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Examiners' Report
Principal Examiner Feedback

Summer 2019

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

In general, mathematical performance has improved on this paper since last year, though was not always consistently good across the whole paper. 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. Most students demonstrated good use of a calculator, though on some occasions it was clear that they did not have an understanding of the way in which their calculator worked or did not have one at all.

It was pleasing to see far fewer attempts using trial and improvement approaches. These mainly occurred when students showed evidence of not having a calculator, mainly evident in Q11, Q21, Q22 and Q23 where non-calculator methods were also seen, such as multiple additions.

The overall quality of the presentation of work has deteriorated somewhat from last year. Students need to read the questions carefully; there were too many cases where students misread the question and failed to give the answer asked for. On too many occasions examiners reported that written work was illegible. Another significant source of lost marks was in the many cases seen, across many different questions, where students mis-copied their own figures, copied down the wrong figures from the question, or rounded figures almost randomly. These many cases of premature rounding/truncating, either in their own figures or whilst in the process of taking them from the calculator, usually resulted in lost accuracy marks and sometimes made questions more difficult than they were designed to be.

Approaches to questions that required some interpretation or explanation were inconsistent. Q13 was answered well, but poor attempts were made in Q11 and Q27. On too many occasions students included contradictory or incorrect statements, which cannot be credited.

Questions that had a slightly unexpected approach and therefore required some thought, caused immediate problems for many, even in the earlier part of the paper. This includes Q16, Q17 and Q20. Q28 to Q30 were the more challenging questions for those striving to demonstrate ability at the highest grades available, and a significant proportion of students therefore failed to score on these questions.

The inclusion of working out to support answers remains an issue for many; but 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. Examiners reported frequent difficulty in interpreting complex and poorly laid out responses in Q21, Q22, and Q23.

Report on Individual Questions.

Question 1

A very well answered question. Most students gave the correct answer of 500 but 400 was sometimes seen.

Question 2

The majority of students gave either 48 or 56 (or both) as their answer. Some gave multiples that were not within the stated range.

Question 3

This was not answered well. 150, 15 or 1.5 were the most common incorrect responses, with about 2/3 giving the correct answer.

Question 4

There were few correct answers for this question. Most students appeared to want to give the numbers that were multiples of 3, rather than powers of 3. Some gave just one of the numbers, and not both.

Question 5

This was very well answered with few failing to gain the mark.

Question 6

Many students gave the correct answer. Less successful methods were those where students used partitioning methods which introduced more opportunity for error. This included those who divided 8 by 2 and gave the answer of 4 on the answer line, or those who just found 10% as 8 and made errors from there. Some treated this as an increase or decrease percentage, giving answers of 64 or 96, but were still credited for method.

Question 7

A frequent incorrect answer was 10, where the students had only dealt with the circles, perhaps from not reading the question carefully. Many gained full marks, but it was not uncommon for one mark to be given for showing 33 or 27 from the first stage of subtracting two numbers logically from the table. There was much evidence of unnecessary errors, such as $33 - 27 = 7$ or $26 + 7 = 34$.

Question 8

There were many correct answers which gained full marks. Many realised that 1/4 was 13 (litres) and gave this as their final answer; use of quantities such as 13 rather than a fractional approach was far more popular. Those who scored no marks often subtracted the 1/4 from the number of litres, that is $52 - 0.25$, or divided 52 by 1/4.

Question 9

This was well answered for an algebra question, with many gaining the full two marks. If only one mark was awarded this was usually for $11e$. The most common incorrect answers were $11e - 5f$ or $11e5f$.

Question 10

Most students got at least one mark for summing the values in some form. Marks were lost by either using the incorrect value of 120 (eg 120/400) or leaving the answer as 240/400. A few went on to express the answer as a decimal or percentage, or an unsimplified fraction and so lost the final mark, since the answer had to be given as a fraction in its simplest form. Overall a well answered question.

Question 11

This was very much a question of two halves. Part (a) was well understood and many saw it through to an accurate conclusion. A small minority chose to do this by multiple addition, presumably without a calculator, and usually lost the final mark due to arithmetic error. Some just found the difference between the given costs. Too many mis-copied the figures from the table.

In part (b) few gained the mark as their explanation was frequently incomplete: reference must be made to both the number of parcels and the cost. Just working out the accurate calculation was also insufficient. The crucial feature was that both figures had been rounded down.

Question 12

This was well done by the majority, giving 9/25 as the final answer. A few students added 6, 9 and 10 incorrectly but were still able to gain the method mark. The final mark was sometimes lost when the student failed to give the final answer as a fraction. Common incorrect answers included 25/9 and 9/100.

Question 13

The most common answer in part (a) was 40, though some gave 80. A significant minority lost the mark by giving the full sequence of numbers, but not highlighting 40 as their chosen answer.

Part (b) was also well attempted but at times was poorly explained by students who would just say they counted up. The most common explanations included the numbers 80 and 88, or focussed on the fact that the sequence was all even numbers, factors of 8, or that 85 was an odd number. Students who deduced the algebraic rule and did a division to show it was not an integer could also gain the mark, as long as their working was correct.

Question 14

This was very well answered with the majority gaining both marks. Common errors included not showing working, writing a shortened answer such as 2.4 or 2.5, premature rounding/truncation, or copying the figures incorrectly from the question. Using an incorrect order of operations led to the answer of 1.3530… The most successful students were those who worked out the value of the numerator (and wrote it down) then worked out the value of the denominator (and wrote it down) then did the division. Students need to be careful when using their calculators. Many misinterpreted their calculators and included recurring notation with some of their figures, which was condoned on this occasion. There was no penalty for students who interpreted the question demand by not only showing the figures on the calculator display, but also showed all other figures that could be generated by the calculator, sometimes to 50 or more decimal places.

Question 15

This was a high scoring question, in both parts. A significant minority of students lost marks through mis-reading the figures in the question, typically using 5 instead of 50. The most common error was adding 70 and 50 first before multiplying by 4.

In part (b) the most common method was 680 – 50 then to divide by 70. Some students did 9 × 4 × 70 + 50 which was probably the result of trialling rather than making use of inverse operations. A common error was to double the answer to part (a), concluding that if 4 weeks cost £330 then 8 weeks must cost £880.

Question 16

Most students earned the first mark by correctly placing 5 figures on the diagram or identifying one of the missing lengths. A high proportion got 30 as their answer since they had missed out the length of 2; many more got an incorrect answer of 36 by including the inner edge. Some worked out the perimeter of the two separate rectangles and just added the two perimeters. Those who worked through the question methodically and found all the required sides usually went on to give the correct answer for full marks.

Question 17

Students found this question difficult. Instead of using the given width of the box (1.5 metres) and measurement (1.8 cm) some measured the height of the box instead and used that measurement. Common incorrect methods included multiplying 10.8 by 1.5 or dividing 10.8 by 1.5. Others chose to just measure the pole and give that as their answer. Some gave their scaling factor as the final answer. But those who realised that they could use the length of the box to divide up the mast into between 5.5 and 6.5 sections and then multiply this by the real length of 1.5 scored full marks.

Question 18

In part (a) only about half the students gave the correct answer, with 5 being the most common incorrect answer, or 7 from using the frequencies rather than the number of points.

In part (b) students appeared well prepared with most showing their calculations. The main error was to calculate 0 × 4 as 4. Those who did not understand the concept of calculating the total number of points often added either column of numbers and gave 15 or 30 as their answer. A minority wrote out all the 30 figures but usually made an arithmetic error in adding them.

Question 19

This was very challenging for many Foundation students. It was common to see the correct steps to rearrange written down but they were either not carried out or not completed correctly. A few stopped at $2x = y - 4$ In most cases the first rearrangement was −4 followed by division of 2, but many spoilt this by writing $4 - y$ instead of $y - 4$. This remains an area of content that is weak.

Question 20

It was surprising how many students failed to gain the answer of 105 in this question. Students who wrote their angles on the diagram were more successful than others. However, those angles needed to be correct to gain the method mark; this was usually gained by stating that the angle in the corner of the square was 90, or the angle in the triangle was 60, which could simply be shown by writing it on the diagram. But these were often just added to give 150 as their final answer. It was clear that some students were not aware which angle *EBC* represented, even though it was clearly shown on the diagram.

Question 21

This was well answered with many getting the final answer of 28, though some lost the final mark by rounding in the wrong direction, or not giving their answer as an integer. The most common errors were 850 × 200 or 850 ÷ 18.53

Question 22

This was a question where students were very happy rounding and truncating figures, sometimes at every stage of their calculations, sometimes inducing a level of inaccuracy that left their final answer well away from what was expected. There was also evidence of mis-copying either the figures in the question, or their own figures from a calculation. The most common method was to find the number of gallons (560 ÷ 34.5) followed by conversion of gallons to litres (16.23 × 4.55); most then multiplied by 1.08 to find the cost, but some just gave their litres conversion as the final answer. The most common error after scoring the first two process marks was to divide by 1.08 instead of multiplying. Many gained process marks, but it was important that their working was clear and unambiguous. There were some good attempts at this question, which is evidence of the increased work that centres are doing on proportion and rates.

Question 23

Setting out methodical and clear working was essential in this question. The majority gained the first mark for calculating either 28% or 112 packets for Alan, but it was not usual to find students working out 32% and 40% and just adding them. Equally, many went on to show 6/10 or 300 for Beryl, but again there were those who just worked with 4/10. As in other questions there were too many cases of poor arithmetic or mis-copying figures, though this did not prevent the award of the process marks. The ratio calculation was the more challenging aspect of this question with many just trying a ratio division using 3 : 4, usually involving a division by 7.

Question 24

Many students were able to complete the regions within sets *A* and *B* correctly but often included all 1 to 9 numbers in the outer region. A significant minority of students incorrectly wrote their numbers on the circumference of the circles.

Part (b) was usually well done and did not rely on getting all the marks in part (a). Some students did not understand the set notation for the intersection.

Question 25

Most students showed some understanding of working with percentages, but there was considerable confusion about the necessary processes attached to compound interest. Firstly, there were errors in copying down the numbers, particularly missed zeros. Then the issue as to what to do with 1.5%. Some used this as 15%, others 0.15%. Some remembered something to do with multipliers and used 1.05, 1.005 or 1.15. But the main issue was simply that they had no notion of compound interest. The most common approach was to find a percentage of 200000 and multiply this by 4; 12000 was a very common answer. Those who tried to remember a formula approach usually inserted an incorrect multiplier, 200000×1.5^4 being common. Those students who made the most in-roads into the process were those who worked it out year by year, but premature rounding was in evidence again here, so the accuracy mark was rarely gained. And finally, those who could get to the end frequently gave the answer as 212272.71 (the amount rather than the interest). So overall too many errors in what is a standard process; the most successful approach being one year at a time and using accurate figures from the calculator.

Question 26

Part (a) was not answered well, with very few able to state the correct class interval. Most common answers were to give the group above the one required.

Part (b) was another question without any distractors which was done poorly. The most common error was to misread the scales, or not join the points. Some drew a line of best fit, but this was ignored.

Question 27

In general, the statements made were not specific enough to be awarded marks. Stating "the scale is wrong" is insufficient; students need to refer to the axis and what is wrong with the scale. It was clear from the responses that many students did not know what a time series graph should look like and interpreted it as an attempt at a scatter graph, or a line graph. Many incorrectly thought the vertical axis should have integer values. Marks were most commonly awarded for students who stated that the points should have been joined using straight lines, or that the horizontal axis was confusing or misleading in some way (some making references to missing labels, but rarely the absent 1).

Question 28

Very few marks were gained in this question. The most common approach was to consider the angle *BCF*, and giving this as 63 earned a mark, but they could rarely proceed beyond this point. Some earned a mark by working with the total angles of a polygon, but again regularly failed to proceed beyond the point at which this figure was found. Most incorrectly used 360 as the total angles in a hexagon or pentagon; many were unable to label angles correctly, which was particularly disappointing when *BCD* and *CDE* were found, but written the wrong way around.

Question 29

Again, very few marks were gained in this question. Having been given a picture of a cylinder many students just found the volume, which was of no use to them. The other common error was to think of the curved surface area as a rectangle 1.8 × 1.6 which again usually led to no credit. There was of course some confusion as to whether a figure of 1.6 or 0.8 should be used for the radius. Marks were sometimes awarded when a student found the area of a circle (without converting this into a volume), or less frequently when they found the curved surface area. A common mark awarded was when they found the total coverage possible (7 × 5) but this was sometime spoilt when students interpreted the 5 m^2 as 25 and then incorrectly calculated 7 × 25.

Question 30

There were many who failed to attempt this question. There was unfamiliarity about adjusting the equations to give the same coefficient of x or y, evidenced when students started to manipulate just one of the equations, or tried a trial and improvement approach. Of those who made a good start, it was not uncommon to find them making an arithmetic error or dropping a minus sign. If this was the only error they could then go on to the next step and potentially gain two of the three marks. For the second stage in their calculation, there were as many who started again with elimination as there were who substituted back in, though substitution was done with greater success.

Summary

Based on their performance on this paper, students should:

- ensure they transcribe figures accurately both within their working and when copying figures from a calculator
- avoid truncating or rounding values until the final answer
- ensure that they know how to use their calculator
- ensure that figures are written clearly, for example, avoid any possible confusion when writing 1s and 7s, when writing 4s and 9s, and even when writing 0s and 6s
- include working out to support answers
- practise questions on topics such as algebraic manipulation and derivation, and application of ratios, scaling and rates
- practise answering response type questions where a written explanation is required

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