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Examiners' Report/ Principal Examiner Feedback

Summer 2012

International GCSE Mathematics (4MB0) Paper 02

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Introduction

Candidates were well prepared for this examination with the majority of responses to each question being of a high standard.

Centres should focus on areas where candidates could still improve, namely:
(a) getting candidates to identify the number of marks available for each part of a question and allocating a proportionate amount of time to each part of the question;
(b) wherever possible, candidates should check numerical answers by back substitution processes. This would have proved particularly helpful to some candidates in questions 2, 7 and 9.

Candidates should also be reminded that if they are continuing a question on a page which does not relate to the question that they are answering, they must say...'continuing on page xxx'.

Question 1

Despite some candidates being confused between a weak inequality and a strong inequality, many responses were good in this question. In part (a), the common error was the omission of the element 1. Part (b) was very well done and in part (c) common errors seen were either extra elements (3 and 10) or the omission of the element 5 – both types of errors as a consequence of not understanding the meaning of the inequality signs.

Question 2

It is always pleasing to see where candidates are well drilled in a process and solving simultaneous equations where the initial equations needed to be identified proved to be well tackled by the majority of candidates. Indeed, the only significant error seemed to be using x and y the wrong way round resulting in 98 shepherds and 6 sheep. Fortunately for such candidates few marks were lost.

It is worth pointing out here that the candidates who arrived at 'impossible' answers (such as answers involving decimals) would be well advised in future to check their working with this type of question.

Question 3

In part (a), although the majority correctly identified the interior angle as 72°, a few then went on to spoil this work by subtracting from 180° to arrive at the incorrect answer of 108°.

Part (b) identified a weakness in candidates' responses as incomplete or invalid reasons were given for the proof on many scripts. Candidates who simply gave the reason as parallel lines or interior angles lost the mark for the reason and subsequently the mark for the conclusion. Also, candidates who stated that *BD* is parallel to *AE* was insufficient as further work was required to show this was the case.

Centres would be well advised to reinforce the processes of formal geometry with their candidates in order for them to provide the necessary rigor in question responses.

Question 4

A very few candidates got the fraction the wrong way round in part (a) to arrive at an incorrect answer of 216. The majority of candidates however, performed well in parts (a) and (b). Whilst there were also many correct answers to part (c), a sizeable minority either mistakenly evaluated $\frac{2}{3} \times 600$ or stopped when they arrived at 162° - the angle and not the number of people. In both cases, the final two marks were lost.

Question 5

It was pleasing to see that the majority of candidates could construct a correct tree diagram from the data given in the question and many full marks were seen in part (a). Part (b) proved to be as well answered as part (a) as a significant majority of candidates found the required probability by adding the correct two compound probabilities together.

Question 6

Many candidates answered part (a) correctly with only a few failing to simplify in part (ii). Significantly, a number of candidates wrote down the correct answer directly in part (ii) without any prior working – presumably these candidates had recalled a class exercise. It was pleasing to see the correct fraction used by many candidates in part (b). Unfortunately, many sign slips were seen resulting in fewer than expected correct answers of $\frac{1}{4}\mathbf{b} - \frac{1}{2}\mathbf{a}$. In part (c), very few candidates identified the easy route to the solution by using a scale factor of 2 and much working was seen. Indeed, some candidates, who had an incorrect answer to part (b) started again and either arrived at the required answer of $\frac{1}{2}\mathbf{b} - \mathbf{a}$ or twice their answer to part (b). In either case, because of the final follow through mark, full marks were earned by the candidate. Again, in part (d) much unnecessary working was seen and, despite a significant number of correct answers of 1 :1 seen, a lot of time will have been lost on this question by many candidates.

Question 7

Much good working seen in this question with parts (a), (b) and (c) generally well done. Some candidates found $\frac{3}{5} \times 3750$ in part (b) rather than the required $\frac{3}{5} \times (3750 - 1350)$ and consequently lost accuracy marks in the latter parts of the question. In part (d), the majority of candidates obtained the correct solution. However, many stopped at the 2011 figure of 3390 and others multiplied by 0.75 rather than dividing by 0.75 and 2542.5 was a popular, but incorrect answer seen.

Question 8

Where candidates seemed to be well drilled in the processes of transformation geometry much good working was seen with many scripts showing full marks. It is worrying, however, to see that a significant minority of candidates did not progress beyond the first mark suggesting that this topic either had not been covered by the candidate or had been poorly understood. As usual, in this type of question, careless arithmetical processes led to marks being lost. Candidates should be advised that this type of question does lend itself to self-checking and if their final transformation, as required in part (f), is not straightforward, then they have made an earlier miscalculation.

Question 9

Many correct answers were seen in part (a) with a significant minority of candidates showing much algebra in part (ii). Whilst this was commendable, the considerable time spent on this part of the question, put pressure on completing other questions in the time available. Whilst $x = 0$ or ($x \neq 0$) were acceptable answers to part (b), a significant number of candidates thought the required answer was $x = -2$. Many candidates started correctly in part (c) with the statement, $2 + \frac{4}{x^2 - 3x - 6} = 0$ but arithmetical errors or poor use of the quadratic formula led to the loss of some or all of the accuracy marks here. Indeed, candidates should be advised that on Paper 2, where the quadratic formula is NOT given, the quadratic WILL factorise. Again, this was another question where candidates could self-check their numerical answers by substituting into the function gf(x).

Candidates seemed to be well drilled in the process of changing the subject of an algebraic formula and much correct working was seen. A significant number of candidates, however, lost the final mark because they failed to give their answer in the required form.

Question 10

Forming an algebraic expression for a three-dimensional shape from a two-dimensional representation is always challenging to candidates and many candidates produced the wrong expression or simply did not know where to start in part (a). Recovery was possible in part (b) with a correct expression for the height in terms of the radius and a substitution of this formula into their expression for part (a) enabled a method mark to be earned in part (c). Overall, the majority of candidates seemed unable to score more than 2 marks out of 4 for the first three parts of this question. Many candidates, however, recovered well in the next three parts of the question by completing the table correctly and drawing excellent graphs. Correctly drawing a straight line and reading from their graphs proved to be not a problem for the majority of candidates in part (f). Part (g), however, proved to be most challenging with a significant number of candidates obtaining no marks for this part of the question. For those who did correctly evaluate $\frac{180 \times 3}{10 \times \pi}$, almost all scored the remaining three marks of this question.

Question 11

Too many candidates failed to link the tangent to the radius (or diameter) in part (a) and, as a consequence, scored no marks at all for this part of the question. In part (b), a majority of candidates correctly used the tangent – secant formula but a significant minority of candidates made attempts to use trigonometry or simply invented ways to combine 6 and 12 to get the required answer of 24. In part (c), 18.7 cm proved to be a popular, and correct, answer with many candidates substituting correctly into the cosine rule. Some candidates successfully used the cosine rule *twice* by first finding *AC* and then *BC*. Whilst these candidates are to be commended, they were required to do a lot of work for the three marks available. Some candidates simply stopped at the first stage and identified *BC* as 9.35 cm – an incorrect answer which meant that other accuracy marks, later in the question, would be lost. It was good to see that, despite some premature approximations ($100.6° \approx 101°$) leading to a loss of accuracy, there was much good working seen in part (d) with good use made of the sine and/or cosine rule. A minority of candidates assumed (correctly) that $\angle BOC = 2 \times \angle BAC$ but then assumed (for whatever reason) that $\angle BOC = 50°$. Not only did this mean that these candidates lost the four marks but they also lost at least three of the marks from the remaining two parts of the question.

The majority of the more able candidates knew what to do with the remaining two parts of the question and only lost marks due to errors in the previous parts of the question.

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