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Principal Examiner Feedback

Summer 2012

GCSE Mathematics (2MB01)
Paper 5MB3H_01 (Calculator)

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

Introduction

This is a calculator paper. It was evident from some work that candidates were attempting the paper without the aid of a calculator. This is not advisable, since calculation errors will cost marks.

Many candidates were able to make inroads into some of the unstructured questions, whilst still gaining marks on questions which had a more traditional style.

Many candidates had significant strengths and weaknesses, that is there were topics for many which were not well understood, whilst they also attempted some questions very well. Many able candidates lost marks in the easier questions in the first half of the paper. To gain the highest marks candidates had to demonstrate high order thinking skills in a range of questions, not just in those questions towards the second half of the paper.
The inclusion of working out to support answers remains an issue for many.

Reports on Individual Questions

Question 1

This question was extremely well done. The most common error was omission of the units.

Question 2

This question asked candidates to use a simple interest method to calculate the numbers of years after which the total interest was exactly £60. Those who did so using a simple interest method usually gained full marks. A lot of candidates chose instead to use a compound interest method. Whilst some credit could be given, their work failed to show the total interest was exactly £60 after 4 years, and there were many occasions when their work (over 4 years) was prone to errors in calculation. Few responses used the simple interest formula, rather relying on working out 1 year (£15) and then realising you just needed 4 of these to make the £60.

Question 3

There were many good attempts at this fraction question. Many candidates correctly converted the fractions to vulgar form, but then made errors in performing the division. Some made the arithmetic harder by writing them using common denominators. Simplification was not required, so any equivalent answer was accepted. Many chose to convert the given mixed numbers into decimals, to then use their calculator to give the answer; this was accepted, as long as an accurate decimal equivalent of the answer was given (to at least 5 d.p.). Many lost marks initially by writing the first fraction as 3.3, a premature approximation. Those with scientific calculators could make good use of the fraction function to give the answer, but in this case it had to be written correctly and not using calculator notation.

Question 4

Full marks were gained by many on this question. In part (a) the most common error was to work out the VAT only, and not give the total cost of the cooker. There were instances of a division of 20% rather than multiplication. Even on this calculator paper it was not uncommon to see 10% then 20% calculated, not always accurately.

It was in part (b) that the most errors occurred, with many giving an incorrect answer of 85%. Another common misunderstanding was finding 39% of £260. There were too many errors caused by candidate copying numbers down incorrectly, typically £199 instead of £119.

Question 5

There were many different approaches to this question. The majority used the straight forward cost per kg to make their comparisons, though calculation of the cost per kg was also popular. A few lost the final mark by choosing the lowest value, not the highest. A significant number equalized the number of kg, for example to 90kg or other weight. It was very encouraging to see a detailed statement given at the end (this was a QWC starred question) by nearly all candidates. Those who failed to give a statement but just relied on circling the chosen box failed to get the final mark.

Question 6

There were many correct answers. The most common omissions were the direction (clockwise) of the centre of rotation. A number of candidates did not pay need to the requirement for a single transformation, usually trying to combine a rotation and a translation.

Question 7

Nearly all candidates gained at least 2 marks for a correctly evaluated trial between 1.7 and 1.8 but some did not carry on to trial a value of x to two decimal places between 1.75 and 1.8. There were some instances of candidates giving an otherwise flawless solution to 2 decimal places instead of the 1 decimal place requested; some made an error of judgement after calculating a value using 1.75 to give an answer of 1.7 instead of 1.8

Question 8

There were many disappointing responses to this question. Few candidates were able to work out the gradient. Many started by drawing a right angled triangle against the line, but were then unable to use them. Frequent problems occurred when triangles that were too small were drawn (leading to inaccuracy) or incorrect use of the scale to find the base length and height of the triangle. A significant minority spoilt their answers by giving them as an algebraic expression (eg $40x$ or $y=40x$) instead of a value. Marks were rarely awarded in part (b) since few candidates demonstrated any understanding of rate of change. Common incorrect answers were related to correlation or attempts to describe the relationship between petrol used and distance without discussing rate. Those who realised that gradient was linked to rate of petrol consumption usually gained the mark.

Question 9

The majority realized that the diagonal was to be found using Pythagoras. Weaker candidates doubled rather than squaring in calculating Pythagoras. Those who failed to choose Pythagoras as a method either guessed the length of the diagonal, or estimated its length from the two given sides. If made clear, they could then gain some credit from calculating the total of their six lengths.

Question 10

This was successfully completed by most candidates. For the rest the first problem was to decide the number of packages and parcels; those misinterpreting the ratio frequently gave incorrect answers of 30 and 10. A significant number spoilt their work by finding 32×25.6.

Question 11

Many values were given correctly in part (a). The most common error was in giving and answer of 3 or -3 for $x=-1$. Plotting points was quite well done in part (b); nearly all candidates realised that a curve was needed to join the points. Not all candidates knew how to answer part (c). Common errors included reading from the line $y=1$ or giving the solutions as coordinates rather than values. Few candidates marked the intersection with their curve to show where they were attempting to read off the values. Reading accurately was spoilt sometimes by poorly drawn curves.

Question 12

Nearly all candidates correctly interpreted the speed aspect of the problem and attempted to divide distance by speed. The problem for most was taking their calculated result and putting it in standard form notation. It was clear that the calculator was rarely being used to best effect in producing the final standard form answer.

Question 13

In part (a) a significant number were able to understand that y was proportional to x and continued to write $y=kx$, usually writing $10=k\times600$. Completion of this was frequently flawed, leading to $60x$ rather than $x/60$. The mark in part (b) was usually gained, in many cases using their flawed equation (used correctly).

Question 14

Part (a) was answered well, usually resulting in full marks. Most candidates realised that 5 was not to be included in the list for y, however it was not uncommon to find 4 included in the lists.

There were many non-attempts of part (b); or many with just horizontal and vertical lines with some quite random shading. Better candidates were able to drawn correct lines, sometimes with consistent shading, but frequently an incorrect region indicated as the answer. The shading for $y<2x-2$ was not always correct.

Question 15

Part (a) was usually well answered by those who understand vector notation. The most common error was leaving expression incomplete or ambiguous by not resolving multiple signs, for example $-\mathbf{a}+-\mathbf{b}$.

In part (b) many candidates gave the correct response of $\mathbf{a}-\mathbf{b}$. Marks for the explanation were harder to come by. References to parallel lines were needed; evidence of vector notation, for example showing expressions were multiples of each other, provided good evidence of understanding.

Question 16

Most students showed they were able to expand the brackets correctly. Many also demonstrated that they could rearrange terms, either by rearranging a *t* term, or by dividing through by a numerical value. Some struggled with sign changes. The final mark was frequently lost when the candidate could not resolve all terms correctly. The final expression did not have to be fully simplified, but candidates did have to write an expression that was algebraically equivalent with the correct answer.

In part (b) clear working out was essential. It was encouraging to see many detailed attempts. Trial and improvement approaches rarely resulted in correct solutions. Substitution methods were equally unsuccessful. Most errors were due to arithmetic mistakes or error in handling negative signs. Most candidates were able to manipulate the equations but processing them was much harder.

Question 17

Part (a) was poorly answered, the majority giving 80 × 2 = 160. One reason might have been that candidates did not associate paint with area.

Greater success was found with part (b). Many used a scale factor 8 correctly to find the answer. Many also chose a circuitous route of working with volumes of cones to find the answer; a minority trying this route used prematurely rounded figures and therefore failed to reach an accurate final answer.

Question 18

There were some who did not understand the topic and associated this question with Pythagoras and right-angled trigonometry. The majority deduced Cosine rule was needed and correctly substituted in their values. In many cases the order of operations in Cosine Rule was flawed, resulting in an incorrect length for DB. Many then went on to use Sine Rule, with greater success and sound method shown resulted in additional marks.

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