Examiners' Report
Principal Examiner Feedback

Summer 2019

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

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IGCSE Mathematics 4MA1 1FR Principal Examiners Report

Students who were well prepared for this paper were able to make a good attempt at all questions. It was encouraging to see some worthy attempts at topics new to this specification. Students were less successful in using set theory, trigonometry and bearings.

Working was frequently shown and easy to follow through. There were some instances where students failed to read the question properly. For example, in question 16(a) students regularly found 40% of ½ of the books while in 16(b) some students worked out the percentage of 15 and did not realise this was a question on reverse percentages.

A striking weakness in students was the method of solving simultaneous equations. On the whole, problem solving questions and those assessing mathematical reasoning were not tackled well; particular question 21.

Question 1

Q1(a) was answered well.

Q1(b) was answered well. Due to a lack of attention to detail, some students 'lost' numbers from the original list or mis-copied them.

Q1(c)(i) was answered well.

Q1(c)(ii) was answered well. Common errors were to find cube of 6859 or the square root of 6859

Question 2

This bar chart question was a straightforward start to the paper. There were few errors on the first four parts and, although the final part proved more demanding, it was still answered correctly by the majority of students. They needed to be careful in cancelling down their ratios.
In Q2(d) a number of students wrote 11,000,000 having ignored or misunderstood the 'millions' that was written on the answer line. In Q2(e), students sometimes didn't attempt to simplify 90:60 or occasionally left their answers as a fraction or as 2:3

Question 3

Students clearly found the terminology linked to the circle difficult to remember. Although there were a number of correct responses, some answers other than the correct 'diameter' were obtuse, hypotenuse, circumference and congruent. A range of responses where the answer was 'chord' were segment, tangent and circumference. Students were less successful at shading a sector, sometimes confusing this with a segment.

Question 4

Students could clearly identify the sign with one line of symmetry. They were successful in Q4(b) with regards to rotational symmetry. In Q4(c) the correct name 'octagon' featured regularly, as did hexagon, however.

Question 5

The overwhelming majority of students were able to write down the correct equivalent fraction in Q5(a) and shade in $\frac{4}{5}$ of the shape in Q5(b), change a fraction into a percentage in Q5(c). In Q5(d) students were less successful in working out the answer. A common incorrect approach was to work out $\frac{4}{5}$ of 60 giving an incorrect answer of 38.4

Question 6

Almost all students were able to draw Pattern number 7 in Q6(a). Q6(b) was more challenging, although a number of different correct methods were seen, including listing the terms of the sequence or drawing Pattern number 12. In Q6(c), the two most successful methods employed were either to carry on with the list (although this method did result in some errors) or to subtract two and then divide by five. The marks were spread out in this part. A large number of students were not able to offer a full explanation in Q6(d). Some simply stated that 123 is not in the sequence while others stated that 123 is not a multiple of 5.

Question 7

Q7(a) was extremely well done. In Q7(b), many students struggled to write down the correct probability and a common incorrect answer of $\frac{5}{18}$ was seen many times. The relatively common incorrect answer of 4 : 18 showed that some students were unaware of the correct notation to use for probability answers. Many students struggled with Q7(c) and did not relate what was asked back to the sample space diagram. Some students did write down that Adam gets a prize if his score is 5 or less eight times and only gained one mark. However, a common incorrect answer for Carmen was five times. Students are encouraged to read the question carefully.

Question 8

Generally, Q8(a) was well answered. Those who didn't score full marks sometimes picked up one mark for multiplying 0.58 by 8. Some students did not read the question carefully enough and divided by 13 at the end. Other errors usually arose from either careless arithmetic or the miscopying of numbers.

The problem posed in Q8(b) was well understood and most students could divide 15 by 0.62 correctly to find the number of pens required. Some students found 24 by trial and improvement. The majority appreciated that their answer needed to be 'rounded down' in this practical context. They used their answer of 24 and multiplied it by 0.62 to find the cost of the pens. Many students then proceeded to find the correct answer of 0.12. Some students wrote down the answer as 12 cents, for which they were penalised.

Question 9

Q9(a) was answered very poorly. Students struggled to write down correct expressions for the number of sweets Yuen and Giulia had. Common errors included writing $2x$, rather than $2 + x$, for the number of sweets Yuen had and $3x$ instead of $3(x + 2)$, for the number of sweets Giulia had. Many also wrote $x + 2 \times 3$ rather than $3(x + 2)$. Some students were awarded one mark for adding three correct expressions but $4x + 8$ was usually then given as the final answer. Many students forgot to add the number of sweets that Simon had.

Finding the subject of the equation in Q9(b) had a lower success rate, with much confusion over the order of working and a good number of students who simply swapped the two letters over.

In Q9(c), it is very important that students take notice of the statement: 'show clear algebraic working' as without this working they will gain no marks, even if the answer is correct. A trial and improvement method is not satisfactory either. It is important to see student working with a correct equation throughout to gain the method marks. Many students were unable to do this and often got mixed up, in this case with the –3, and then subtracting 8 from this.

Question 10

In Q10(a) the majority of students gained at least one mark. Those who used a pair of compasses and drew the appropriate arcs were usually successful. A significant number of students, however, gained only one mark because they failed to show construction arcs and merely drew the required triangle instead of constructing it – some used a vertical line from the centre of the base as a guide.

In Q10(b), a clearly constructed perpendicular bisector with two pairs of relevant arcs yielded some students two marks; some benefitted from one mark either for showing relevant arcs but failing to draw in the bisector or more usually for producing a perpendicular bisector but with no arcs present. Occasionally an isosceles triangle was offered as a response, with one set of arcs at the vertex. A very high number did not attempt anything for this question while some made seemingly random attempts to use a compass.

Question 11

In Q11(a) there were some fully correct responses from students who could both divide £1190 in the given ratios and go on to find the required difference. Others dealt with the ratio but stopped at that point, gaining the first method mark. Common errors were to divide £1190 by the numbers from the ratios, or to add the ratio numbers (to get 7) and then multiply the ratio numbers by 7. A variety of other irrelevant and somewhat confused attempts made regular appearances. A large number of candidates divided the cost (£1190) by 2 and then by 5, subtracting the answers.

In Q11(b), finding 12% of £3500 was answered using a variety of methods. Those using a build-up approach were more likely to make errors; some divided 3500 by 12. Many students could work out 12% of £3500 but did not know what to do with the value £420. Students rarely worked 88% of £3500 and some worked out the difference and then divided by 12, obtaining the correct answer. Some added £420 to £3500 and then divided by 12 giving an incorrect answer.

Question 12

There was a mix of blank responses and fully correct responses for this question. For those who attempted the question, a fully correct graph was often seen. Although it was disappointing to see a number of students who plot the correct points and don't put a line through them. A few students made errors such as incorrectly plotting one of the points, but were generally able to gain 2 marks for a correct line through at least three of the correct points. A small minority gained just one mark for a line drawn with a positive gradient going through (0, −1) or for a line in the wrong place, but with the correct gradient.

Question 13

This form of question is familiar to many students, who understood fully what was required, and achieved all 4 marks. Others came close but used a value other than the mid-point from the class-interval (usually the upper class boundary) and so did not gain full marks. Partial marks were also given to students who did not divide the sum of their products, or who divided by 5 instead of 48.

Equally, this topic appears inaccessible to a large number. Adding the frequencies or the midpoint values and dividing by 5 were common false approaches. No working with answers such as 115 was often seen. There were also a noticeable number of non-responses.

Question 14

In Q14(a), some students had little idea of what was required here and often left the answer space blank or gave a vague response. A significant number did not recognise the notation, particularly the empty set symbol.

In Q14(b), students clearly get confused with symbols relating to set notation and this was apparent by some of the answers that were written down. There were also several blank responses for this question. Some students incorrectly thought they should repeat numbers in sets but this was penalised, and it should be noted that a number should just appear once in a set.

In Q14(c), three of the four numbers were seen with an incorrect additional number which, along with incomplete answers, were worthy of the award of one mark. Some students simply wrote 4 or 5 or 6 numbers or omitted this part completely indicating a lack of familiarity with set notation. Some attempted the question by drawing an incorrect Venn diagram.

Question 15

Showing that the answer could be calculated by $\pi \times 7^2 \times 20$ provided the opportunity to gain one mark and using this to give a sufficiently accurate answer secured a fair number of students the second mark as well. However, wrong formulae and answers were seen frequently seen. The most common false approaches were simply to multiply the radius by the height or to add those two dimensions or to use the diameter instead of the radius or to add the height instead of multiplying. Also occurring regularly were the use of $2rh$ and πrh. Given that the correct formula is clearly provided, it is hard to understand why students fail to make use of this, as much of the working that was seen did indicate an ability to substitute numbers into a formula and to evaluate.

Question 16

In Q16(a) the majority of students gained some marks by working out the total cost of the 120 books and then working out the cost of the books that cost £5 each. Many students could work out the total cost of the three different types of books as £732, however, some students misinterpreted this part incorrectly. A common error was to work out 40% of 60 books that cost £7 each and then use this value to work out the number of books that cost £8 each. This method gave a common incorrect answer of 57.5%, some students then lost the final 3 marks. Finding the percentage profit was very poorly attempted. A common error when attempting to work out the percentage profit was to work out 152.5 and then fail to subtract 100 or to work out 0.525 and fail to multiply by 100, so losing the final 2 marks.

A minority of students were successful in Q16(b), where understanding that the given value had already been increased by 20% was rare. The incorrect method of finding 20% of 15 and then subtracting or adding was widespread. Careful reading of the question would help students realise that the 20% is a percentage of the original price and not 20% of the given price.

Question 17

This question proved to be beyond many students and it was not unusual to see Q17(a) and Q17(b) not attempted at all. The students who answered Q17(a) correctly generally used 4.2 × 2.5, whilst Q17(b) was poorly attempted. In both parts, various creative attempts to apply Pythagoras' theorem were seen and measuring was quite a popular choice of method.

This was a very challenging question and most students showed little understanding of similarity and what it meant in terms of this question. Few even gained a mark for showing a correct ratio as they did not understand how this could relate to the question. Many responses across this question were left blank.

Question 18

There were a significant number of blank responses in this question. Many students did produce some working but to no avail. A minority of students scored full marks with the majority only picking up at most one mark. Those who were successful tended to start by multiplying 30 by 26.8 and 13 by 25. A common incorrect approach to the question was to add 26.8 with 25 and then divide by 2.

Question 19

This question was answered poorly by the majority of students. Many students could not recall that there are 1000 metres in 1 kilometre. Students need to recall how to convert hours to seconds. Many responses across this question were left blank.

Question 20

Many students did not answer this question well and did not show a clear method. Some students made simple arithmetical errors which often happened when subtracting the *y* terms; it was however, still possible to score 2 marks if a correct substitution was made. Others chose the incorrect operation when trying to eliminate a variable, resulting in no marks. Correct answers by trial and error or using a calculator were rare, but gained no credit. Generally students continue to find this topic very difficult.

Question 21

There were many blank responses or 'guesses' at the angle with some students trying to measure the angle. The most popular method seen was using Pythagoras' theorem to find the length of *BC* and invariably this was then given as the answer. However, as the question asked for the bearing of *B* from *C* and required the use of trigonometry, such answers gained no credit. Where a direct link was made between tan *BCA* and 234/356 or

tan *ABC* and 356/234, this scored the first method mark and some students were able to do this. Overall, the majority of students at this tier find bearings very difficult.

Question 22

Q22(a) was poorly done. Only a minority of students were able to use the given gradient and the intercept on the *y*-axis to correctly write down the equation of the straight line. A common and perhaps surprising error was to omit "*y*" when writing down the equation of the straight line, e.g. $5x - 3$ or $L = 5x - 3$.

In Q22(b) there was evidence of *x* and *y* being confused in answers to this question. Similarly, the wrong inequality signs were often seen with = used instead of the correct ≥ and vice versa. In particular, students could not use pairs of inequality signs, so attempts such as $1 < y > 3$ were seen. Incorrect values were occasionally read from the axes with −2 being used in place of 2 when writing down the inequalities in *x* being the most common of this type of error. Some students were also using *R* in the inequality. For those who failed to score at all, the most common incorrect answer seen was simply a list of coordinates with a complete failure to engage with the concept of boundary lines. Many responses across this question were left blank.

Summary

Based on their performance in this paper, students should:

- learn and be able to recall metric conversions such as 1 km = 1000 m
- learn how to convert hours to seconds
- apply the formula for a volume of a cylinder
- show clear working when answering problem solving questions
- read the question carefully and review their answer to ensure that the question set is the one that has been answered
- make sure that their working is to a sufficient degree of accuracy that does not affect the required accuracy of the answer.