Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

Summer 2024

Pearson Edexcel International GCSE

In Mathematics A (4MA1) Paper 2F

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Summer 2024
Publications Code 4MA1_2F_2406_ER

International GCSE Mathematics
4MA1 2F
Principal Examiner's Report

Students who were well prepared for this paper made a good attempt at all questions. Most students showed their working, which is very advantageous for maximising their marks. Problem solving and more wordy questions tend to be the ones that students on this tier find most challenging but it was pleasing to see a good number of students making a very good attempt at this sort of question.

This series, it was noticeable that a significant number of students appeared to mis-read or mis-transcribe numbers in the questions, and likewise answers from their calculator. In the percentages question, for example, with an interest rate of 2.4%, we repeatedly saw use of 2.5% and 2.7% In the same question, working that led to an answer of 4947 could have 9447 or 4974 on the answer line. In question 12, 232 was seen several times as 234 and 54 seen as 52. An answer of 108 rupees was seen as 180 rupees, perhaps indicating that an error had been made, but working suggested otherwise.

Comments on individual questions

Question 1

Almost all students were able to score the full 3 marks or 2 marks for drawing a bar chart. Heights of the bars were usually correct and each bar correctly labelled. Where a mark was lost, this was mostly for the lack of a linear scale for km or for the gaps on the km scale being labelled rather than the lines. A number of students used 3 squares for 2 units on the distance scale and then sometimes penalised themselves by using 1 unit for 1 km, when they came to draw a height that was an odd number of km.

Question 2

Drawing a shape congruent to a given shape was well answered in part (a). Those who did not get it correct often drew an enlargement, or a rectangle with the same area, or a rectangle that enclosed the shape. In part (b), where an enlargement was required, just over half the students did this successfully. For those who could not, many gained 1 mark, for a shape in which at least 2 of the sides were enlarged to the correct length. Part (c) was correctly answered by most students, who could draw a line of symmetry on a given shape. Somewhat surprisingly, only around half the students could correctly find the perimeter of the shape drawn on a squared grid. The most common error was to omit one of the lengths from the 'concave' section of the shape. The success rate was similar for finding the area of the shape in part (e). Here the main error was to find the area of the enclosing rectangle. It appeared generally that students were correctly able to distinguish between perimeter and area.

Question 3

Most students were able to order a list of 5 integers in part (a) and 5 decimals in part (b). Where a mark was not scored with the integers, it was by putting the negative numbers in the wrong order. It was impressive that some students included inequality signs between the numbers. Changing a decimal to a percentage and a fraction to a decimal in parts (c) and (d) was very well done. Part (e) was a 2-step problem, to work out how many non-vegetable plants there were, given a total of 60 of which 7/10 were vegetable plants. Nearly three-quarters of students gave the correct answer. Of the remainder, many could score 1 mark either for stating that 3/10 were non-vegetable plants or for giving the number of vegetable plants. Regularly seen incorrect approaches were to subtract 7 or 7/10 from 60 to give 53 or 59.3 as their final answer.

Question 4

This was a regularly seen style of number sequence question, with very high number of students able to give the next term in the sequence, explain how they got that answer and find the 12th term. Where students did not gain a mark for explaining how they got to 71, this was mostly because they simply mentioned the difference being 7 and not specifying that this was −7 or that the sequence was decreasing by 7. Around half the students were able to explain in part (c) why 7 could not be a term of the sequence. The most common response worthy of credit was to show that 8 was a term of the sequence so 7 couldn't be; others had reasons based on the fact that the numbers in the sequence were not multiples of 7 and some used the *n*th term to show that 7 would produce a non-integer value for a position in the sequence.

Question 5

Completing a table to show all the possible scores when two spinners were spun, and the numbers they landed on subtracted from each other, provided a very high number of students with both marks. A further good number gained 1 mark for at least 5 correct entries. Part (b) asked for probabilities based on the table and marks could be gained for this from any fully completed table. Noticeably, some tables were left uncompleted. Around two-thirds of students were successful in finding the probability of an even score and a score greater than 7; some, wrongly, included 7 itself in this. A regularly seen incorrect response gave the probabilities of an even number and a number greater than 7 from the numbers the spinners could land on, instead of from the scores in the table. It is good to report that incorrect notation is rarely seen now, although ratios do still make an appearance from time to time. Some of the students used denominators of 9 in part (b), possibly because they had to fill in 9 numbers in the table or there were 9 numbers on the two spinners with 2/9 (two even odd numbers on the spinners) and 3/9 (three odd numbers on the spinners) frequently seen. Sadly, there are still far too many students who gave answers of 13 and 6 for part (b), clearly not understanding how to give an answer as a probability.

Question 6

Given that there were 150 animals, of which 19 were sheep, 32 goats, 3 dogs and the rest chickens, nearly three-quarters of students correctly gave 16/25 as the fraction of the animals that were chickens. Others gained 2 marks, mostly for giving their fraction not fully simplified or giving a simplified fraction for the animals that were not chickens. Working out only the total of sheep, goats and dogs provided some students with 1 mark. It was interesting to note that once students reached 96/150, many went on to cancel showing 48/75 etc which indicated they did not use their fraction button on their calculator to immediately go from 96/150 to 16/25

Question 7

Given a total amount of milk, 2.8 litres, and 2 jugs, each with 350 millilitres of milk, students had to work out how much milk was in each of 5 bottles. Around half the students were able to work with compatible units, find that the jugs contained a total of 700 millilitres of milk, work out that 2100 millilitres was in the 5 bottles and divide by 5 to find the amount in each bottle. This gained them 4 marks. Some lost a mark by giving an answer of 0.42 based on litres, although the required answer needed to be based on millilitres. Some students stopped at 2100, the amount of milk in the 5 bottles. Others subtracted the amount of milk from only one jug from the total but did go on to divide by 5 and this gave them 2 marks. A correct conversion at the start provided some students with a mark, even if they made no further attempt at the problem, although most at least had a try.

Question 8

Students needed to compare the cost of buying 30 tins of crayons from 2 different shops, each with a special offer. For one shop, this was a pay for 2 tins, get 1 free, offer. Some students worked out that they would pay 2/3 the normal price and calculated a total cost of $84 ($4.20 a tin). However, more often, students simply read 2 tins, 1 free, and thought this meant paying half price. The other shop offered 25% off, where 5 tins were sold for $18. A good number of students could work out that 6 sets of 5 tins were needed, for a cost of $108. They then variably found 75% of this to get to the final cost in this shop, or just found 25% and took this to be the cost, or found 75% or 25% of one set of 5 tins. Work with these simple percentages was generally more well done than working with the pay for 2, get 1 free offer. A partial method for either shop could gain 1 mark, a fully correct method for one shop 2 marks, both methods correct with subtraction to find the difference 3 marks, with an accuracy mark for the final answer. Around a third of students were awarded the full 4 marks, with another third gaining 2 of the marks.

Question 9

Students still confuse the formulae for the area and the circumference of a circle, thus only around half the students gained the 2 marks here for finding the area of a circle. Working out the circumference was commonly seen, as were attempts that involved squaring π, or combining the formulae to use $2 \times \pi \times r^2$ or giving the diameter of the circle.

Question 10

While around two-thirds of students could find the area of an irregular shape drawn on a square grid and then draw a rectangle with this same area, it was perhaps surprising how many did not get a correct value for the area of the shape, given it could be done simply by counting the number of squares. Some incorrect responses could be explained by students finding the perimeter of the given shape but other answers seemed random. A good number of these students at least benefitted from the award of 1 mark for drawing a rectangle with a different area. Some just copied the shape they were given.

Question 11

The success rate for this algebra question decreased through the parts, with three-quarters giving the correct answer in (a) to around half by part (f). Correct index notation, e^5, was used in part (a), with only a few $5e$ answers seen. Like terms were collected to give $3m$ in (b), with occasional incorrect answers of m^3. In part (c) $3g^2 + 7g^2 – 4g^2$ simplified to give $6g^2$ but also seen were answers of $6g^6$ and $42g^2$ or $42g^6$, the 42 coming from $3^2 + 7^2 – 4^2$ Multiplying a term over a bracket saw many correct answers in (d) of $a^2 + 8a$, with omission of the final a being the only noticeably seen error. Part (e) needed the expression $5(3x + 4)$ from factorising $15x + 20$; where incorrect, this was most likely to be an answer of $35x$. The final part of the question asked for a formula to be given for T in terms of d and h. $T = 3d + 5h$ was correct for 3 marks. Omitting $T =$ or giving an incorrect coefficient for either d or h could usually gain 2 marks but more usual than this were 1 mark answers where the coefficients for d and h were omitted. $T = d + h$ was the most common of these, but expression such as $T = d \times h$ and $T = d/h$ were also seen.

Question 12

This money conversion problem proved accessible for most students to attempt and nearly three-quarters gained full marks. Given a price in dollars and rupees for an identical handbag and a conversion rate, they were able to convert to compare the two prices and find the difference for their answer. Some wrongly gave their converted value as their answer rather than finding the difference and others omitted to state whether their answer was in dollars or rupees, costing them the accuracy mark. A few used the wrong mathematical operation when attempting the conversion whilst others used incorrect monetary symbols such as pound and euro signs. It was not unusual to find an answer with the correct numerical value, with the wrong currency attached.

Question 13

By now a familiar topic, listing possible combinations was also a very accessible question, with around 80% of students gaining both the marks. A mark was sometimes lost for including repeated or incorrect combinations alongside at least 4 correct ones, or for not separating out the 8 distinct combinations, for example stating a hat could be white or yellow, rather than a white hat or a yellow hat.

Question 14

Around a quarter of students could describe the given transformation as a rotation for the first B1 and give both the centre and angle of rotation for the second B1. Another quarter, could either state rotation, or give the angle and centre. Obtaining a mark for rotation depended on not giving an additional transformation, either directly, eg reflection, or by implication from certain words like move or flip. A good number of students who had some understanding of this topic lost the second B1 by giving either the angle or the centre but not both. Only just over a quarter of students could draw the reflection of shape A in a given line, $y = -1$ Another fifth were able to pick up 1 mark for correct reflection in a line parallel to the given line, or for the reflection of shape B in the given line, or for the reflection of shape A in the line $x = -1$ It was perhaps surprising that around a half of students were unable to gain any marks for drawing a reflection worthy of at least some credit, with a noticeable number not drawing anything.

Question 15

Placing values on a Venn diagram was accessible to most students and nearly two-thirds gained all 3 marks. Where 1 mark was lost, this was usually for omitting the values outside sets *A* and *B* but within the universal set, or for a more careless error of missing out one value or misplacing it. Only about 10% of students were unable to gain a mark in the question.

Question 16

Over 80% of students were able to gain the marks here for using their calculator to evaluate an expression. Some lost one mark by leaving their answer as a fraction instead of giving all the decimal places required, or by truncating their answer, or by evaluating only the first part of the calculation. Some students who did not understand BIDMAS and thus entered the values and operations into their calculator in the wrong order came up with predictably incorrect answers.

Question 17

Given a list of numbers in numerical order with some unknowns and the value of the mode, median and range of the numbers, students were asked to work out the values of the unknowns. Most readily found $k = 18$ which was the mode and also the largest number in the list. From this a high number of students could give $h = 5$ as the smallest number. The median 10 lay between 8 and j and many correctly wrote $j = 12$ as their answer, mostly without showing working. 10 itself and 11 featured as regularly answers.

Question 18

In part (a), well over half the students could draw the lines with equations $x = 6$ and $y = 2$ However, $x = 2$ and $y = 6$ appeared frequently. Sometimes unlabelled parallel lines were shown and could not gain credit unless the correct one was labelled. Only around 10% were able to draw $y = x + 1$ Where other diagonal lines had been drawn instead, the most common incorrect one was $y = x$ Often a vertical or horizontal line one square away from one of the 2 correct lines was drawn for $y = x + 1$ For those who had gained full marks for drawing the three lines, most went on in part (b) to gain a mark for shading the region enclosed by their lines. Some others were also able to find a mark here, if their region met certain criteria following on from partial success in part (a). It is important for students to remember to label their drawn lines as where a student drew eg $y = 1$ instead of $y = x + 1$. then the lines $y = 1$ and $y = 2$ would be seen as a choice of answers for drawing $y = 2$ and score no marks unless $y = 2$ was labelled.
The most common error in drawing $y = x + 1$ was to join the points (0, 0) to (8, 8) with a straight line.

Question 19

Changing a time given in hours and minutes, (here 9 hours 36 minutes), into a time in hours continues to be a problem for many students and 9.36 was used more often than the correct 9.6 Showing 820 x 9.6 as the calculation to find the required distance, gained students 2 method marks and most of these also gave the correct answer for the accuracy mark. Where 820km was multiplied by 9.36 this was awarded 1 mark only. Many chose to change the time into minutes and a correct method for this gained them 1 mark. For most of those who worked in minutes, although they knew to multiply by 820, did not then divide by 60 and so could not be given a 2nd mark. Some worked out the distance for 9 hours and then for the 36 minutes separately. Such attempts often went the route of realising it would be 410 km in 30 minutes but then they were unsure how to deal with the last 6 minutes, often adding 6 minutes to the accumulated distance. Where they did have a correct method, interim rounding often cost them the final accuracy mark. Less than a quarter of students gained full marks, with nearly half unable to be awarded a mark, but the majority attempted something.

Question 20

This fractions question asked students to show that two given mixed numbers multiplied together to give 8. About a quarter of students could show correct improper fractions, either multiply numerator and denominator directly, with a few showing cancelling before multiplying, and end by stating the answer 8 Although nearly half the students could not make any correct attempt, around a quarter gained 1 mark for the initial conversion to improper fractions. There were noticeable attempts to change the multiplication to division and inverting the second fraction; this rarely led to marks after the initial conversion. A noticeable number of students changed their improper fractions into fractions with a common denominator; the large numbers that then came from multiplying proved problematical. It was clear that there is confusion for students as to the most appropriate method to use for using each of the four rules with fractions.

Question 21

About a third of students were able to find the length of the opposite side in a right-angled triangle, given an angle and the length of the hypotenuse and using the sine formula to gain 3 marks. By far the majority of those who started correctly went on to find the right answer. Of the rest, many recognised this was trigonometry and could quote the three formulae but chose cosine or, less often, tangent. Others tried to make creative use of the inverse function but this invariably led to no marks. Other random attempts at manipulating the numbers seen in the question, 34 and 6.5, equally led to futile working and no marks. Blank responses were beginning to be seen more often.

Question 22

Expressing a speed given in metres per second to a speed in kilometres per hour is a regularly seen topic but, because the speed was given as *w* rather than as a number, students struggled to make any coherent attempt. A handful were able to give 3.6*w* as the correct answer and a few more gained 1 mark for either 3600*w* or *w*/1000 or for 3.6 with no reference to *w*. The values 1000 and 3600 were often seen but students were then not sure what mathematical operation to use for any subsequent calculation, nor did they attempt to link their calculations with *w*. Multiplying by 1000 and dividing by 3600 (with and without w) were seen more often than the correct way round. There were a significant number of blank responses.

Question 23

The diagram showed a rectangle topped with a trapezium. The area of the shape and various dimensions were given but the height of the trapezium and therefore the overall height of the shape were not. Students needed to work out the height of the trapezium in order to find the overall height. An encouraging number worked out the area of the rectangle and subtracted to find the area of the trapezium, 117, to gain the first 2 marks. A few of these could go on to equate an expression for the area of the trapezium to 117 and from there solve to find the required answer. However, mostly the working from having found 117 was by trying out possible values or seemingly random calculations. Expressions linked to one part of the shape could gain 1 mark but this was not often seen; where it was, this was mostly 0.5(15 +

21) × *y* where y was the height of the trapezium. A significant minority knew that the trapezium formula was relevant for this question but incorrectly equated it to the total area. Again, blank responses were noted.

Question 24

Here students needed to divide 600 bulbs in the ratio 9:4:2 for tulips, crocuses and daffodils (360, 160, 80). Then they needed to work out 45% of 360 and 5/8 of 160, these being the numbers for yellow flowers. Adding these answers, together with the 80 daffodils (all yellow) gave the required answer. Around 40% of the students were able to do this and gain all 5 marks. Other students began by finding 45% and 5/8 of the relevant numbers from the given ratio, for 2 marks, but rarely made progress beyond this. Even when little inroad was made into solving this problem, many students were able to make a start by working out 1 share of the number of bulbs and gain the first method mark. Some ignored the ratio aspect of the question but could gain 1 mark for finding 45% of 600 or 5/8 of 600 and this was regularly seen. While many attempted this question, it was disappointing that there were noticeable blank responses, given the very familiar start to the question. Students should be encouraged to attempt anything they recognise, even if they realise that they do not fully understand the whole question.

Question 25

About a third of students gained all 3 marks for this compound interest question. While some worked through the calculations year on year, often fully accurately, there seemed to be more students who could multiply by 1.024^4 to go directly to the answer, which is to be encouraged. The same errors are still being seen in this type of question; multiplying by 1.24 for an interest rate of 2.4%, calculating as for simple interest and applying depreciation instead of increasing the investment. Finding the interest or the value of the investment at the end of the first year could gain 1 mark and this benefitted a good number of students.

Question 26

Simultaneous equations is another familiar question for students and around a fifth of them were able to show algebraic working to gain the 3 marks. However, about two-thirds did not gain any marks, by not responding, by trying to work with the 2 equations in the form they were presented without multiplying, or by showing some random algebraic manipulations. The award of 1 or 2 marks was rare, but the marks were available when a student understood the method but made numerical errors.

Question 27

The two parts of this question asked students to factorise a quadratic expression and then solve the equation when the expression was equated to zero. About a quarter of students correctly factorised the expression but, somewhat surprisingly, only a little over 10% could then write down the solutions to the equation. Sometimes the factors were repeated, with or without brackets. Factorising the two terms in x and adding the constant proved a common but incorrect approach. Again, much random algebraic manipulation was seen. Also there were a noticeable number of blank responses.

Question 28

Given the mean number of steps for 4 days and the mean number of steps for 3 days, students were asked to work out the mean number of steps for the 7 days. Nearly a fifth of students could do this but most of the others were not able to gain a mark. However, the majority made an attempt. One common incorrect approach was to add the two given means and divide either by 2 or by 7. Division of the mean for 4 days by 4 and the mean for 3 days by 3 was also regularly seen as a starting point, with the two answers sometimes being added and divided by 7

Summary

Based on their performance on this paper, students should:

- always show clear working
- learn formulae so they do not get mixed up, for example, between area and circumference of circle formulae
- take care when transferring a number from the calculator to their working
- know unit conversions
- know that there are 60 minutes in an hour and for instance be able to convert 9 hours 36 minutes into 9.6 hours
- when drawing lines on a grid, these lines should be labelled with their equation to avoid seeing eg 2 horizontal lines or 2 vertical lines being a choice of answers, thereby not scoring the mark
- work out the numerator and the denominator, showing these answers, when students are presented with a calculator question involving fractions

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