Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

November 2020

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 was good. However, students need to read the questions carefully. There remain a concerning number of cases where students copy down the wrong figures from the question, mis-copy their own figures, or round figures almost randomly. Equally another error sometimes occurs when students prematurely round or truncate figures, either their own figures or figures from the calculator, which usually result in lost accuracy marks and could also make questions more difficult than they were designed to be.

Approaches to questions that required some interpretation or explanation were inconsistent. Questions 10 and 21 were answered well, but poor attempts were made in questions 15 and 26. On too many occasions students included contradictory or incorrect statements, which cannot be credited.

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 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, such as in question 9.

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 18, 20 and 24. Question 25 to 29 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.

There were far fewer attempts using trial and improvement approaches. These mainly occurred when students showed evidence of not having a calculator, mainly evident in questions 15, 18, 19 and 20 where non-calculator methods were also seen, such as multiple additions.

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.

Report on Individual Questions.

Question 1

This was a poorly answered question. Most students gave the correct answer of 3 but 300, 30 and 3000 were frequently seen.

Question 2

A well answered question with nearly all giving the correct answer of 8.

Question 3

This was not always answered correctly.

Question 4

There were few incorrect answers in this question.

Question 5

This was very well answered with few failing to gain the mark. The most common error was the absence of one of the numbers.

Question 6

A very well answered question. There were a few who gave the answer of 4 to part (a).

Question 7

Students were generally very successful with this question with most obtaining full marks. Those achieving partial marks tended to mis-read the shaded section and recorded the fraction unshaded instead leaving their answer as $\frac{1}{4}$. A significant minority failed to give their answer in its simplest form, usually leaving the answer as $\frac{12}{16}$.

Question 8

This question was generally well done with the majority dividing 200 by 25 (some with multiple additions of 25) and then completing the process of 9.75 × 8 and giving the correct answer 78. Some students preferred to list eight lots of £9.75. The most common errors were students multiplying the cost by 200 or by 25.

Question 9

Parts (a) and (b) were not always answered correctly, with students having difficulty with the order of operations on their calculators.

It was rare to see any correct answers to part (c). Knowing the meaning of the term "reciprocal" is clearly a weakness in students.

Question 10

Most students got the marks in parts (a) and (b).

In part (c) students were able to explain that the drop in the first 3 minutes was steeper than the last 3 minutes. Some struggled to articulate this and some forgot to agree and imply that Pam was correct. There were a wide variety of values presented by students, although this question assessed the interpretation of the graph rather than the accuracy of reading values. Students generally used suitable values to explain their reasoning. Some students didn't use the graph at all but tried to explain that water cools more quickly when it is hotter.

Question 11

Many responses achieved full marks. Many managed to use the fact that angles in a quadrilateral sum to 360 or found the angle on the straight line to *y* was 70 degrees and score one mark. Not all students who correctly calculated angle *PSR* were able to complete this question correctly, deciding to go off in all sorts of related incorrect calculations. Some of the weaker students knew that angles on a straight line totalled 180^o but chose to use angle *QPS* with angle *y* to sum to this total.

Question 12

Part (a)(i) was well answered. In parts (a)(ii) and (b) it was clear students did not properly understand the meaning of "term". This was evidenced by statement involving algebra, "*n*th term", "$n - 5$" and numbers not relating to the sequence given in the question.

Question 13

Many students added up the numbers that they saw on the diagram to get an answer of 26. Many more managed to score at least one mark on this question as they identified the length of one of the missing sides, usually on the diagram. For some reason finding 2cm was much more prevalent than finding 6cm. Some then forgot to find the missing length of 6cm leading to an answer of 28. The majority understood the meaning of perimeter, but some divided the shape into rectangles and added together the perimeter of both rectangles. The other common mistake was trying to find the area.

Question 14

In part (a) most students understood the need to collect like terms and it was often done successfully. If full marks were not awarded, students usually achieved one method mark, usually for the $5x$.
The negative sometimes caused problems when collecting the *y* terms. Common errors seen included $6xy$ and $5x^2 \pm y^2$.
Part (b) was well done by many with the answer 3 on the answer line, though a formal algebraic approach was not seen very often, students preferring to show $22 - 7 \div 5$. Some showed "–7" written by the equation but this was not credited unless the next stage was shown by, for example, writing $5p = 15$. Few attempted to divide by 5 as their first step. The most common incorrect answer seen was 10 from subtracting the 5 and 7 from 22.

Question 15

There were some good attempts at this question, encouraging since there were several steps needed to get to the answer: division to get the number of packs and rounding 7.5 to 8 before calculating the cost. Conclusions were well stated. The common error was to work out the individual cost of the batteries in each shop and then find the cost of 30 which clearly demonstrated misunderstanding about the packs.

Part (b) was usually well stated with 'No' and a clear reason. Most calculated the cost of 30 individual batteries of £12 and £13.50 and stated 'No, shop A is still cheaper'.

Question 16

In part (a) the majority wrote the correct answer on the answer line. Some went on to convert their answer to a decimal which was unnecessary. It was also pleasing to see most students using the

correct notation for probability with only a minority using the incorrect notation of a ratio. Of those not gaining both marks, most earned M1 for $\frac{5}{n}$ or $\frac{m}{11}$.

In part (b) a common incorrect answer was 0.3, but the majority of students gave the correct answer of 0.7, which was sometimes written as an equivalent fraction.

Question 17

The majority of students attempting this question gained full marks. There were many who gained 1 mark for drawing only one 6cm line correctly, though quite a few struggled to draw an accurate isosceles triangle. Though they were not required in this question, there was very little evidence of construction lines/arcs drawn; it seemed most measured using their rulers.

Question 18

Many students secured one mark for providing an accurate conversion using the graph. However, others drew lines on the graph, not always correctly, but failed to take any accurate readings from these. Of those that did, most went on to complete the method, but many of these confused their $ with £ and so lost the method mark. Other students chose to take their initial reading near the origin, for instance using £5 = $6, which by the time they had multiplied it up to $345 was too inaccurate to give an answer within the range allowed. There was some misunderstanding of the scale on the $ axis, with some students assuming 1 small square = $1

Question 19

In part (a) to achieve both the marks, students needed to understand through proportional reasoning that the number of tuna sandwiches represented 40% of the total sold. Many students were not able to demonstrate this and as such scored no marks. There were some who adopted a bar modelling approach e.g. stating 40% = 56 so 20% = 28, and adding 56 + 56 + 28.

Part (b) was answered slightly better, but still demonstrated that students need more practice of ratio and proportion. Where students showed some understanding of what was required but chose to use a percentage of 18 to scale up were often not able to achieve a solution that was accurate enough.

Question 20

Students that were able to demonstrate some understanding of the context were rewarded with one of two process marks if they able to sum the total of money (200) that Akhtar, Ben and Carl had without the £10 notes or used the mean amount to calculate the total of all the money (240). After scoring one or two process marks there was a variable understanding of how to use these values to solve the problem. Of those who made mistakes many appreciated that the answer had to be an integer and rounded their mistakes rather than reflecting that there had to have been an error and a further check of their work was needed.

Question 21

Part (a) was answered well, with many students gaining the mark. The most common incorrect answer was $\frac{25}{50}$, a probability statement rather than a statement of the number of times.

In part (b) some students thought that the answer was Paula because "10 times was enough" as her approach was quicker. Lots of students had the right idea that the more trials, the more reliable your results, but some failed to actually say "Simon, because…" A common mistake was just talking about 100 throws and not making comparisons.

Question 22

This question was attempted by most students but very few correct plan views were seen. Most students incorrectly drew a net or a side elevation involving a square with a triangle attached. Out of the ones who scored any marks, most scored one mark for a square with sides 6cm, but without the diagonals drawn.

Question 23

Part (a) was not well answered. n^{15} was a common incorrect answer.

In part (b) c was usually shown correctly (frequently written as c^1 but often paired with d^4). Most achieved one mark for c or (less likely) d^3. There were a significant number of correct values for c found from an incorrect method.

In part (c) many students were unsure where to start and a common incorrect answer given was $2.5x > 7$. Of those students who did start to approach the question correctly, many ignored the inequality sign throughout the process getting $x = 2.8$ or $x = \frac{14}{5}$ and as a result could not gain the accuracy mark.

Question 24

Most students attempted this question but very few achieved full marks. The distance, speed, time triangle did not help in this question; students always seem to make more errors at this level when using it rather than taking an everyday approach to the problem. Some added the distances together and the speeds together then divided by 2. Quite a few students gained one mark, but more students gained two marks for finding the times as decimals and adding the two times but failing to convert the times correctly and ended up with 2 hr 75 mins or 3 hr 15 mins which were the most common answers seen.

Question 25

Error intervals remain a weakness and was poorly attempted. Some were able to correctly give 9.35 but rarely gave 9.45; a few 9.44 but not 9.4499...

Question 26

Many were able to secure the first process mark for finding the area of one of the lawns (45 m^2 or 140 m^2) or the amount of seed available (10kg) but did not proceed any further with many reasoning incorrectly that if 3kg covered 5 × 9 area, then 6kg would cover 10 × 18, more than is needed. Other students were successful in gaining the second process mark mainly for the coverage of 1 kg of grass seed (15m^2). The most successful approaches seen where students were able to reach the correct conclusion were finding the amount of grass seed needed (9.3…kg) and comparing it with 10kg or finding the area that could be seeded with 10kg (150m^2) and comparing it with 140m^2.

Part (b) required reasoning supported by correct figures and as a result, students were not successful in gaining many marks.

Question 27

Part (a) was generally answered well, and most students were able to write at least two correct probabilities on the tree diagram, sometimes writing these as equivalent fractions of $\frac{2}{4}$2/6 and 4/6. Some students chose to try to use decimals for this problem but were not able to score any marks due to inaccurate approximations of $\frac{1}{3}$.

Having perhaps achieved one or both marks in part (a) many students lacked the knowledge that they needed to select the correct branches and multiply the fractions together and the few that did were rewarded with the marks in part (b).

Question 28

There were very few correct answers in part (a). There seemed little evidence of an understanding that the solutions could be read from the graph. A significant number attempted an algebraic solution, but their algebraic abilities were insufficient for such a task.

In part (b) there were a few who got full marks but for those who knew to read from the intercepts often included 2 with 0.6 and 3.4. Some spoilt their answers by writing the two values as coordinates. Other errors included those who attempted to substitute values into the equation, then plot the points on the graph, using algebraic solving/factorising methods or stating the *y* value at the minimum point.

Question 29

Many started off knowing that they needed to multiply the dimensions 6, 4 and 10 but many failed to take into account that the end shape was a triangle and division by 2 was required. The biggest failing, after calculating the volume correctly, was to divide by 0.8 getting the answer 150. For those students that only omitted division by 2 there was a special case mark for the answer of 192.

Summary

Based on their performance on this paper, students should:

- accurately transcribe figures taken from the question, and taken from their own work
- avoid rounding or truncating answers, and to use the most accurate values in subsequent calculations
- ensure that their work is legible for examiners to consider awarding marks. For example, avoid any possible confusion when writing 1s and 7s, when writing 4s and 9s, and even when writing 0s and 6s.
- ensure that they include working out to support answers
- work on algebraic manipulation and derivation, and application of ratios, scaling and rates in preparing for future examinations.
- learn the meaning of technical terms such as “reciprocal”, the “term” of a sequence and error intervals
- continue to need practise answering response type questions where a written explanation is required.

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