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Principal Examiner Feedback

November 2012

GCSE Mathematics (2MB01)
5MB3F (Calculator) Paper 01

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November 2012
Publications Code UG033853

GCSE Mathematics 2MB01
Principal Examiner Feedback – Foundation Paper Unit 3

Introduction

The majority of candidates taking this paper were clearly well prepared and showed much confidence dealing with multi-step unstructured questions. Towards the end of the paper, however, even the most successful candidates appeared to be less familiar with questions requiring recall of facts such as the circumference of a circle and Pythagoras' theorem.

The majority of candidates provided clear working to all solutions and few lost method marks through lack of evidence of working when inaccuracies in final answers occurred. As this was a calculator paper, it was disappointing to see a number of arithmetic errors spoiling otherwise correct work. Whilst it is pleasing to see that candidates do not resort to their calculators to carry out simpler calculations, students should be encouraged to make use of it to check their work.

Students need to be encouraged to read questions with great care. As candidates appear to have become more familiar with questions involving calculations and then interpretation of final answers they need to ensure that they are answering the actual question set.

Reports on Individual Questions

Question 1

In part (a) the most common incorrect decimal given for $\frac{1}{4}$ was 0.4
Other incorrect answers involved the incorrect placement of the decimal point giving 2.5 or 25 and some candidates gave 1.4. Most candidates converted 0.75 correctly to either $\frac{75}{100}$ or $\frac{3}{4}$ for part (b), but others used the digits 7 and 5 to make the fraction $\frac{7}{5}$ or wrote 7.5. The most common error in part (c) was to convert 200 mm to 2 cm with a few candidates multiplying rather than dividing by 10 to give 2000 cm.

Question 2

In parts (a) and (b) correct names were usually given for both polygons. Slightly incorrect spelling was condoned but where ambiguity occurred with words such as hectagon, marks were lost.

In part (c) candidates realised that the congruent shapes needed to be the same shape but those losing marks chose 2 shapes of different sizes, typically the parallelograms A and C, trapeziums E and F or rectangles D and G.

Question 3

A lack of attention to detail was the cause of candidates losing marks in this question with errors made distinguishing between the T-shirt and shirt in otherwise correct work. Organised candidates gained method marks in part (b) showing 50 - 3 and then various trials of pairs of prices to reach exactly £47

Question 4

Candidates were very successful answering this reflection question with only a few losing a mark for slightly incorrect positioning of the image.

Question 5

The majority of candidates clearly understood this question and answered it well. Correct calculations were written down and candidates were clearly equipped with calculators as there was very little evidence of attempts at non-calculator working. Inaccurate transcription of answers from the calculator display led to marks lost when £104.04 was written 104.40 and £112.80 as 122.80. Other errors were made where candidates over complicated the question and tried to work out the relative cost as if there were equal hours worked for both jobs. Some introduced other time periods, sometimes multiplying by 5 or by 7 as if the hours given were per day.

Question 6

Part (a) was answered well with the majority of candidates working methodically through the problem adding and subtracting from the starting 150. Most errors appeared to arise from misinterpretation of whether passengers getting on or off increased or decreased the total. The most common incorrect answer was 94 where all 4 values given were subtracted from 150. A few arithmetical errors suggested that candidates did not bother using a calculator for the relatively straightforward calculations in this question. In part (b) many candidates gave the correct unsimplified fraction $\frac{80}{240}$ but failed to simplify it correctly. Usually non-calculator methods were used with arithmetical errors seen in a list of equivalent fractions or sometimes giving $\frac{5}{15}$ as the final answer. Basic misunderstandings about fractions were demonstrated by answers such as $\frac{240}{80}$ or 3, and some candidates misread the question and gave the seats which were not red.

Question 7

In part (a) most students realised that 2 successive division calculations were required and usually carried them out in the same order as information had been presented in the question. Part marks were awarded for the first division and those scoring no marks had usually misinterpreted the situation and multiplied all the numbers seen in the question. Conversion to kg caused much difficulty in part (b). Many candidates found the correct weight of 25 packets of sweets and they usually added the weight of the actual box. Often no further work was done or incorrect conversion factors, typically 10 or 100, were used.

Question 8

This question was usually accurately answered; the errors that did occur were often as a result of inaccurate reading of the information. There was some confusion with the ticket price for a Child under 16 with several candidates using the age 16 as the price with £16 rather than £15. Familiarity with “best buy” type questions led some candidates to conclude that the family ticket would be cheaper without stating the £3 difference as required by the actual question.

Question 9

In part (a), candidates appreciated the need to substitute 9 into the word formula and did so correctly with errors, with the order of operations causing some inaccuracies with the final answer. Some candidates went on to attempt an unnecessary conversion of seconds to minutes and seconds.

For part (b) a variety of strategies were seen with the words in the formula appearing to discourage more able students from forming an equation to solve. Instead inverse operations were applied with varying degrees of success applying the process in the correct order. As a result the answer 4.4 from 360 ÷ 14 +10 was frequently seen. Trial and improvement methods were common and usually yielded the correct final answer.

Question 10

The majority of candidates could make some progress with this question and were generally unfazed by the context with its mixture of varying and fixed sponsorship amounts. The forms were used to show working but a few arithmetic errors particularly with 2 × 18 or finding totals were seen. Some failed to give a final conclusion or thought that both Jamie and Lily were each aiming to raise £108 rather than combine their totals raised.

Question 11

The majority of candidates knew what a net was and drew an acceptable sketch. Marks were lost when diagrams were drawn to suggest some perspective or a net was starting to fold leading to parallelograms or trapezium faces instead of two of the rectangles. Although this question asked only for a sketch, candidates need to take some care to draw shapes carefully to ensure that there is no ambiguity about their intentions.

Question 12

Very few candidates gave the correct bearing in part (a) although there was no evidence of a lack of protractor being the problem. Many measured 60° instead of 120°, presumably from the anti-clockwise angle from B to A or a protractor scale misread or gave the distance from A to B instead. Candidates were more successful in part (b), but a significant number who measured the correct 5.5cm and understood the scale factor 10 then gave 10 × 5.5 = 50.5. Had these candidates chosen to use their calculator to check their answer, this arithmetic error could have been corrected.

Question 13

Parts (a) and (b) were very well answered with only the weakest candidates using the incorrect operations giving 2 from 7 - 5 and 3.5 from 7 ÷ 2. Collecting up the 3 terms in y caused problems in part (c) and meant that the first mark alone for doing so was rarely awarded. Others combined the $2y$ and $3y$ and then ignored the y to subtract 5 from both sides leading to $y = 37$.

In part (d), many weaker candidates used trial and improvement rather than a formal algebraic approach. Unfortunately, when they had reached the correct solution they did not write 5 on the answer line but gave 21 or 25 instead.

Question 14

Part marks were rarely awarded with candidates either understanding the term tessellation or not. Candidates need to take care to show the outline of each shape clearly and not obliterate the edges with unnecessary shading.

Question 15

Candidates usually made some progress with one of two approaches; either finding the total for Gordon's shop, reducing it by 5% and then comparing to the supermarket total or reducing each individual item by 5%, totalling and then comparing to the supermarket. Whichever method was used the main source of error was an inability to correctly reduce by 5%. Several candidates found 10% and then halved it sometimes making rounding errors in the process. The weakest ignored the percentage aspect altogether and instead reduced all items by 5 pence. On this question, accurate answers were not essential for the award of the final communication mark. It was acceptable for candidates to compare either the total price of items at both shops or the price of all 3 individual items.

Question 16

The majority of candidates gained both marks for this construction giving an equilateral triangle with sides' length within a +2mm tolerance. Students need to understand that accuracy is essential and take the time to measure very carefully or risk losing marks unnecessarily.

Question 17

Most candidates made good progress towards finding the total costs of buying the paint from each of the two shops. The majority gained the first mark for finding the number of cans required from at least one shop, and they usually went on the multiply this number by the cost per can at times including VAT and at times not. The main source of error was in calculating the VAT at 20%. Many found 10% doubled and added it on. Several candidates inaccurately stated that 10% was 83p or 84p (rather than 83.5p) and lost marks as a result. Only a few candidates chose to compare the cost per litre of each can but they usually omitted to show how many of each can size was needed to acknowledge that this method was valid to compare the cost of 7.5 litres of paint.

Question 18

Few candidates used a fully algebraic approach and it was extremely rare to find the equation $3x + 2 = 26$ being successfully reached and then solved. Most candidates used a numeric approach, scoring at least one mark for showing three ages that added to 26 or giving at least three trials. Some candidates who tried to use algebra gave the expression $4x$ for Peter's age instead of $x + 4$.

Question 19

Surprisingly few candidates reached the correct final answer with units on a relatively straightforward circumference question, albeit in the context of ribbon round a cake. Several candidates used the area formula or missed the required units. The mark for giving centimetres associated with a final answer was gained by others who had made no progress with circumference.

Question 20

In part (a), most candidates gained at least one mark giving at least 4 of the correct integers. There were some errors interpreting the difference between the inequality symbols with confusion as to whether -2 and 3 should be included. Some candidates appeared to have misunderstood the question and gave a final answer of 5 to indicate how many integers met the inequality. Candidate's answers for part (b) included both formal algebraic solutions and trial and improvement methods. Trial and improvement often yielded the correct integer answer from straightforward inspection whereas, many candidates who reached $\frac{11}{3}$ did not go on to give 4 as their final answer and so lost the final mark.

Question 21

Candidates who realised that they had to use Pythagoras' theorem generally went on to give a fully correct method and final answer. Although the question advised candidates to give their answer to 1 decimal place, they were not penalised for incorrect rounding once an accurate answer had been seen. Students need to read calculator displays with care as many gave 227 as an interim answer rather than the correct 277. Use of the ANS key on a calculator would help prevent this error although students should always be encouraged to also write down full working. Occasionally candidates multiplied the side lengths 9 × 14 and, despite the diagram not accurately drawn warning, many had clearly measured the hypotenuse length to give 7.3 or 7.2 cm.

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