Pearson Edexcel

# Examiners' Report
# Principal Examiner Feedback

## January 2022

Pearson Edexcel International GCSE
Mathematics (4MA1)
Paper 2F

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**International GCSE Mathematics 4MA1 2F**

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Those who were well prepared for this paper made a good attempt at all questions. It was good to see several students having a go at the grade 4 and 5 questions and gaining a couple of marks for these, even if they could not see the question all the way through.

The paper differentiated well.

Overall, working was shown and was followable.

We did notice that students often fail to spot a link between parts within questions. This was particularly noticeable in Q13, and to a lesser extent in Q18. In Q13, many students failed to directly use their answer in (a), but 'started again' when trying to convert their found £440 to Canadian dollars. This resulted in a significant number of additional calculations and limited their chances of gaining the full three marks. In Q18, whilst the majority recognised that 3 was the scale factor in (a), there was a noticeable number of students who did not make the connection that $y$ was 3 times bigger than $x$.

**Question 1**
This question made a very accessible start to the paper for almost all candidates, who scored full marks in all three parts, for dealing with simple fractions.

**Question 2**
Most students were able to identify a factor, a multiple and a prime number from a given list of numbers, but only a little over half identified the cube number as 8; 3 and 9 were noticeably incorrectly selected. Some students gave a factor of 6 rather than a multiple. 9 also appeared as a prime number.
Whilst most students in part (b) were able to work 'backwards' to find the input for a given output in a 2 step number machine, a significant number used the given output value as the input. If they used this correctly they could gain 1 of the 2 marks.

**Question 3**
There was a high success rate for selecting the word 'unlikely' for a probability of 1/8 on a spinner but fewer candidates could select the required word 'evens' for a probability of 4/8; 'likely' was seen more often than the correct answer. Almost all were able to put a cross at zero on the probability scale to indicate the probability of an impossible event.

**Question 4**
Using positive and negative values in a table of temperatures was a familiar context for students and most arrived at correct answers in all three parts from their interpretation of the figures and their calculations.

**Question 5**
Asked to draw a line with equation y = -2 on a coordinate grid, around half of the students were able to do so. There were frequent incorrect responses, most noticeably the line x = -2 and assorted diagonal lines passing through the point (0, -2) or simply a cross marked at (0, -2)

Finding the midpoint between 2 points marked on the grid proved straightforward for most for 2 marks, with 1 mark available to those who could only give one correct coordinate or who interchanged the order of the coordinates. In part (c), students needed to locate a point D with coordinates (5, *d*) Around half were able to do so and those who gave their answer as *d* = (5, 1) rather than d = 1 as their answer were not penalised.

**Question 6**
This question presented students with 9 shapes. Less than half could name the trapezium, with rhombus and parallelogram being popular incorrect answers; there was a surprisingly high number of blank responses. Finding two congruent shapes was well done. However, asked for the order of rotational symmetry for a shape where 4 was the correct answer, not all students understood this terminology and gave answers like $90^o$ or clockwise; again, blank responses appeared surprisingly often. The regularly seen error for giving the number of lines of symmetry for the rectangle was stating the answer as 4, which was seen about as often as the correct answer.

**Question 7**
The majority of students were not able to appreciate that they needed to find 3/8 of 5/6 and therefore to multiply these fractions together. For those who did, it was a straightforward way to gain 3 marks, working in fractions, decimals or a combination of both. Of those who attempted something other than this with the given fractions, finding a common denominator and either adding or subtracting was the favoured approach, but gained no marks. Occasionally, students assumed a total for the number of people in the club but rarely chose a total that produced integers for the sub-groups involved.

**Question 8**
Less than half the students were able to follow the instruction to write each of the values in the question to one significant figure and then to calculate using these rounded values. Where there was an attempt to do so, the most common errors were to leave 181 unrounded and to round 0.482 to 0.4 Mostly, candidates simply used their calculators to find the actual value, showing various interim steps to indicate their working.

**Question 9**
The majority of students were able to give the correct value for an angle that was vertically opposite a given angle of $58^o$ but only a little over half of these were able to give a reason for that answer, which needed 'opposite angle' or 'vertically opposite' to gain the mark. Often seen were alternate or corresponding angles with parallel lines. Well over half the students were able to calculate a different angle that required an understanding of angles on a straight line and the sum of angles in a triangle. A common error was to assume the scalene triangle was isosceles and some students still wrongly think that any two angles at different points along the same straight line equal $180^o$

**Question 10**
Many students gained the 2 marks for finding the 9 correct combinations of book subjects for books selected from two trolleys. Most of the others gained 1 mark, either for omitting some combinations or for including extras. Grouping the subjects into threes was the only repeated error seen.

**Question 11**
This question about a number sequence for which the *n*th term was 3*n*, proved accessible, with a very high success rate for drawing the next pattern and finding subsequent terms. Likewise, very few candidates were unable to give an explanation as to why Sven could not make pattern number 25 with 70 counters. Reasons that either indicated that 70 counters were not enough as 75 were needed or indicated that *no* pattern could be with 70 as it isn't a multiple of 3 gained the mark.

**Question 12**
Finding the left over space in a box when it was filled with as many cartons as possible required an understanding of volume of cuboids and an appreciation that the dimensions of the cartons limited the number of cartons that could be physically arranged in the box. However, most students did not grasp the latter point. Thus many worked out the volume of the box and the volume of a carton, either of which gained a method mark, and divided to find how many cartons would fit, simply in terms of volume, ignoring their configuration within the box. The numerical result, 56.25, suggested to many that the remaining space was therefore 0.25 Those who went on to work out 56 x 512 and subtract this from the volume of the box were able to benefit from a 3 mark special case. Only a handful correctly worked out how many cartons would actually fit and of these some were able to find the remaining space.

**Question 13**
Reading two values from a graph to convert between pounds and Canadian dollars gained most students the 2 marks in part (a). In part (b), students first had to use a given exchange rate to convert from euros to pounds, before finding a relevant conversion factor from the graph (or from their answers in part (a)) to convert these pounds to Canadian dollars. Many were able to do so, gaining 3 marks. About a quarter of the students were only able to progress as far as using the exchange rate but were awarded 1 mark for this. Where marks were not given, a common error was to multiply rather than divide for the initial conversion.

**Question 14**
Given a distance, 18.2 km, and a time, 3 hours 15 minutes, this question asked for the speed. Around a third of the students gained the full 3 marks for this. The difficulty for the rest seemed to be with the time, which was frequently converted to 3.15 hours; division by this value gained students 1 mark. Others converted to 195 minutes instead, which could gain 1 mark, but using this without the subsequent multiplication by 60 meant that no further marks could be awarded. A fairly regularly seen error for those working with minutes was 195 ÷ 18.2

**Question 15**
Students were given a price list for some quantities of ingredients used to make brownies. There was also a recipe with quantities for 12 brownies. Given a selling price per brownie, the requirement of the question was to find the profit that would be made by selling 120 brownies. Well over a third of students were able to combine all this information and give the correct answer for 5 marks. About a third were not able to grasp the need to work out the costs for the total amounts of ingredients needed and simply added up the price list and subtracted from the total selling price; this gained them 1 mark. Others were able to work out the total cost for one or two of the ingredients or the total selling price, for which up to 3 marks could be given.

**Question 16**

In part (a) students needed to multiply a single term over a bracket for two expressions and simplify. Well over half were able to get at least 3 resulting terms correct for 1 mark. Of these, around half found all the correct terms and most could then simplify correctly. The positive and negative signs here were the cause of most simplification errors. As is often the case, a few went on from a correct answer to attempt further simplification, resulting in an incorrect answer and the loss of 1 mark.

Part (b) tested expanding the product of two linear expressions; around a quarter of the responses were fully correct, while half gained no marks. Some students were able to gain 1 of the 2 marks for 3 terms fully correct or for 4 terms with some incorrect signs or for incorrect simplification. Again there was confusion with using the positive and negative signs. Answers involving simply $4y$ from $y + 4$ in the first bracket and $2y$ from $2 - y$ in the second bracket appeared quite often.

In part (c), less than a quarter of the students were able to factorise a 2 term expression, some of these partially for 1 mark and some fully for 2 marks. Many responses showed no understanding of what was required and random combinations of numbers and letters were seen, often from a dubious attempt at subtraction. Blank responses were noticeable.

**Question 17**

Around a quarter of the students were able to multiply two mixed numbers to show that the given answer was correct, but almost half were unable to gain any marks. Where a good understanding was shown, some students lost a mark by omitting one or more steps of working, which needs to be shown through to the given answer. Conversion to decimals was seen; with no evidence of working with fractions such attempts could gain no marks. Other attempts showed randomly generated fractions.

**Question 18**

In part (a), students were presented with two similar triangles and needed to work out the scale factor and find a missing length. The majority were able to do so but around a third of students scored no marks, the most common incorrect approaches being to use subtraction or to attempt to apply Pythagoras's theorem. Many of those who were successful in part (a) were able to write down an expression in part (b) for the side labelled $y$ in terms of $x$ but assorted numerical working also appeared regularly.

**Question 19**

Writing the lower and upper bounds for 18, which was given correct to the nearest 0.5 mm, proved beyond almost all students. Where there was an element of understanding, this was to assume 18 was to the nearest mm and to give 17.5 and 18.5 as the lower and upper bounds. Where both of these were seen as answers, students were able to benefit from a 1 mark special case. The special case was not able to be applied when the upper bound was given as 18.4 There were a number of blank responses.

**Question 20**

It was pleasing to see a good number of fully correct responses for plotting point C, given its distance and bearing from point A Where students were not able to do so, many gained 1 mark for either a correct distance or a correct bearing. Blank responses also appeared regularly.

In part (b), almost no candidate was able to express the scale '1 cm represents 200 metres' in the form 1 : n

Mostly 1 : 200 was seen, with the occasional 1 : 700 (the actual distance given in part (a)) or 1 : 3.5 (the distance that students needed to draw on the map).

**Question 21**
This multi-step probability problem was correctly answered by around a quarter of students. Others were able to use a probability of 0.35 for taking at random a red sweet (of which there were 28) to find the total number of sweets, for 1 mark. A mark could also be gained for finding the probability of taking a white or pink sweet, given the probabilities for red and green – most students seem confident with the idea of the probabilities adding up to 1. Splitting the 0.45 probability in the ratio 2 : 1 proved more problematical for many but those who did gained another mark. An assortment of meaningless working was also seen.

**Question 22**
Over half the students were able to score 2 or 3 marks for finding the LCM of three numbers. For those who scored full marks, the most popular approach was to list multiples of each number and find the first common one. Most 2 mark students used factor trees to find the prime factors of each number but failed to gain the accuracy mark as they gave the HCF instead of the LCM. This is a commonly seen error in the Foundation papers; students generally seem more confident and familiar with factors than they do with multiples. For the third of the students who were not able to gain any marks, writing lists of factors was the favoured approach.

**Question 23**
Part (a) of this percentage question asked for a percentage increase and part (b) required an understanding of 'reverse' percentages to find a previous price. This is a familiar topic but it was surprisingly poorly done, with just over a quarter of students able to gain a mark in part (a) and even fewer in part (b). Many started correctly in (a) by finding the difference between the 2018 figure and the 2019 figure but then tried to convert this into a percentage by using a calculation involving 100. Alternatively, the difference was divided by the 'new amount' rather than by the original. In part (b), the given price was 7.7% greater than in 2017 but most students found 7.7% of the given price, usually then subtracting, or found 92.3% of the given price. It was rare to see any understanding that division of the given price by 1.077 was needed; those who did mostly went on to gain all 3 marks but any use of 1.077 could gain one of the method marks.

**Question 24**
Finding the mean from a frequency table is a regularly tested topic but here one of the values in the table was given as $x$ and the mean was given. Most students struggled with how to apply their knowledge to find the value of $x$, although those who calculated at least 3 correct products (the product involving the $x$ term was often omitted) and added them gained one mark, while adding the frequencies, which needed to include the $x$ term, provided some students with a mark. Division of the two terms and equating to the mean was seen in only a handful of responses; where a student did this, they usually went on to give the correct value for $x$. A few trial and improvement methods were seen and if a student arrived at the correct answer, they gained full marks. Others simply ignored x throughout and various totals were seen, often divided by 5 rather than by the total frequency.

**Question 25**
Fully correct solutions coming from careful algebraic working were seen from over a quarter of students, with some others gaining 2 marks for steps of correct methodology but with a numerical

inaccuracy. A commonly seen incorrect approach was to subtract or add the equations as they were given in the question, such that neither $x$ nor $y$ was eliminated. Alternatively, parts of the equations were ignored or only one term in the given equations was multiplied, leading to working that became increasingly incoherent.

**Question 26**

Of the students who attempted this question, though there were many who left it blank, most understood that to show that $x = y$ they could work out the size of various angles and it was encouraging that they made a start, even if unsure where they were heading. Finding the size of either an interior or an exterior angle of the decagon was the necessary first step and gained them the first mark. From here, most divided by 3, as there were 3 angles marked on the diagram, not recognising that one of these angles was a different size to the other two. Occasional further working within pentagon *AGHIJ* or within quadrilateral *ABCD* was seen and sometimes resulted in a method mark being awarded. All 4 marks were awarded for a rare fully correct response.

**Summary**

**Based on their performance on this paper, students should:**

- Read questions very carefully and even when they think they have the answer, check they are giving what was requested

- Improved knowledge of angle reasoning and labelling angles using 3 letters
- Reading questions carefully to identify when an estimate is required
- More exposure to volume problem solving questions
- Increased understanding of time in hours and minutes converted to decimals
- Improving their basic algebra knowledge
- Being encouraged to make an attempt at a question rather than leaving it blank.
- not to cross out work unless they are replacing it with something better.

- Remember the formula to find the volume of a cuboid

- Check if answers are realistic

- Check any rounding instructions.

- Show clear easy to follow working

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