Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

November 2023

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Foundation (Calculator) Paper 3F

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GCSE (9 – 1) Mathematics – 1MA1
Principal Examiner Feedback – Foundation Paper 3

Introduction

The overall quality of the presentation of work has improved since last year, with good working usually shown in the longer questions such as Q9, 17, 18 and 22(a). A recurrent error is where candidates prematurely round or truncate their figures, either their own figures or whilst in the process of taking them from the calculator, with such errors seen on Q9, Q17, Q18 and Q27. This usually resulted in lost accuracy marks and could also make questions more difficult than they were designed to be. Candidates need to read the questions carefully. There remain a concerning number of cases where candidates miscopy their own figures, copy down the wrong figures from the question, or round figures almost randomly.

Approaches to questions that required some interpretation or explanation were not always done well on this paper. Question 8(a) and 8(c) were answered well, but in Q22(b) candidates showed little understanding of the median in this context.

Within a broad range of questions, the paper was able to discriminate well. Weakest areas continue to be the application of ratios, scales and rates, but also algebraic manipulation and problem solving. Time remains a weakness, such as in Q12, but certainly in Q26 when in the context of speed.

Questions which had a slightly unexpected approach, that is required more thought. caused immediate problems for many, even in the earlier part of the paper. This includes questions 19, 25, 27 and 29. Questions 25 to 29 were the more challenging questions for those striving to demonstrate ability at the highest grades available, and a significant proportion of candidates therefore failed to score more than a few marks on these questions.

Candidates should be reminded that not only does working out need to be shown, it needs to be shown legibly, demonstrating the processes of calculation that are used. This is most important in longer questions, and in "show that" questions. Whilst working out was frequently seen, some annotation of labelling by the candidates is always useful to aid interpretation of what they are trying to do.

Report on Individual Questions.

Question 1

A well answered first question on the paper where most candidates gained the mark. The most common mistake was to just remove the percentage sign and write 35. Occasionally it was seen as a fraction or only divided by 10 instead of 100.

Question 2

This question was well answered with most candidates correctly rounding off to obtain 8100. The most common error was to round off to the wrong place value, normally to the nearest 1000 leading to 8000 as an answer. Several wrote 100 rather than 8100.

Question 3

A question in which nearly all candidates gained the mark. A minority gave incorrect answers where the numerical component was less, such as −4.

Question 4

Mostly answered correctly, relatively few candidates chose to simplify to $\frac{2}{7}$ and errors only arose when candidates counted the total number of squares incorrectly.

Question 5

This received a variety of answers with many candidates unable to identify tenths. Stating 0.9 was a more successful approach. "Uniths" was a common incorrect answer.

Question 6

Nearly all candidates were able to draw the pictogram accurately with the vast majority getting full marks. In part (b) nearly all the candidates managed to get at least one total correct with the errors mainly associated with the partial circles. 4 instead of 3 cakes was a common error for what a quarter circle represented. Totalling the number of cakes was generally well done with few arithmetic errors. Some of these candidates then forgot to end with a statement making their choice as to which year sold more cakes and thus missed out on full marks from an otherwise excellent response.

Question 7

Many candidates gained one mark for either 322 or 4450. But the next steps seemed to cause an issue for many candidates. If using 322 and 178, then the tendency was to add the two figures to get 500 laps, rather than subtract. If 4450 was subtracted from the initial distance and 3600 m found, then candidates struggled to convert this to lengths. Many candidates made arithmetic errors with subtraction even though it was a calculator paper.

Question 8

(a) Most candidates were able to articulate that the sequence was decreasing by 6, by saying exactly that or in an alternative way such as; "subtract 6", "decreasing by 6", "minus 6" or "go down 6". Some spoiled their answers by not quantifying the reduction.
(b) The majority of candidates were able to continue the sequence, often next to the number sequence given. They then went on to either work out the difference between the 5th and 7th term by completing a subtraction. There were two main methods seen; 73 − 61 or it was sometime shown in two different steps: 73 − 6 = 67 and 67 – 6 = 61.
(c) Candidates always find response type questions more difficult to answer and often do not give enough detail to explain their reasoning, but on this occasion this question was well answered. Answers such as "subtracting 6 will not get to 52" or it goes past 52 or similar were not enough to be credited with the mark without further supportive evidence of their statement. Most candidates chose to either comment: "the sequence is odd" and/or "52 is an even number" **or** continued the sequence far enough to show that the 8th term was 55 and/or the 9th term was 49.

Question 9

The familiar context of this question meant that candidates were able to access it and make some good progress into the marks. The most common method seen was to take 105g and then multiply it through by 3 (portions) and by 7 (days in a week) to find the total dog food needed for one week of 2205g. From there candidates either systematically showed totals for multiple weeks getting to 11025g **or** then divided 12000 by 2205 to understand that the food would last 5.4... weeks. Many implied the first process mark, even if they didn't state that 12kg = 12000g and ran the risk of losing that first mark if they did not go on to get a correct solution or show enough workings to justify it, like a solution of "5.4 weeks". Alternatively, other candidates chose to work in weeks and arrive at 38.09... weeks, however they often left their solution as this and so either scored only 2 marks or 3 marks if they had stated that 12kg = 12000g. Other common misconceptions were seen such as; 12kg = 1200g or that candidates thought that there were only 5 or 6 days in a week.

Question 10

In part (a) most candidates were able to correctly identify a pentagon. Common incorrect answers were polygon and hexagon.
In part (b) very few candidates actually used the word 'edges' in their working box. The most common error was using 10 vertices, shown on the diagram. Many candidates gained 1 mark for marking the edges as they counted them and then multiplying the wrong total of edges by 7.5. Most candidates who scored 0 marks did so because they made no attempt to count the lines (either with ticks or overwriting). This meant that whilst they carried out a multiplication with 7.5, they did not gain marks as their answer was incorrect or ambiguous and there was no indication of a correct method.

Question 11

A very well answered question. The most common mistakes were either giving the fraction over 18, found by incorrectly adding the other 2 numbers in the ratio, or choosing the wrong number from the 3 options as the numerator.

Question 12

Candidates always seem to struggle with time, and this paper was no exception. Although it was not uncommon to see the correct answer, there were also many examples of candidates treating $\frac{1}{4}$ hour as 25 minutes, or in some cases 20 minutes. The temptation to reach for the calculator was too much for many, who simply worked out 14.1 – 3.25 or added time to 14 10 rather than finding the difference.

Question 13

In part (a) man candidates correctly simplified the coefficient to 20 but there were numerous errors with the power of h, especially giving the power as 9 or 6. Quite a few candidates showed $22h^6 – 2h^3$in the working box but their final answer was often correct, suggesting that they were adding and subtracting both the coefficient and the power. Many times the candidate was seen to be applying the power to the co-efficient, leaving out the h altogether before popping it back on to their answer at the end.

In part (b) Most candidates used order of operations correctly and got the correct answer. Some chose to divide each term in the bracket by 3 and sadly failed to simplify their answer and left as $3y + 4y$. It was also common to see the y dropped and the answer of 7 just given.

Question 14

It was pleasing to see many correct answers given, with the numbers (or their equivalents) given in the correct order. Candidates who attempted to convert to fractions quickly realised that this was a more difficult route since you then had to find fractions with common denominators in order to make a comparison. They usually joined the rest in converting the two fractions to a decimal, and then ordering their five decimals, though this was not always done correctly.

Question 15

It was quite common for candidates to score full marks on the frequency tree. Where this did not always happen the majority of candidates scored 1 mark placing the 64 and 36 correctly. Most candidates scored well on part (b), recognising which values from the frequency diagram to use. Some candidates wrote their probability out of 100 or as a ratio but this was less common. A mistake seen a few times was when the candidates had missed the 'given' part of the question and included the UK holidays for families and couples which scored them zero.

Question 16

Generally, this was not well answered. If the candidate chose to multiply through by 7 as their first step, they were often unsuccessful at gaining method marks because they omitted to multiply the 9 as well as the other terms. With an incorrect first step no further marks were possible. Whilst those candidates who showed the intention to subtract the 9 from both sides as a first step were more successful at gaining method marks, they would often fail to carry out the subtraction on one or both sides. They had difficulty in subtracting a larger number from a smaller one often ending up with a positive solution demonstrating their struggles when working with negative numbers. If this step was completed successfully, they would often go on to divide by 7 rather than multiply. Another common error was to dispense with the divide by 7 altogether and to rewrite the equation as $7x + 9 = 4$ as they are more familiar with this type of equation.

Question 17

Most candidates made a start on this and gained at least one mark by calculating how many Australian dollars were earned in a week, or the UK rate per hour.
Frequently candidates then went on to compare unlike values. Few gained all 3 marks because candidates often swapped between rates per week and rates per hour. If they did get to comparable figures they occasionally lost the accuracy mark since they had prematurely rounded figures earlier in their working.

Question 18

There were four distinct steps to this problem: find the missing length of the triangle base (6.4), calculate the area of the triangle (19.2), calculate the area of the rectangle (67.2) and thus calculate the length of the rectangle (4.8). Where there were earlier mistakes in the base length or in the calculation to find the area of a triangle it was still possible for candidates to be awarded marks for correct application of later processes using their figures, under certain circumstances. The likely misconceptions were seen which included incorrectly assuming the base was 6 or 3.8 and forgetting to correctly apply the formula for a triangle by halving the product of "6.4 and 6". Centres are encouraged to teach candidates to structure working with labels as to what they are doing; e.g. "area of a triangle = ..." That way more marks would be yielded from further working from previous mistakes as examiners are in a better position to understand what the candidates is doing, and can apply marks whenever possible.. In most cases where candidates scored the first three marks most went on to finish this problem.

Question 19

It was very rare for a candidate to gain full marks for a rectangle of 7 × 8. Writing the dimensions of the given elevation on the diagram would have been an easy first mark, but many did not do this. Drawing a rectangle of length 7 or 8 was the most common way that candidates gained 2 marks, but whether they understood the term ‘plan’ is unclear.
The majority of candidates did not appear to know how to find the missing length or didn’t realise that they needed to.

Question 20

Part (a) was mostly answered correctly but several candidates failed to fully understand the need to use a number between 1 and 10 when converting to standard form and gave 468×10^3 as their answer. Generally, candidates showed they had counted the movement of the 'decimal point' to place it from the end to after the 4, and this usually led to the correct answer. When the wrong answer was given, it was usually due to counting the non zero digits and this gave the incorrect 4.68×10^3. In other instances candidates dropped the digits after the 4 to give 4×10^5.
In part (b) it was common to see 4 zeros put in front of the 5 and the decimal point not moved, omitted, or put after the third 0 to give 000.05037. It was common to also see the answer of 0.005037. Some candidates either did not see or did not know how to work with the negative index in standard form and gave the answer 50370.

Question 21

This question was mostly answered well as 200 × 0.4 = 80.
The common incorrect answer was 200 ÷ 0.4 = 500.

Question 22

In part (a) the majority of candidates were able to show they understood what the table meant. Many candidates were able to find a value within the inequalities and multiply this by the frequency. In using a variety of different methods candidates used mid-points, ends and other values.

All candidates were able to pick up the two method marks if they then went on to sum their six products and divide the total by fifty to find an estimate for the mean. Those who used the correct method of using the mid-points were able to go on to achieve the correct solution and were awarded the final accuracy mark.
The usual misconceptions were seen, such as adding the frequencies, adding the midpoints or summing their chosen values from within each inequality and then finding the mean of these, all of which gained no marks.
In part (b) many candidates were unable to answer this question correctly and gain any credit. Many took the misconception offered and chose to agree that Seija was correct often justifying this by taking the ordered midpoints and finding the middle of these. Other common misconceptions seen included ordering the frequencies and then opting for the 15-20 inequality or selecting 17.5 (the midpoint from this).

Question 23

In general part (a) of this question was well answered with most candidates picking up at least one mark for stating that the inequality should have been drawn from -3 and/or that the circle at 4 should have been shaded/coloured. Again, as usual, sometimes responses lacked detail and were not precise enough which meant that the mark was not awarded. Examples included: "the circle was not shaded" or "the line was not long enough" or "the circle was not drawn at the correct number". Some candidates chose to correct the diagram and re-drew the correct inequality, with or without an explanation. In both these cases the marks were awarded when it was clear and when there was no contradiction.
In part (b) few candidates scored full marks. The most common responses scored M1 for finding the critical value of 4.6. A few candidates who got this far then stated 5 instead of 4 as the greatest integer. A common error seen was where candidates subtracted 7 rather than adding (scoring 0). There were fewer embedded answers seen this year, showing candidates were using more formal methods.

Question 24

This was a very well answered question with most correct answers coming from listing multiples of 30 and 24, realising that 120 was a common multiple and giving the final answer of 4 and 5 for full marks. Occasionally candidates used a different common multiple but still commonly scored full marks.
Candidates who did not score generally had tried using factors rather than multiples (just by listing them). Occasionally candidates attempting to list multiples made an error before they reached three multiples for each of 24 and 30, scoring zero.

Question 25

Many candidates did not recognise this question as inverse proportion, so there were many examples of $30 \div 4 = 7.5$
Some candidates just worked with the numbers to see what they got, though a few reached the correct answer, explaining their logical steps. An example of this was where they reasoned that if it takes 4 machine 30 hours it will take $4 \times 30 = 120$ hours for 1 machine, then $120 \div 6 = 20$ machines to take 6 hours.
Candidates were usually awarded 0 or 2 for this question; it was very rare for anyone to pick up 1 mark.

Question 26

Many candidates were able to recall the formula for speed (mainly seen as a formula triangle) and use it to successfully find the time by dividing distance (143 miles) by speed (55 mph) to get 2.6 (1 mark). Unfortunately, most candidates were unable to convert this to hours and minutes, often stating 2 hour 6 mins (leading to a final answer of 7 hours 26 mins) or 2 hours and 60 mins (being changed to 3 hours and leading to 8 hours 20 mins) or 2 hours 40 mins (interpreting 2.6 hours as $2\frac{2}{3}$ hour).
The build up method to try to find the time for travelling 143 miles often broke down.
2 hours = 110 miles was correct but candidates struggled to find the time for the remaining 33 miles often just writing 33 minutes giving a final answer of 7 hours 53 minutes.

Question 27

Some candidates scored 1 mark for correctly substituting the values correctly into the equation or were able to gain the mark for 144. Very few scored marks beyond this point. The most common error was to rearrange the formula into a multiplication instead of a division. Most did not substitute the values into the equation as a first step and hence missed out on the method marks. Most of the candidates showed a lack of understanding of pressure and where an object presses onto another. Once they found the area of one face, they often made no further progress as they failed to understand this was one face of the cube and not the whole cube. Several candidates divided 900 by 144 (area of one face) = 6.25 but did not then show the 6 to compare it to, failing to realise they had demonstrated that 900 cm^2 was more than enough to cover 6 faces. Sometimes 3.5 was substituted as 3.5^2 as candidates sometimes confuse the square on the units and apply it to the numbers also.
The candidates that answered successfully for full marks understood that a cube has 6 faces. 864 was the most common correct answer.

Question 28

By this stage in the paper many candidates were struggling. It was common to see a table of values generated by taking the points from the straight line usually followed by an attempt to find an equation by trial and error. Candidates who had some knowledge of this skill knew to highlight the y-intercept at (0, 3), drawing a gradient triangle on the graph. However, many were unable to take the gradient triangle further and were unable to show correct working and/or that the gradient was "−2". A method mark was awarded for the few correct gradient workings seen and for arriving at "−2". Candidates who got this far nearly always went on to find the correct solution when using this method. It was more likely to see a solution of the form $y = mx+3$ which demonstrated understanding of the y-intercept. A few candidates, who knew what they were doing, spoiled their final solutions by using L instead of y, but were awarded the two method marks.

Question 29

This question was poorly attempted with only a small minority recognising the need to use Pythagoras to calculate the diagonal of the square. A few students earned M1 for 2×3.5^2 but were unable to progress further. A lot of candidates demonstrated a good understanding of calculating the circumference but were unable to be awarded marks without identifying the

radius or diameter correctly. There was lots of use of π but with the wrong values for radius or diameter.

Summary

Based on their performance on this paper, centres should note that:

- Written work needs to be legible for examiners to consider awarding marks. Figures taken from the question, and taken from candidate's own work, need to be transcribed accurately.
- Candidates need to be trained to avoid rounding or truncating answers to calculations, and to use the most accurate values where possible.
- At this level of Foundation, this year candidates showed significant weaknesses in handling issues to do with time, and proportion.
- There is a continued need for emphasis to be given to algebraic manipulation and derivation, and application of ratios, scaling and rates in preparing for future examinations.
- The inclusion of working out to support answers continues to need emphasis.

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