Examiner's Report

Principal Examiner Feedback

Summer 2018

Pearson Edexcel International GCSE

In Mathematics A (4MA0) Paper 2FR

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Introduction

The first half of the paper provided a range of questions that were accessible to most students, with good success on number topics and basic algebraic simplification. Some of the later questions were also answered well, such as finding the total frequency from a frequency table, percentage pay rise and working out prime factors. There were also questions that challenged even the best Foundation students, especially those without a well established method, such as finding three numbers given their mean, median and range.

There is a general area of weakness in identifying and remembering correct mathematical terms, such as those associated with circles (tangent, radius and chord) and with the geometry of parallel lines (alternate angles). Many students have difficulty in finding the correct words to describe a transformation fully.

Some very well organised working was seen, in contrast to other attempts that failed to communicate any method. It is not unusual to see no working at all, just an answer, even for questions that involve several steps of reasoning. Such brevity is rarely in the student's best interests.

Question 1

Students seemed to appreciate this question as a gentle start to the paper. Most of them handled the scales well and then completed the decimal addition correctly. There were a few more mistakes ordering the list of decimal numbers, with a some attempts ignoring place value and giving the answer 0.6, 0.07, 0.0011, 0.063, 0.77. The mid-value in part (d) was answered well, often by listing the one decimal place numbers between 12.9 and 13.7 and then trying to locate the median.

Question 2

Knowledge of units was good. A unit of capacity was usually given for the amount of water but the more familiar litre was sometimes chosen. Occasionally, a unit of mass was used for the width of a book, but millimetres was the most likely wrong answer. The most prevalent mistakes in converting 4.3 kilometres to metres were 43 and 430.

Question 3

Most of the answers were names related to circles but not always the right ones. Segment and sector were common mistakes for the chord, often after the word chord had already been used instead of tangent. Radius was the most successful of the answers.

Question 4

The first three parts and the percentage were answered confidently. Just a few scripts showed 72.163 truncated to 72.1 instead of being rounded. There was the usual confusion between multiples and factors in part (d). Those who understood what was needed invariably gave correct values for the multiples. Inserting brackets produced many good results but a few made no attempt and some others put brackets around 3×7. There were instances where more than one set of brackets were used, sometimes correctly and sometimes incorrectly. A few students simply worked out the value of the expression without brackets and gave an answer of 44. The most frequent mistake in selecting the smallest odd number was 6386, ignoring the fact that this is even.

Question 5

Frequencies were usually completed accurately. Sometimes the answers were recorded in the tally column, using the frequency column for further unwanted work such as multiplying each number by its frequency. The mode posed few problems, though 3 was picked occasionally, being the most common frequency, and other gave 7, the frequency of the modal value. Many students understood how to use the data to write down a fraction in the final part. Typical mistakes were $\frac{3}{10}, \frac{3}{17}, \frac{0}{3}$ or just 3.

Question 6

Nearly all answers to part (a) were correct. The subtraction of directed numbers in part (b) was usually successful, sometimes being done by counting on a number line. The main mistake was to add 6 to -9 and give -3 as the answer. Wording in part (c) was less direct but the majority of answers scored the mark, with 17 or -17 being the most frequent wrong values.

Question 7

Stronger students scored full marks with concise answers, but for many it was a challenge to organise several pieces of information. One of the $20 notes was often overlooked along with the cost of the rake. This led to the incorrect calculation $\frac{20-8.56}{1.99}$ and an answer just less than the correct value of 6. It was not unusual to see a trial and improvement approach, finding the total cost of a rake and various numbers of packets of seeds.

Question 8

Some students may have interpreted this question as estimating probabilities since C was a frequent alternative to *B*, and *D* was sometimes given instead of E. Successful answers often showed the correct numerical probabilities in the working space. The two extreme values in parts (iii) and (iv) were much more likely to be correct, although a few students had these the wrong way round.

Question 9

There were few problems expressing 4 45 pm using the 24 hour clock. The use of both 12 and 24 hour clock conventions in the question affected some answers in part (b), with students looking at the difference between 16 45 and 6 55 pm to give an answer of 10 minutes. The final time was usually converted correctly to minutes but it was sometimes left as 2 hours 10 minutes. The strategy of breaking down the difference to full hours was often successful, giving 15 + 60 +55 minutes. Students appeared to know what was required in the final part but arithmetic was unreliable. It is worth emphasising that any times given using the 12 hour clock do require am or pm, whilst those given using the 24 hour clock do not.

Question 10

The absence of a diagram appeared to make this pie chart question more difficult. There was a tendency to focus on the number 6 in part (a), with working such as $360 \div 6$, $240 \div 6$ and 6×38. Slightly better attempts used 38 but incorrectly, with calculations such as $\frac{38}{240}\times100$ and $\frac{240}{360}\times38$. Only the stronger candidates obtained the correct answer, often by identifying that the angle is 1.5 times the frequency.

Similar problems occurred in part (b) where 3 was often used and 360 often ignored. Those who used the correct numbers still made mistakes such as $\frac{100}{360} \times 250$ and $\frac{100}{250} \times 360$, failing to appreciate that the answer had to be greater than the 250 times that the spinner lands on 3. Many of the successful answers multiplied each angle in the pie chart by 2.5 and then added the results.

Question 11

Algebraic simplification was done very well. Just a few scripts showed t^3 instead of $3t$. The equation was solved less reliably. Those who attempted a two step algebraic method were usually successful, though there were instances of mistaken operations such as $8x = 9.2 + 5$. Many chose to guess the answer, sometimes verifying the guess by substituting into the original equation. A common answer obtained in this way was 5.8, which scored no marks.

Question 12

Some students failed to realise that the formula sheet provides a method to work out the area of a trapezium. They tended to give answers with no working, which were nearly always wrong, or the sum of the lengths, possibly including 12 twice. Most solutions did use the formula, often correctly. Mistakes included forgetting to multiply by 12 or to divide by 2. Incorrect signs were sometimes introduced, with calculations like $\frac{1}{2} + (22 + 25) + 12$ and $\frac{1}{2}(22 \times 25)12$.

Question 13

The question posed challenges both in the interpretation of the graph and in using the time scale correctly to work out that grid lines were 10 minutes apart. Figures of 5, 30 and 16 were common amongst the range of incorrect responses for the rest time. Students struggled to identify both the distance and time required for the speed. Some of those who clearly knew what they were looking for left the time in minutes and gave the speed as $\frac{7}{30}$ or $\frac{30}{7}$.Few obtained the correct speed. There was more success completing the graph in part (c), though it was not unusual to see lines with a positive gradient representing the journey home.

Question 14

There was a reasonable degree of success with the exchange rates. Inevitably, there was some doubt as to whether to multiply or divide by 1.25 and 0.72, and it was not unusual to see either two multiplications or two divisions. A few students ignored the exchange rates and simply subtracted 360 from 425.

Question 15

Students seem to like this sort of numerical question and they often score full marks. There were several stages to manage, however, so regular mistakes were seen, especially where working was less well organised. Some tried to save only 13 000 rupees; others used all of the pay or only 45% of it. The more concise answers used division for the final stage but it was equally common to see repeated addition of 2915 to reach the target of 26 000. It is worth encouraging students to think about the size of their answer where questions have a meaningful context. For example, 16150 was seen from time to time $(55\% \text{ of } 39\,000 - 5300)$ and this is more than a lifetime of Saturdays.

Question 16

Few students were able to find a reliable method for this question, resorting instead to trial and improvement or just guessing. A further complication was the failure to understand all of the terms mean, median and range. Despite this, many scored at least 1 mark. This was usually for three numbers with the correct mean or for recognising that they should add up to 51. The median was less likely to be correct. Those who realised 20 must be one of the numbers often included it in a combination like 17, 20, 14, placing it as the middle value but not ensuring that it was the median. There was a similar problem when the range was worked out in the order the numbers were written, such as 11, 2, 38, where the range is 36 and not 27. Some students did not consider the concept of averages when they gave three numbers all less than the median or three numbers all greater than the median.

Question 17

The angle x was sometimes given as 60 and occasionally as 113 or 120, but there were also many correct answers. The reason, which depended on a correct angle, was not well known. Corresponding angles and opposite angles were common responses, and some tried to give general explanations that simply stated which angles were equal. Even when the correct theorem was known, the right word was not always found to state it. Variations such as alternating angles and Z angles were not accepted. Attempts to use a combination of other reasons were never complete. There was reasonable success in finding the angle y. The greatest problem was making unjustified assumptions, especially treating triangle BFC as isosceles, with base angles of 60 or 67 degrees.

Question 18

This standard question was familiar to most students and it was answered well. A mark was sometimes lost when 0×2 was calculated as 2, or when the mean was given as the answer. A few candidates listed all 20 numbers before adding them, an inefficient but successful strategy. The most common mistakes were to add the numbers 0 to 5 or to add the frequencies.

Question 19

The percentage increase was handled well. Decimal points were sometimes misplaced, usually due to treating 6% as 0.6, and some answers decreased £8.50 by 6%. Working occasionally stopped at £0.51, which scored just 1 mark.

Question 20

A substantial minority of students are unfamiliar with transformation names and descriptions. An assortment of translations, reflections and rotations was seen in part (a), though the majority of students did attempt an enlargement. They did not always end up with a similar shape and the position was frequently wrong, both errors that were usually avoided if lines of enlargement were drawn. A common misconception was to draw the new figure with A at its centre, instead of using A as the centre of enlargement. The instruction to describe a single transformation in part (b) was sometimes ignored, but many did identify that a rotation was involved. Full descriptions were less common, with the centre often omitted or the angle given as 90 degrees without specifying clockwise.

Question 21

The simultaneous equations were presented in a way that encouraged elimination by substitution rather than the more usual method of adding or subtracting equations. This led to some concise and correct solutions but it also caused difficulty for those who wanted to rearrange the equations before eliminating. Negative signs were frequently lost in the initial manipulation and mistakes were made in the subsequent elimination, leading to equations like $11x = -13.5$ and $3x = 13.5$. A few students ignored the instruction to show algebraic working and tried to find values by trial and improvement. These attempts were not accepted.

Question 22

The combination of trigonometry with bearings was too much for many students. Some made no attempt at all and others concentrated only on side lengths, usually finding the length of BC using Pythagoras' theorem. There was even working like $180 - (70 + 43)$, mixing length with angles. Where trigonometry was used, it was not always possible to tell which angle the student was finding, though a correct value for A or B was often seen. Relatively few answers proceeded to find a correct bearing.

Question 23

The multiplication in part (a) was done well, with just a few instances of m^3 and m^{28}. Answers to part (b) were more varied. The number part was often left as 3 or squared to give 9. Mistakes with the algebraic parts usually involved some sort of addition of indices, $3a^5b^7$ and $3ab^9$ being typical wrong answers. Brackets were usually expanded well in part (c) but mistakes were made in the simplification, often combining $-8h$ and $-15h$ to give $-7h$. The pattern in part (d) was similar, with good attempts at the initial expansion, spoiled mainly by sign errors. Frequent mistakes were made in the subsequent simplification. It was not unusual to see terms in y^4.

Question 24

This standard question provided most students with at least 1 mark. The main exception was those who tried to list pairs of factors of 280 instead of finding the prime factors. Working was required and candidates invariably complied, usually using a factor tree or a table showing repeated divisions. There were some mistakes and some incomplete methods but many found all of the prime factors. Most of these went on to give the product that was needed.

Question 25

Many students were uncomfortable with inequalities. The stronger ones, at whom this question was targeted, rarely had a problem with part (a), just occasionally writing inequalities the wrong way round or mixing up the inclusive and exclusive ends of the interval. Below that, there was much less understanding of what the question was asking. It was very common to make no mention of x and write $-3 \leqslant 4$ or to list all of the integers from -3 to 3. Part (b) was particularly challenging, with plenty of students making no attempt. It was often seen as a single inequality and working tended to contrive to lose one of the inequality signs at some stage. $2p+3<18$ was quite common, as was the sequence of working $-5 \leqslant 2p < 10,\quad 2p<15,\quad p<7.5$. When the double inequality was maintained, it was usual to gain at least 1 mark for making a correct start to one side of the inequality. Relatively few fully correct answers were seen.

Summary

Based on their performance in this paper, students should:

- learn and be able to recall terms associated with circles
- learn and be able to recall the correct names required to give reasons for finding angles in geometrical problems
- avoid making assumptions that are not supported by information given in the question
- read the question carefully and review their answer to ensure that no aspect of the question has been overlooked
- aim to show clear, well-labelled working that communicates their method accurately.