# Examiners' Report
# Principal Examiner Feedback

## November 2024

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

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**2F PE Report**

Overall, students seemed more prepared to attempt all the questions, rather than leaving a blank. Misreads, appear to be more common than they used to be and students should be encouraged to check carefully when writing down a value from their calculator and when transferring a value from one part of their response to another. For example, in Q11, the angle 53 was seen written as 35, in Q12 63% and 65% were used instead of 64% and in Q20 the population of 650 was seen written as 605, and there were many other such misreads.

## Report on individual questions

### Question 1

The number skills required for this opening question were familiar to students, most of whom scored highly. Where 7823 was incorrectly rounded to the nearest hundred, 8000 was seen regularly. The most common error in selecting the prime number (17) from a list was to give 27

### Question 2

Almost all students could find the next term in a sequence of numbers and the high majority could also explain how they arrived at their answer, in this case by adding 4 Students do need to show by their answer whether a sequence is increasing or decreasing; simply stating that the gap between the numbers is 4 is insufficient to gain the mark. While many could find the 16th and 17th terms of the sequence, to gain 1 mark, only a third went on to sum the two values for the accuracy mark. Around three-quarters of students were able to explain why 98 was not a term of the given sequence, most simply by stating that 98 is even or the sequence is odd or that 99 is a member of the sequence. One response that was seen regularly but which did not gain the mark was stating that 98 is not divisible
by 4

### Question 3

This bar chart question was accessible to all students; both reading values from the chart and completing a missing bar gained almost all of them full marks.

### Question 4

Shading 3/7 of a rectangle with 21 squares was readily done by the majority. Also very well answered was selecting two fractions from a list that were equivalent to ¾. It was noted, however, that some students gave equivalent fractions that were not from the list, denying them the mark. The most

common wrong fraction to select was 16/20 Around three-quarters of the students could write 24/7 as a mixed number with only a few writing it as a decimal. Converting 9/10 to a percentage had the highest success rate within this question. The final part of the question was a problem solving one, where 2/5 of the 80 crayons in a box were red and students needed to work out the number that were not red. Around three-quarters of students were able to do this. Where an incorrect answer was given, this was most usually the number of red crayons, for 1 mark, or giving the fraction of crayons that were not red, also for 1 mark.

**Question 5**

Finding the median shoe size from a frequency table produced more incorrect than correct answers, with nearly three-quarters not gaining any marks. A noticeable number of students worked out the mean. Many saw that there were 5 different shoe sizes and simply stated the middle of these, ignoring the different frequencies. Where median was understood, often all 25 shoe sizes were written out in an ordered list, although a few realised that they could stop their list once they reached the 13th value.

**Question 6**

This was another problem solving question and provided over 80% of students the chance to gain full marks. Given $250 to spend, and plates at a cost of $14 each, students had to work out how much money would be left if as many plates as possible were bought. Some just divided 250 by 14 and stopped there but most realised that an answer of 17.857 meant that 17 plates could be bought and that this would cost $238 Occasional errors were made subtracting this from 250 but the majority progressed from here to the correct answer.

**Question 7**

We return to the on-going issue that students have converting values within the metric system. However, two-thirds did gain full marks. Here, 3.5 km and 1.8 km needed to be converted to metres and incorrect values of 350 metres and 180 metres were regularly seen. Alternatively, 950 metres and 1200 metres could be converted to kilometres and it seemed that those who chose to do this were generally a little more successful. The four given distances had to be added and some credit was given to those who did this, albeit with conversion errors; however, those who did not attempt any conversions were not able to gain this mark. Subtraction from 8 km or 8000 metres was the last stage and the accuracy mark was awarded for an answer in metres. If the answer was in kilometres, the final mark was not awarded. Sometimes just two parts of Marion's walks would be subtracted from 8 km.

**Question 8**

Collecting like terms to give 11g – 2h was competently done, although 11g + - 2h only scored 1 of the 2 marks, and this was noticeably seen. Students who went on to "simplify" this expression to give something like 9gh also gained only 1 mark, providing the correct answer had been seen in the body of the script. Multiplying 7a by 4m was also well done. In part (c), students were asked to solve the simple equation $5x - 7 = 12$ A good number set out their working algebraically, while others used inverse processes numerically , ie $(12 + 7) \div 5$ While this method of working led to many correct answers, more often the $\div 5$ was shown as $- 5$ and students were unable to gain any marks. The majority of students were able to multiply a single term over a bracket but factorising a simple expression with a common factor of 3 was successfully achieved by only about two-thirds. In part (f), Bulan had 3 times as many counters as Max, who had *c* counters. Writing the number of Bulan's counters as $3c$ gained around half the students 1 mark. Chanda had 7 more counters than Max but there were surprisingly few who were able to write this as $c + 7$ More often, we saw either $7c$ or $3c + 7$ An incorrect expression here led to an incorrect expression for the total number of counters. The main issue for students was not recognising the distinction between 3 times and 7 more. Only 10% of students gained full marks. A mix of letters was rife. Sometimes *m*, *a* and *b* were seem, relating back to the names of the people, and also *x* and *n* instead of, or as well as, *c*. Squares and cubes were occasionally seen instead of multiplication.

**Question 9**

Finding the length of time between two given times, here 07 35 and 13 25, still proves challenging for a surprisingly high number of students, and a variety of incorrect methods were seen. Subtracting 7 from 13 to give 6 produced the wrong answer for the number of hours. Adding 35 and 25 produced wrong answers of 60 or 0 for the number of minutes, while subtraction gave the wrong answer of 10 minutes. Using a time line was a more successful method. Just under a third were able to find both values correctly, while the award of 1 mark for one of these being correct benefitted around 15% of students.

**Question 10**

Asked to find the volume of a cuboid measuring 25 cm by 9 cm by 12 cm, it was surprising how many students could not find the correct answer, with nearly one-third gaining no marks. Even some students who wrote 2700, went on to divide by 6 or by 2, and lost the accuracy mark. Common incorrect attempts were noticeably seen: multiplying only two of the dimensions; multiplying two dimensions and then dividing by, or subtracting, the third dimension; trying to find the surface area; adding all the given dimensions. The required formula is a relatively simple one and students would benefit from learning it.

**Question 11**

Using the facts that vertically opposite angles are equal and that angles in a triangle add up to $180^o$, around 80% of students were able to find the size of an unknown angle to gain the 2 marks. Students could gain a method mark for working but needed to make it clear which angle they were calculating. They could do this by stating it in their working, but this was rare, or by showing it in the correct position on the diagram, which more did. In any question on angles, students should be encouraged to write all the angles they find on their diagram.

**Question 12**

This problem solving question involved both ratio and percentages. There were various possible methods but the most common was to work out the number of apple trees, given a ratio of 5 : 3 for apple trees to pear trees, and a total number of trees of 240. 2 marks were available for getting as far as 150 apple trees. Around 60% of students then worked out 64% of 150 and gained the other 2 marks. The most usual error seen at this point was to work out 64/240 x 150 A small number of students set out on alternative methods and gained M1 for finding either 64% of 5 or 64% of 240 but almost none were able to take these methods any further. It is noticeable how many students tried to find 64% by finding 10% and 5% and sometimes 1% but many such methods contained numerical errors and were not always worked through to conclusion.

**Question 13**

Nearly 90% of students used their calculator to work out the value of the given expression and heeded the demand to write down all the figures on their calculator, gaining 2 marks. A few responses were awarded 1 mark, where the calculation had been only partially worked out or where the answer had been prematurely rounded to show only I or 2 decimal places. The success rate in writing their answer from part (a) correct to one decimal place was very high.

**Question 14**

Students were asked to find the perimeter of a shape made from a square and an isosceles triangle. The major issue was wrongly including an internal side as part of the perimeter. Where that was the case, if working to this point was correct, 2 of the 3 marks could be awarded. However, nearly half the students did not gain any marks. The first step was to find the length of the sides of the square, having been told its area and many knew to square root 49 to give 7; the most common error here was dividing 49 by 4. Given the perimeter of the triangle was 27, some students realised they needed to subtract the length of the square to find the length of the two equal sides of the isosceles triangle. Here a common mistake was to assume the triangle was equilateral and divide 27 by 3 to work out the length of each side. Overall, nearly a quarter of students did achieve full marks.

**Question 15**

The transformation question on this paper was an enlargement and increasingly students are giving only one transformation and in this instance knew which it was. Where they stated an additional transformation or words related to them like move or up/down, right/left, the mark could not be given. They should be encouraged to learn that when asked to name the type of transformation, one word is all that is needed. Scale factor 3 was correctly given by many, even when they were unable to provide any other information. Stating the centre of enlargement as the origin, which could be done in a number of ways but not as a vector, was the least successful part of this question; assorted coordinate pairs and vectors appeared and it was unclear what these were meant to refer to, although some were probably the centre of the shapes, rather than the centre of enlargement. Overall, only around 20% of students were not able to gain at least 1 mark.

**Question 16**

Too many students still confuse the formulae for circumference and area of a circle but, asked for the area, over half were able to select and use the correct one to give the correct answer, although the length of the circumference also appeared regularly. It was noticeable that some students were wrongly using $\pi^2 r$ A few simply gave the diameter as their answer.

**Question 17**

There continues to be some improvement in the ability of students to work with fractions and to provide sufficient working through to an acceptable conclusion to show that a given answer is correct. Over a quarter gained full marks, plus another third 1 mark. The most common parts missed out by students were either to go direct from 420/112 to 3 ¾ without showing 15/4 or missing out 420/112 and going direct from their improper fractions to 15/4 420/112 could be omitted if their improper fractions had been cancelled, which would make the number work easier for students, but this is rarely seen. In fact some students made it harder by changing their improper fractions into fractions with a common denominator to give 192/112 x 245/112 in which case we also needed to see 47040/12544 There is still some confusion about when common denominators are needed and about when the second fraction needs to be inverted, which was seen, wrongly, in the context of this multiplication question. Several blank responses were seen.

**Question 18**

Upper and lower bounds remain poorly understood. This question gave a measurement of 1.4 metres correct to one decimal place and asked for both bounds. Giving the lower bound was slightly better answered than the upper bound, but only about a quarter of students gained either mark. Some deny

themselves the mark for the upper bound by trying to give it as 1.449 recurring, or 1.44999(9…) but omitting the recurring dot or not showing a sufficient number of 9s. Answers of 0.7 for both bounds and 1.5 for the upper bound with 1.3 as the lower bound featured more often the correct answers.

**Question 19**

For those who appreciated that this was a trigonometry question and that cosine was needed, one or two lines of working took them readily to the correct answer for 3 marks. This was a little over a third of the students. On the whole, the answer was then correctly rounded, or the fully correct answer was shown in the body of the script, but some students could not gain the accuracy mark having *only* stated an incorrectly rounded answer. Other responses indicated that students knew how to find the length of a missing side but unfortunately had selected sine, or occasionally tangent, instead of cosine. Attempts at trigonometry featured in much working but with little understanding of how to use the given values, for example, trying to find $\sin^{-1}(43^o / 86$ cm) Random attempts to combine the numbers on the diagram with no reference to any trigonometric ratio appeared, as did calculations involving $180^o$ Thus half the students did not gain any marks. Occasionally, blank responses were noted. A few may have had their calculators in radian or grad mode.

**Question 20**

In part (a) students were told that 17% of a number was 357 but a high number of students interpreted this as being asked to find 17% of 357 and gained no marks. Others were able to divide 357 by 17 to find 1% but gave this value, 21, as their answer. However, over half the students arrived at 2100 for both marks.

Part (b), finding the percentage increase in population size, provided many over a third) the opportunity to gain 1 mark for working out the actual difference in population size. Alternatively, division of 806/650 to give 1.24 was also seen for the first mark. From here, another 40% of students could proceed to work out that the increase was 24% for the full 3 marks, while others benefitted from the award of 2 marks in total for getting as far as 124 or 0.24 Another common mistake was finding the increase as a percentage of 806 rather than of 650

**Question 21**

This probability question needed students to work out two equal missing probabilities for a spinner landing on various numbers, given three of the five probabilities. Many knew to add those that were given, subtract from 1 and then divide by 2, to give 0.24 The question continued by asking for an estimate for the number of times the spinner would land on 4 when spun 400 times. While some students did not proceed to this stage and gave their final answer as 0.24, around half gained all 4 marks. A

noticeably seen error was to forget to subtract the given probabilities from 1; where working went on from this incorrect interim answer to find an estimate, some credit was given.

**Question 22**

Students were asked to find the total surface area of a triangular prism. Only around 20% were able to find the five areas and sum them to give 408 $cm^2$ as the correct answer and over half gained no marks. Of those who understood what was required, the most common error was to multiply base by height to find the area of a triangle, forgetting to divide by 2, if this was the only error, 2 of the 3 marks were awarded, which benefitted 10%. Other responses found products using two lengths from different rectangles, some omitted one or two faces and others simply added a number of dimensions. It was also clear that a surprisingly high number of students are confused by area and volume, with some writing volume equals length x width x height or cross section area x length immediately below the words surface area in the question. Thus, assorted values were multiplied together in ways that might have been volumes or beyond!

**Question 23**

Well over half of students could draw the lines $x = 3$ and $y = 1$, although $x = 1$ and $y = 3$ were regularly seen instead or in addition. $x + y = 7$ proved more problematical, the correct line being drawn by less than a third of students. The most regularly seen error was to interpret this as the line $x = 7$ and the line $y = 7$ and to draw both. Other seemingly random diagonal lines were seen, with positive and negative gradients, the most usual ones being those that went from corner to corner of the grid. The final mark needed a region to be shaded. Where incorrect, these regions sometimes showed a misunderstanding of greater or less than but more often were quite random.

**Question 24**

The mean weight of 4 bananas was given as 145 grams. With a fifth banana included, the mean weigh of the 5 bananas was 142 grams. Students were asked to work out the weight of the 5th banana. By far the most common, but incorrect, response was $145 \div 4$ and $142 \div 5$ and to show subtraction with the two answers. Another common, also incorrect, method was to subtract 142 from 145 and give 3 as the final answer. Two-thirds of students were thus unable to score any marks and there were a number of blank responses. Correct multiplication was seen and where this was the first step most students continued to a fully correct answer, although some found only one product and stopped. This style of question appears very regularly and students would benefit from further practice on the topic.

**Question 25**

This 3 year compound interest question should also be a familiar topic and it clearly is for some, with over a third gaining full marks. A high number of these work year by year, and although this is a correct method, often marks are lost due to numerical errors and insufficient working shown to support their method. There is still confusion between simple and compound interest and more responses applied only simple interest rather than compound interest to the figures. This could gain at most 1 mark, which was achieved by around a quarter of students. Some students *reduced* the amount by 3.5% pa. With wildy incorrect answers, few considered the unsuitability of their final result; an answer in the millions is unlikely. Another method error that was seen a few times was working out the amount of interest and adding that to 3 lots of $20,000. Some blank responses were noted. Students also find it hard to interpret 3.5% and so instead of multiplying by 1.035 or 0.035 they multiply by 1.35 or 0.35 or 3.5 This is an error we continue to see year on year and further work by students on this would be of significant benefit.

**Question 26**

One part of this question was based on a pie chart. The pie chart represented 300 students, with the Biology section shown as $126^o$ There was some limited success with working out that this represented 105 students, with several different appropriate methods seen. Incorrectly dividing 126 by 300 was noted but other incorrect attempts were fairly random. The second part of the question involved setting up a linear equation and solving it. There were three algebraic expressions, which needed to be totalled and equated to 320 (students). Mostly those who did this were able to solve it to find that Biology was the favourite subject for 69 students and complete the question by working out the difference between 105 and 69. Thus around 20% gained all 5 marks. One regularly seen error was for the expression $7x - 9$ to be written as $7x + 9$; if this was the only error, 1 mark could usually be given for the equation written in full, but the non-integer value for x that this led to often meant that no further marks were gained. Also commonly seen was to equate each of the three expressions separately to 320, which could not lead to any marks for this part of the question. Over half did not gain any marks and several blank responses were seen.

**Question 27**

The given diagram showed a regular pentagon, a regular hexagon and an isosceles triangle. To find the size of an unknown angle in the triangle, the first step was to work out the interior or exterior angles of the pentagon and hexagon. 360/5 (= 72) and 360/6 (= 60) were the most evident of the calculations that were seen, which could score 1 mark each for finding the exterior angles. However, more often

than not, students thought this was the method for finding the interior angles and thus their method was contradicted by showing 72 and 60 as the interior angles and so the marks could not be awarded. Little working worthy of credit followed. Around 60% of students did not gain any marks and there were more blank responses than with other questions. Where 540/5 ( = 108) and 720/6 (= 120) were used, these angles were almost always correctly placed on the diagram and students often went one step further to subtract these two angles from 360 to give angle AEF (within the isosceles triangle) as 132. Surprisingly few (around 15%) then completed the question by subtracting 132 from 180 and dividing by 2. 180 featured often in fairly random working and BAF was sometimes taken to be a straight line.

Based on their performance on this paper, students should

- Check their calculator screens and previous work to ensure they do not miswrite a number
- Practice the frequently occurring topics such as compound interest and ensure they do not get mixed up with concepts such as simple interest and compound interest.
- On fraction questions, know when to use common denominators, when to invert the second fraction etc
- Ensure formulae are not confused, eg the area and the circumference formulae for circles
- Ensure they read questions carefully and check they are giving the answer that was required.
- On algebra questions to realise/understand that $3x + 6$ is not $9x$ and $c + 3c$ is not $3c^2$

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