

Principal Examiner Feedback

November 2012

GCSE Mathematics (Linear) 1MA0
Foundation (Calculator) Paper 2F

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GCSE Mathematics 1MA0

Principal Examiner Feedback – Foundation Paper 2

Introduction

Candidates appear to have been able to complete the paper in the allotted time. The paper gave the opportunity for candidates of all abilities to demonstrate positive achievement.

Many candidates are setting out their working in a clear, logical manner. The performance of other candidates might be helped if they improved this aspect of their work.

Candidates are advised to write down their method before using a calculator, for example by calculating and writing down the numerator and denominator of a fraction prior to division.

Examiners sometimes found it difficult to tell what the candidate intended after they had altered an answer or a diagram. Candidates are advised to use a pencil when drawing diagrams.

In responses to questions which specifically assess the quality of written communication, candidates have improved this aspect of their answers in recent examination series. However a minority of candidates do not write a clear statement, are still giving just one word answers or merely circle a word or phrase to indicate a decision. A few candidates fail to make any decision at all.

A significant number of candidates appeared not to have access to a calculator or a ruler or a protractor.

Report on Individual Questions

Question 1

This question was also well answered. The majority of candidates gave the correct answer to part (a) of the question. Most of the incorrect responses to this part were either "3060" or "3006".

The majority of candidates also gave correct responses to parts (b) and (c) of this question.

Question 2

Candidates generally made a good attempt at this question. More than three quarters of the candidates were awarded at least 5 of the 6 marks available.

Nearly all candidates understood what was required to complete the table in part (a). However a lack of accuracy led to many candidates losing a mark. Centres are advised to remind candidates to check their working. The stem of this question stated that 24 people were included, yet the sum of many candidates' frequencies was not 24.

The vast majority of candidates chose a bar chart as their "suitable diagram" in part (b). These candidates nearly always gained some credit. A relatively small proportion of candidates were awarded all three marks. The main errors involved an inaccuracy in scaling or a lack of labelling of the vertical axis. Many of the scales seen either did not start at zero or were unclear with numbers written in the spaces instead of being clearly attached to points on the y axis. Labelling of the vertical axis, for example with "frequency" or "number of people", was often omitted or incorrect. A surprising number of candidates did not use the grid given to draw their bar chart. Other forms of diagram were not seen often but when they were seen they usually scored well.

Question 3

A number of candidates were able to score the available mark for parts (a) and (c) of this question. The majority of candidates were able to score the available mark for part (b) of this question.

In part (a) "10" was a commonly seen incorrect answer and in part (c) a significant proportion of candidates confused the term "factor" with the term "multiple" giving "60" as their answer.

Question 4

Most candidates were able to complete both parts of this question successfully. There were no particularly common errors in part (a).

In part (b) the possible correct operations of "+30" and "×2" were equally popular. Some candidates did not give an operation and wrote "30" to complete the number machine. This, of course, could not be awarded the mark.

Question 5

Candidates were generally able to reach a correct conclusion by either comparing £18 with £20 or £198 with £200. Only a small proportion of candidates were unable to work out 10% of 180.

A few candidates treated a 10% increase as £10. It was pleasing to see that only very few candidates missed out a direct response to the question "Is the offer from Jim's boss more than Jim asked for?" and that more candidates are now writing a statement in response to the question instead of single word answers.

Not surprisingly, hardly any candidates tried the alternative method of working out 20 as a percentage of 180 then comparing this to 10%. Candidates generally worked with accuracy and almost two thirds of them scored full marks. About 5% of candidates worked out the "£18" or "£198" thereby scoring two marks but then either forgot to use their calculation to make a deduction in order to answer the question or they made the wrong deduction. It was usually the former case.

Question 6

In part (a) of this question many candidates found it difficult to express clearly what they wished to say. The terms "evens" and "even chance" were used indiscriminately. Examiners were hoping to see a direct answer to the question posed together with an explanation, for example "No, she has the same 1 choice out of 3 as Mike". Clear responses which did more than repeat the information given in the question and which were not marred by contradiction were not seen frequently.

In part (b) a majority of candidates could list at least five distinct combinations but very few candidates could list all of the possible nine combinations. Many candidates missed out the three outcomes describing the situation where Mike and Ellie take out a counter of the same colour. Other common errors were to give just three pairs with each pair giving two different colours, for example RB, GR, BG or to write a list of combinations of the 3 colours, RGB, RBG etc. Candidate should always be advised to refer back to the stem of the question when answering later parts of the question. They may then have been reminded that the counter Mike took out had been put back in the bag.

A correct answer to part (c) was seen only rarely. Candidates who had listed at least 5 outcomes in part (b) qualified for the award of the mark in part (c) provided that they used their outcomes correctly to form the required probability. Very few were successful in doing this. It was common to see candidates list two probabilities in response to this question, the probability that Mike takes a blue counter and the probability that Ellie takes a blue counter, rather than the probability of a combined event. While about three quarters of candidates gained some credit for their answers to this question, less than one in ten candidates scored 3 or more marks.

Question 7

It is encouraging to report that over half of all candidates gave fully correct responses to this question. It was common to see the correct method for each part clearly written in the working space. Where candidates had identified a correct method, some made careless errors.

For example the answer "5.5" was seen often for part (a) and in part (b) candidates often totalled the numbers correctly only to divide their total by 8 or 10 instead of by 9. In working out the mean candidates often omitted brackets and wrote " $4 + 8 + 5 + 9 + 10 + 5 + 6 + 3 + 4 \div 9$ " instead of the correct " $(4 + 8 + 5 + 9 + 10 + 5 + 6 + 3 + 4) \div 9$ ". When trying to find the median many candidates forgot to order the list before selecting the "middle number".

A significant minority of candidates were confused between the different statistical measures and it was not uncommon to see the mean worked out for part (a) and the median for part (b).

The range also appeared in some candidates' responses to either part (a) or Part (b).

Question 8

This question was very well answered with few candidates getting confused between perimeter and area.

A number of candidates gave the correct perimeter with a similar proportion of candidates gaining the mark for the area in part (b). The reflection was carried out correctly by the majority of the candidates.

Question 9

Responses to this question were disappointing with less than a half of candidates able to find the volume of the cuboid. Many candidates merely added the three measurements given on the diagram whilst others gave varying combinations of multiplying and adding the dimensions of the cuboid, sometimes confusing volume with the total length of the edges or with the surface area. Those candidates showing a correct method sometimes wrote down "1600" as their answer. Candidates are advised to check the number of zeros after such calculations. Of those candidates who worked out the volume correctly, many missed out suitable units or gave incorrect units (usually cm or cm²). Some candidates gave the correct units but earned no marks for their working. They were awarded one mark.

Question 10

The concept of a hire charge consisting of £30 then a further £8 for each day the concrete mixer is hired seemed unfamiliar to many candidates. Consequently the answer "£152" was often seen. Candidates who did understand the price structure usually worked with accuracy to score both of the marks available in part (a). Part (b) was also often successfully completed. Approximately two thirds of candidates scored full marks in each of the two parts of this question. A significant number of candidates appeared unaware that an inverse process to that in part (a) was required to solve the problem posed in part (b). These candidates often used a trial and improvement method.

Question 11

Each of the four responses required in this question attracted correct answers from between 40% and 60% of candidates. "Centimetres" was the expected unit for the diameter of a football though "millimetres" was also accepted. Similarly, "gallons" was the expected unit for the amount of fuel in a car fuel tank, but "pints" was also accepted by examiners on the basis that the conversion between pints and litres is a common one.

It was disappointing to see that less than half of the candidates could change kg to grams and/or ml to litres in part (b) of the question.

Question 12

Most candidates were able to use the table to find the cost of parcels of weight 6 kg and 10 kg but only just over 1 in 8 candidates could use the table for intermediate weights. Many candidates assumed that they needed to calculate the price of parcels not listed explicitly in the table by interpolation, so for example estimated the price of posting a 3 kg parcel as halfway between the price of posting the 2 kg and 4 kg parcels. Once they had worked out their total cost for posting the parcels, most candidates were able to compare their cost with £55 and make a sensible deduction in response to the question posed. Only a small number of candidates used the alternative method of subtracting the cost of the parcels from £55 and found the amount of money Umar should have left after posting the parcels.

Question 13

Nearly half the candidates were able to get correct answers for parts (a), (b) and (c) of this question. Some candidates who were not successful in parts (a) and (b) gave the correct area of triangle E in part (c) of the question.

Question 14

This proved to be a challenging question for most candidates at this level and a good discriminator of ability. Of those candidates who made some headway, the majority of them tried to find the total cost of the tiles needed and compared it with £1000. Relatively few candidates tried to find the number of tiles needed and then compare that with the number that could be bought for £1000.

Conversion of units was poorly done in general. Candidates who converted 3m or 4m to cm were more successful than those who tried to convert 120000 cm^2 to m^2 . They often divided by 100 to get $120000 \text{ cm}^2 = 1200\text{m}^2$. Candidates should perhaps be advised to change units of length rather than units of area. However, there were a number of candidates who wrote $3\text{m} = 30 \text{ cm}$ or 3000 cm . Many candidates earned 1 mark for multiplying 3×4 or 300×400 , but most of these candidates then failed to find the area of the tile and divided the wall area by 0.2 or 20 instead of 0.04 or 400. Examiners were able to reward some candidates who did not earn all the method marks available but who carried on to find a total cost and make a correct deduction. These candidates earned the communication mark.

A more successful approach adopted by candidates was to work out how many tiles would fit along each side of the wall. Reaching 20 and 15 automatically earned the first 3 marks. Some of these candidates spoiled further working by considering the perimeter of the wall rather than the area. Too many candidates showed insufficient working and could not be awarded marks because of this.

The question discriminated well between those candidates who could identify and carry out a clear strategy, recording their method in an intelligible way and those candidates who had little understanding of the processes required and/ or did not communicate them clearly to the examiner. The best candidates produced a clear and accurate solution in a few lines. However, many responses seemed disjointed comprising of several apparently unrelated calculations scattered all over the page.

Question 15

About two thirds of the candidates gained 2 marks for adding one square in a correct position to the incomplete net and then identifying two opposite faces of the cube. A further one in ten candidates scored one or other of these two marks. Only about one third of candidates could give the correct number of edges for a cube to answer part (c) correctly. Some candidates sketched a cube to help them. Commonly seen incorrect numbers were "8" and "24"

Question 16

This question, worth 6 marks was well done by many candidates with almost 40% of candidates scoring full marks. The best candidates presented clear and concise solutions.

Of those candidates who did not score full marks, the majority of them tried to find the cost of 9 tins of paint at each store in order to make a comparison and calculated that they only need pay for 6 tins at "Paint R Us". There were some, but not many candidates who realised that they could compare the total cost of 3 or 6 tins from each shop. Some candidates had difficulty in working out the price after discount at "Deco Mart" and either ignored the discount altogether or worked out the discount but did not subtract it from the normal price.

It was not unusual for candidates to reduce the price of a tin by subtracting 10p from it or to give 10% of £1.80 as £1.08 without working. The working for this question was generally well set out with candidates doing the working out for each shop separately and clearly.

Some candidates merely circled the name of the shop Ashley should buy the paint from. This was insufficient for the award of a communication mark. Candidates are advised to write a clear statement in words in order to be sure of qualifying for this mark. Three quarter of candidates were awarded some credit for their responses to this question.

Question 17

Almost 60% of candidates scored 2 or 3 marks for their response to this question. The most successful answers were from candidates who calculated the angle for each sector (usually from $360 \div 72$ rather than $75 \div 15$), and wrote them in the table. This scored 2 out of the 3 marks available these candidates usually went on to score full marks. However it was more usual to see little or no evidence of working. Two marks were awarded to candidates who drew and labelled one sector correctly.

Several common but incorrect methods were seen. These included dividing 360° by each frequency and dividing 360° by 4 (the number of categories in the table). Some candidates used the frequencies as angles.

Some candidates produced pie charts without using a ruler or protractor. Very few of these candidates could be awarded any marks

Question 18

About two thirds of candidates gave a correct answer to part (a) of the question. Those candidates who could substitute the values given generally went on to evaluate y correctly. Some weaker candidates added 4 to 7.5 or added 7.5 and 5.4 then multiplied the result by 4 or multiplied 7.5 by 5.4, indicating a clear lack of understanding of algebraic notation and/ or knowledge of "BIDMAS"

Attempts to part (b) were much less successful. The negative sign appears to have confused many candidates and a final answer of "4.1" was often seen. There was little evidence of candidates checking their answer to this part of the question by substitution. Some weaker candidates substituted 18.8 as the value for x . A flow diagram approach was rarely seen in candidates' responses to either part of the question.

Question 19

This question was a good discriminator. Candidates were usually able to make some headway with this question, whether by calculating that it would take Tom 6 hours to lay the bricks or by working out the number of bricks he lays in the first two hour period. However, many candidates did not take account of both of the breaks. The incorrect answers 3pm and 3.30pm were often seen.

Other candidates used a time line showing hours worked and breaks taken and writing the number of bricks alongside. Some candidates did not organise their working very well and it seems likely that more organisation in this respect may have helped them to avoid errors.

A common error was for candidates to record that 30 bricks were laid at 9am, 30 at 10am and 30 at 11am, leading to the deduction that 90 bricks had been laid before Tom took his first break. Some candidates chose to subtract the break times from the 6 hours need to lay the bricks rather than add them.

Candidates generally gave their answer using an acceptable time notation. The majority of candidates were able to score some credit for their answer with almost 40% of candidates scoring full marks.

Question 20

The full 2 marks in this question was scored by 38% of candidates, with 22% scoring mark. Under half of the candidates earned no marks for their response to this question. It seems that many candidates are still not well practised in using a calculator to work out more complex calculations. Candidates still expect to be able to do questions such as this without giving thought to the correct sequence of operations that are needed when putting the expression into their calculators. Candidates who are not confident in evaluating expressions using one sequence of operations are advised to break the calculation down into several intermediate calculations and record the results of these calculations in the working space. In this question many candidates gave the answer to the calculation $\frac{\sqrt{20.4}}{6.2} \times 0.48$

or to $\sqrt{\frac{20.4}{6.2 \times 0.48}}$ rather than a correct evaluation of the expression given.

Candidates who wrote down the value of $\sqrt{20.4}$ or the value of 6.2×0.48 as an intermediate calculation could earn 1 mark. The wording of the question advised candidates to write down all the figures from their calculator display but despite this many candidates lost marks because they rounded numbers in intermediate working or they rounded their answer. Candidates who wrote down all the figures from their calculator before rounding were not penalised.

Question 21

This question was answered quite well by candidates of all abilities. Over half of all candidates scored all four marks and only about 20% of candidates were unable to score any marks. The main error made by candidates in both parts of the question was to read off from the wrong graph. This error should surely have been detected if candidates had checked their working.

In part (b) a significant minority of candidates worked out the difference in the delivery costs for bricks delivered 5 miles from Barry's Bricks and bricks delivered 4 miles from Bricks ArUs. Again this error could have been avoided. Most candidates correctly interpreted the scales used on the axes.

Question 22

This question was answered well by many candidates though there was often little or no working shown. More than three quarters of candidates were awarded 2 marks or more for their responses.

In part (a) a significant number of candidates struggled with the concept of a biased coin and so gave an answer of either "0.7" (by assuming that the probability of throwing tails is the same as throwing heads) or "0.5" (by ignoring the bias of the coin completely). Some candidates worked out 2×0.3 and gave their answer as a number greater than 1 apparently not realising that there must be an error.

For part (b) the most common incorrect answer given was "100" presumably again from a consideration of a fair coin. Other common responses seen included 200×0.3 and $200 \div 0.7$. A few candidates gave their answer as the fraction $\frac{140}{200}$. Examiners awarded these candidates 1 mark.

Question 23

This question was not well done. Less than 1 in 10 candidates scored full marks with a further 2 in 10 candidates scoring part marks. The most successful candidates used a common sense approach realising that at an average speed of 50 mph Aysha would cover a distance of 25 miles in half an hour and that for the second part of the journey, a speed of 60 mph is equivalent to an average of 1 mile per minute.

A significant proportion of candidates earned the mark available for the time it took Aysha to drive from A to B, the first part of her journey. Fewer candidates obtained the correct time for the second part of the journey. Many of them gave the time taken to travel from B to C as 24 minutes. Evidence seen suggested that these candidates had worked out $60 \div 25 (=2.4)$ and interpreted their answer as 24 minutes. Many of these candidates went on to work out $30 - 24$ and so earned a second mark for working out the difference of their times (with at least one correct).

Another error commonly seen was for candidates to divide speed by distance getting answers of 2 and 2.4 and then interpreting the difference as 40 minutes. Candidates often made errors converting between units of time and some weaker candidates either multiplied the speed by the distance for each part of the journey or simply found the difference between the two speeds giving their answer as "10".

Question 24

This question discriminated well between the more able candidates taking this paper. More than 40% of candidates were able to work out the size of at least one of the missing angles (candidates were given credit for these written clearly on the diagram). About a half of these candidates made further progress and worked out the size of several angles but only the more able candidates were able to get as far as finding the size of angle x . Very few candidates gave correct reasons in an acceptable form and so candidates could rarely be awarded all four marks for their response. In particular, candidates did not accurately articulate properties involving angles and parallel lines. Weak candidates often added the sizes of the angles given on the diagram and then found the difference between their answer and 180° or 360° .

Question 25

Over half of the candidates scored at least one mark for their responses to parts (a) and (b) of this question which tested an understanding of the notation and diagrams used to illustrate inequalities. About 1 in 20 candidates scored all four marks.

In part (a) most candidates did not interpret the " \leq " and " $<$ " signs correctly and either did not include "-1" in their list of integers and/ or did include "4".

There were few totally correct answers to part (b) of the question. It was common to see " $-4 \leq 3$ " or " $-4 < 3$ ". These answers could not be awarded any marks. Of those candidates who could be awarded partial credit, many gave an answer in the form " $-4 \leq x < 3$ " showing an incorrect understanding of the notation using empty and full circles. Many candidates gave the range of the two endpoints, "7", as their answer.

In part (c) of this question, candidates rarely tackled the inequality with confidence. Of those candidates who did show some correct working, many either spoilt their answer by rounding $\frac{7}{3}$ to 2.3 or treated the question as one with an equation rather than an inequality. These candidates could not, of course, be awarded full marks but often could be awarded 1 mark.

Question 26

Simple factorisation questions continue to prove to be very challenging for candidates entered for Foundation tier papers. About a quarter of candidates scored the mark available in each part of this question.

Commonly seen incorrect answers to part (b) included $7x^2$, $8x^2$, $8x$, $9x$, $x(x + 7x)$ and $x(x^2 + 7)$. Candidates who gave one of the first four of these answers seemingly thought that some simplification/ combining of terms was needed. Candidates who gave one of the last two answers might have spotted their errors if they had attempted to reverse the process and multiply out the brackets as a check.

Question 27

The majority of candidates knew what was meant by the term "translation" and nearly 1 in 6 candidates could be awarded a mark for translating the triangle albeit often by the wrong vector. Twenty two per cent of candidates gave a fully correct answer. There was no single common error though errors usually involved an incorrect interpretation of one or more of the components of the vector. Very few candidates tried to rotate, reflect or enlarge the triangle and in most cases their transformed shape was congruent to the original shape.

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