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Principal Examiner Feedback

Summer 2013

GCSE Mathematics (Linear) 1MA0

Foundation (Non-Calculator)

Paper 1

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GCSE Mathematics 1MA0
Principal Examiner Feedback – Foundation Paper 1

Introduction

The paper proved accessible with many candidates able to give good answers to a range of questions. In future candidates should ensure that, where appropriate, units are given with the final answer to each question. Knowing the conversions between metric units (eg. cm to m, g to kg) proved to be a weakness for a number of candidates. There was evidence of weak arithmetic in a number of questions, for example questions 5 and 13 where many candidates failed to gain full marks due to errors in arithmetic, frequently in subtraction but inaccuracy in basic addition was also seen. In general, candidates responded well to those questions testing quality of written communication (qwc) by showing all relevant working. There is still, however, a small minority of candidates who either fail to show working or else fail to give a conclusion where this is appropriate. For example, in question 13, the demand was 'Does Mitch have enough money?' but a significant number of candidates failed to address this and just showed their working out with a numerical answer. In question testing qwc, conclusions must be given as a statement. It is not sufficient to circle the answer in the question or draw an arrow pointing to the answer. There was a noticeable lack of checking in many questions with candidates happy to give completely unreasonable answers. For example, giving the height of a girl as 183 m, 1.83 cm and 6.78 metres in question 7, the total cost of the tickets as £24 in question 17, the cost of 200 g of cheese as £1120 in question 19.

Report on individual questions

Question 1

The success rate in part (a) was very high. Some candidates clearly confused an isosceles triangle with an equilateral triangle as C was the common choice from those who got the question wrong. In part (b) a number of blank responses suggested that not all candidates had a protractor with them. There was evidence that those who did have a protractor sometimes had problems with using the scale; some candidates used the wrong scale and so gave an answer of 62^{o}, others read the correct scale incorrectly and gave an answer of 122^{o} rather than 118^{o}. Part (c) was well answered with 15 cm and 11.5 cm common errors from those who failed to gain the mark.

Question 2

The majority of candidates gave the correct answer but a sizeable minority gave an incorrect answer of 6, the height of both bars representing cheese sandwiches but not the total. A significant number of candidates gave 47, the total number of sandwiches, as their answer suggesting that they had not read the question carefully enough. In (b) a common error was to evaluate 28 – 19 as 11 rather than 9. The majority of candidates found the number of white bread sandwiches and then subtracted the number of brown bread sandwiches although some employed a method of differences within each type of filling. Significant numbers of candidates gave an answer of 28 or 19 rather than finding the difference. Some candidates did struggle to take accurate readings from the graph when the bar was halfway between 10 and 12, for example, this was sometimes written as a frequency of 10.5 rather than 11.

Question 3

In part (a) significant minority of candidates either gave the name of one of the relevant caravans or else wrote down 6 and 8. It was rare to see an incorrect answer in part (b). Errors in part (c) were most likely to arise from the selection of the wrong figures, there were also a surprising number of misreads of 449 as 499 and lack of accuracy with the subtraction. In part (d) the majority of the candidates realised the need to multiply 12 by 30 (although not all could do this correctly) but the change from centimetres to metres proved more difficult. Some candidates just gave their answer as 360 metres and so ignored the need to convert from centimetres to metres while others used the wrong conversion factor.

Question 4

Many candidates made effective use of numbers lines to get to the correct answer in both parts of this question. However, errors in the counting along number lines were common.

Question 5

Many candidates were let down by their arithmetic in this question. It was not uncommon to see the correct method being attempted but with errors usually, but not always, occurring in subtraction. A significant number of candidates gave their answer as 77 - the number of boxes in the store room rather than the number that could be added to the store room. A common error was to start by adding 65, 17 and 29.

Question 6

The majority of candidates gave the correct answer to part (a). Of those who were incorrect the most common answer was 19 mins which seems to be the time taken by the 10.30 train. A surprising number of students got part (a) incorrect – mainly due to poor arithmetic- not because they couldn’t read the timetable. In part (b) the majority of answers were correct. However, 10 29 and 10 39 were also occasionally seen.

Question 7

When no units are given on the answer line then it is down to the candidate to provide these where necessary. In this question, many answers were given as 183 or 1.83 both of which scored one out of the two available marks. A common error was to add 1.78 and 5 rather than 1.78 and 0.05 or 178 and 5. Some candidates subtracted the 5cm instead of adding it. Common errors included 183m or 1.83cm, where candidates did not consider the context of the question.

Question 8

Counting the number of centimetres on the perimeter proved a challenge for many with the bottom of the shape causing the most problems. A significant number of candidates failed to give the units of cm with their answer, this was frequently omitted or else the wrong units, eg. cm^2 were given. A common incorrect answer from the confusion of area with perimeter was 9 cm^2. In part (b) a significant number of candidates drew a shape other than a square with an area of 9 cm^2 or drew a shape with an area of 14 cm^2, again confusing area with perimeter. Others drew a square of the wrong area.

Question 9

$(-3, -2)$ was a common incorrect answer in part (ai) although most candidates were able to both identify the point correctly in (ai) and plot the correct points in (aii) although many candidates failed to label point *B* this was condones unless they had plotted additional points. Part (b) proved more demanding with relatively few candidates being able to draw the correct line. Most drew a diagonal line, often passing through *A* and *B* or the point (0,3) alone was plotted. Some drew the line $x = 3$.

Question 10

The vast majority of candidates gained at least one mark in this question. The most common error was to repeat pairs. Some included (apple,apple) etc. though they then usually went on to repeat pairs as well. The candidates who worked methodically tended to get full marks. A few candidates used their own types of fruit rather than those given in the question or explained which fruits they thought would go well together or commented on the relative nutritious qualities of the fruits.

Question 11

This was a question that tested 'quality of written communication'; candidates were also instructed in the question to show all their working. A small minority of candidates did not show their working and were penalised for this. The majority of candidates tackled the question by finding the cost of 30 pens from each shop and then stating their conclusion. Many candidates successfully tackled this problem by listing multiples. Some candidates did not achieve the "C" mark as they did not clearly express their conclusions and simply ticked or circled their choice, which was insufficient. Quite a few students finished this question by circling the part of the question giving info about Shop B instead of writing a conclusion comment – this combined with very poor conclusion statements for many who did attempt to make one suggests that the conclusion aspect of questions like this is a major weakness which really needs to be worked on. A common misconception was to think the prices were per pen and so obtaining 30 × £2 = £60 for shop A and 30 × £3 = £90 for shop B.

Question 12

Those candidates who worked out that each division on the gauge was equivalent to 10 litres generally went on to gain full marks. There was some confusion over where to put 80 on the gauge with a number of candidates putting it at the 'start arrow' position rather than at the full position. Many pupils showed the calculation of 60 – 50 = 10 and then put their final answer as 10. In part (b) carrying out the operation of 180 ÷ 15 proved more difficult for candidates than identifying that this was the correct process. Many used repeated subtraction or repeated addition, too often, errors were made. Some showed the correct process but then gave the answer of 120 rather than 12. Some candidates incorrectly thought that they could evaluate 180÷15 by working out 180÷10 and 180÷5 and adding their answers.

Question 13

As the information about prices was given using mixed units, it was essential that candidates showed units with the answer in this question. It was common to see candidates working with the prices of only three rather than four items, often omitting one cone. The majority of candidates added up the total and compared it with the amount of money available and then using the £4 and £4.10 to conclude that he didn't have enough money or stating that he was 10p short. Others showed Mitch buying one item with one of the coins and so on, this method was perfectly acceptable although it wasn't always easy to follow the working through. A small but surprising number gave the total of the coins as £3 and/or misread the prices given in the question. Probably the most common loss of the 'C' mark was for lack of units.

Question 14

Part (ai) was almost always correct. The reasons in part (aii) were generally given as 'add 5' or else hinged on the numbers in the sequence ending in 2 and 7 so 27 being the next number to do this. A very few candidates identified the *n*th term and gave that as their reason. Reasons involving $n + 5$ gained no mark. In part (b) the most common reason was to state that numbers in the sequence ended in 2 or 7 which 45 did not. Stating that 45 was not in the sequence because 42 and 47 were was also frequently seen.

Question 15

3.3 and 0.33 were common wrong answers for $x = 0.5$ When the value of x was an integer, there was a much higher success rate. Plenty of success was also evident in the final row in the table where the inverse rule had to be used.

Question 16

Part (a) was well answered. Part (b) proved to be a good discriminator. Some candidates picked up a method mark by showing the intention to start with either 3×3 or 4×5. However, starting correctly did not always mean the correct answer, those who started with $3\times3 = 9$ then frequently went onto and 4 and then multiply by 5 to give the common incorrect answer of 65. Another common incorrect answer was 50 from those who started with 3×3 but evaluated this incorrectly as 6 and then went onto add 4 and multiply by 5 rather than add 20. Also, 26 was another common response from those candidates who incorrectly evaluated 3^2 as 6 but correctly evaluated 4×5 as 20 and added the two together. Finally, 15 was a common incorrect answer in part (c). There were a significant number of blank responses in part (d) with 8 being the most common incorrect response from those who attempted the question.

Question 17

It was rare to see an estimation attempted; the majority of candidates worked with the figures given in the question. Much time was wasted by candidates engaging in long drawn out multiplication calculations. Most managed to score at least 1 mark in this question by attempting $2.95 \times 21 \times 39$.

Question 18

Part (a) was well done although a significant number of candidates gave an answer such as 'unlikely' or impossible' rather than a numerical value. Incorrect notation such as 1 : 6 was also seen. In part (b) a common incorrect method was to divide 120 by 7 rather than 6. In some case, $\frac{1}{6}\times120$ was evaluated as $\frac{120}{720}$.

Question 19

A common misconception was that 1kg is equivalent to 100g. Candidates who wrote this down then went onto double the given price so that £11.20 was a very common incorrect answer. Some who knew that 1kg is 1000g, then stated that 500g would cost £2.80 and 250g would cost £1.40 but were unable to work out the cost of 200g. A number of candidates realised that the calculation needed was 5.60 ÷ 5 but were unable to carry this out accurately with £1.20 being given as a common incorrect answer.

Question 20

Those who realised that the total of all the numbers on the cards must be 40 generally went on to gain full marks. However, this first stage proved beyond many candidates. Few candidates used an algebraic method and formed an equation. Some attempted it with occasional confusion with the 'range' found instead of the mean. Most frequent answer was 33 or '33/3 = 11' Quite a few errors were made in just adding the numbers on the cards!

Question 21

Part (a) proved surprisingly difficult for many, C was a common incorrect answer. Greater success was evident in part (b). In part (c) many of the tessellations were of a hexagon and a triangle or rhombus rather than just a hexagon. When this was the case, no marks could be awarded. Some candidates started drawing what could have been a correct tessellation but failed to show how the hexagons would fit together round a point and so fill an area.

Question 22

The first two parts of this question were almost always correct. Part (c) was also well done although there was some inaccurate reading of the graph. Providing candidates showed working then one mark could be awarded for a correct method if just one of the readings used was incorrect. However, many write down an answer alone so, in the event of the answer being incorrect, no mark could be awarded. In (c) a significant minority misread the second graph. Dropping a line from the end point to the horizontal axis usually led to a correct reading.

Question 23

Success was very high in part (a) but then decreased throughout the rest of the question. 2 was a common answer in (c) where the candidates divided 8 by 4 instead of multiplying. $9t$, $5t$, $6t$ and $6 + t$ were common incorrect answers in part (d). Some candidates although able to expand the bracket then went on to give an answer of 9t.

Question 24

Some very good solutions were seen to this question with all working present and well organised; a two way table was the most successful (although rarely seen) method where the cast majority of attempts gave full marks. On the other hand, some candidates worked in a very unordered fashion showing multiple attempts. If it was clear which attempt and therefore method resulted in their chosen answer then this would be marked. But if, as on many occasions, an examiner was presented with a mass of calculations with no clear path through these then no marks could be awarded. Equally, some candidates made a correct start to the process but then abandoned this and started again. Again, the final answer determined which working should be marked. The most common incorrect method seen was to add up the given figures of 10, 8 and 13 then subtract the answer from 40. Such an approach gained no marks. Candidates who used a two way table were able to provide an organised solution. Several who did not use a table gave 17 + 5 rather than 17 + 8 for the number travelling by car.

Question 25

In questions testing quality of written communication there is no answer line given. It is therefore important that the candidate makes it absolutely clear which is their final answer and, in the case where an angle is the answer, links the answer with the name of the angle. Too many candidates left '50^{o}' somewhere in their working and failed to link it with angle x. Geometric reasons must be given in full. It is not sufficient, for example, to state 'a triangle is 180^{o}. A common error was to sate that the marked lines were parallel instead of equal. Some candidates also identified the triangle as equilateral rather than isosceles.

Question 26

Whilst many candidates did attempt a translation in (a) it was frequently the wrong one. There were many rotations and reflections seen rather than a translation. In part (b) the part of the description most likely to be omitted was the centre of rotation. 'Turn' or 'rotational symmetry' are not an acceptable description of a transformation, 'rotation' must be used. A significant number of candidates gave more than one transformation and so scored no marks.

Question 27

Some very good solutions were seen. However, in many cases, arithmetic errors or incorrect calculations led to the loss of one or more marks. It was disappointing to see a number of candidates get to a correct final calculation of 240 − 216 and then give the final answer as 34 or 124 rather than 24. There were two main methods of solution used by candidates. The most popular was to work through in the order given, working out 15% of 240 and $\frac{3}{4}$ of 240 then subtracting these values from 240. There were two common errors seen by those who took this approach; the first was to work out and use just $\frac{1}{4}$ of 240 , the other was to work out 15% of 240 and subtract this from 240, leaving 204 and then find $\frac{3}{4}$ of 204. Both errors were serious enough to mean that candidates were only able to gain the method mark for the correct method to find 15% of 240. The other common method was to add up 15% and $\frac{3}{4}$ to get 90% and then conclude that 10% of students 'did not know'. Some candidates stopped here, gaining two of the available marks, other candidates went on correctly to evaluate 10% of 240.

Question 28

The most common method employed by those candidates who attempted this question was trial and improvement. This approach resulted in either full marks or no marks. A minority of candidates did attempt to form an equation from the given information. Some omitted to add all four sides and so equated the semi-perimeter to 32 rather than the perimeter. A significant number of candidates who correctly arrived at $8x = 12$ were then unable to get to the correct solution with 1.4 being a common incorrect answer, which came from using the remainder 4 for the decimal when dividing 12 by 8. A common algebraic error was to simplify $4 + 3x$ as $7x$.

Question 29

There were many candidates who made no attempt at this question. A surprising number of candidates just plotted the point (−2, 4). This is a correct point on the line (a minimum of two correct points were needed to gain a method mark), however, it seemed more likely that candidates were simply reading the last part of the demand 'values of x from −2 to 4' and using this information to plot the point. The most successful candidates were those who drew up a table of values and then plotted their found points. A significant number of candidates who took this approach gave incorrect values of y for negative values of x but usually did enough to gain two marks for the correct line in the first quadrant. A significant minority of candidates did plot a number of points correctly but then omitted to draw a line through these and so lost the final accuracy mark. Others, had difficulty with the scales.

Summary

Based on their performance on this paper, candidates are offered the following advice. They should:

- Ensure that, where appropriate, units are given with the final answer to each question.
- Know the conversions between metric units (eg. cm to m, g to kg)
- Check arithmetic carefully
- Show all necessary working
- Present your working so that it can be followed through, explain what you are working out where appropriate
- Ensure that the question asked is answered; when a statement is needed to answer the question make sure that this is given
- Think carefully about answers considering whether they make sense in the context of the question

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