only occasionally marred by some candidates who rounded the area of the semicircle to 127 resulting in an answer of 63.4 rather 63.6, losing the A mark. Most candidates realized that the radius of the circle was 4.5 cm, thus collecting at least the bonus mark.

Question 14

Common errors seen for $\overrightarrow{AB}$ were $\overrightarrow{AB} = \begin{pmatrix} 12 \\ -6 \end{pmatrix}$ or $\overrightarrow{AB} = \begin{pmatrix} 3 \\ 1 \end{pmatrix} \times \begin{pmatrix} 9 \\ -7 \end{pmatrix} = \begin{pmatrix} 27 \\ -7 \end{pmatrix}$ which lost the B mark for $\overrightarrow{AB}$ but left the M mark available for a correct statement of the modulus of *their* $\overrightarrow{AB}$. A minority of candidates left their answer as $\begin{pmatrix} 6 \\ -8 \end{pmatrix}$ or $\begin{pmatrix} -6 \\ 8 \end{pmatrix}$ without continuing to calculate the modulus of their vector. Fortunately, many correct responses were seen.

Question 15

This question was usually correctly answered although a minority of candidates used x instead of $3x$ in their expression for $\frac{102+60+30+3x}{6} = 40$, arriving at an answer of 48 and scoring M0 A0 but usually collecting the B1 for 240 usually found embedded in the line following the latter expression.

Question 16

The majority of candidates collected full marks for this question. Occasionally, $\frac{12}{4} = \frac{AX}{3}$ was seen as an incorrect statement of the intersecting chord theorem resulting in the loss of all 3 marks.

Question 17

Most candidates collected full marks for this question with a few failing to evaluate $27^{\frac{2}{3}}$ correctly, thus usually scoring 2 (B1 M1 A0) out of the 3 marks available.

Question 18

This question was a discriminator with many incorrect answers seen. Many candidates appeared to mix up the interior and exterior angle of the polygon thus losing all of the available marks. A minority started off with a correct expression involving an interior or exterior angle (M1) but then produced incorrect algebra (A0) but in some cases collecting the second M mark.

Question 19

Overall, this question was well answered. The usual error was the omission of $10\sqrt{2}$ or 10 in the answer, losing 1 mark. Some candidates, ignored the demand of question and used their calculator to arrive directly at the value of a, gaining the final mark, and thus failed to *show* how they arrived at this answer, possibly losing all of the rest of the marks available.

Question 20

Most candidates collected the first method mark for substituting the given values of *a, b*, *c* and *d* into the Cosine formula correctly. Unfortunately many then equated $4^2 + 5^2 - 2 \times 4 \times 5 \times \cos A$ to $1 \times \cos A$ and lost all of the remaining marks. A common incorrect answer was $78°$ resulting from $\cos^{-1}(+0.2)$. Many candidates failed to give their answer to the nearest degree as required by the question. However, a significant number of candidates collected full marks.

Question 21

Parts (a) and (b) were, in general, well answered. In part (c), many candidates lost both marks because they solved the given equations rather than writing down the coordinates of the intersection of the lines from their diagram.

Question 22

This question was a discriminator. A significant number of candidates answered part (a) correctly but few correct answers were seen for part (b). Some candidates were able to obtain a B1, follow through, mark for their answer to (c) from their incorrect answer to (b) which had to consist of prime numbers. The B1 mark for (d) was a follow through mark dependent on their answer to (c), thus many candidates were able to collect this mark from their incorrect answer to (c). Only the ablest candidates collected full marks for this question.

Question 23

Part (a) was usually correctly answered, however, some candidates lost marks because of simplification errors made in calculating the elements of the required matrix, $\mathbf{A}^2$. A common incorrect answer seen in part (b) was +3 for *a*. Overall, this question was well answered by the candidates.

Question 24

It was pleasing to see that many candidates are now beginning to understand histograms with unequal intervals, with the result that many candidates collected full marks for this question. The weaker candidates usually collected one mark, namely, that for the column for the $15 < d \leq 20$ interval.

Question 25

Full marks were collected for this question by many candidates. However, candidates should be made aware by centres that they should show their construction arcs in such questions as this which require construction.

Question 26

Candidates invariably gained the method mark in part (a) but many lost the accuracy mark because of incorrect algebra or failing to simplify their answer. In part (b), most candidates gained M1 for equating their answer to (a) to 0. The second method mark was for solving a trinomial quadratic so this mark was lost by those who did not have a quadratic as their answer to (a). Of those that did solve the correct quadratic, many left their answer as 12, –14 thus losing the final accuracy.

Question 27

This question was a discriminator dividing the cohort into two camps, the first containing the majority of candidates who had no idea of what to do resulting in many incorrect guesses and thus gaining no marks, and the second with fully correct answers.

Question 28

Part (a) was well answered by most candidates. A significant number of candidates left their answer to part (b) as $t = 3$s possibly thinking that it was the time that was required or that they did not understand the full demand of the question and so failed to carry out the final step. Of those that did attempt to factorise the quadratic, some found it problematic because of the negativity of the quadratic term. Fortunately, many candidates arrived at the correct answer.

Question 29

Unfortunately, a number of candidates found parts (a) and (b) difficult despite the relatively straight forward nature of the question. Some used the Sine Rule correctly in part (a). Many candidates successfully found AC in part (c) and proceeded to calculate the correct value for AB. However, centres should stress to their candidates that they should show all of their working – in a significant number of cases, the working for AC in part (c) was not present in the candidate's answer and if the value for AC was clearly incorrect, such candidates lost both of the method marks for part (c). A small number of candidates lost an accuracy mark in this question for failing to give one of their answers to the required degree of accuracy.

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