Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

Summer 2023

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

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

Introduction

The great majority of students seemed to be entered at the appropriate level and coverage of the specification was good. Questions on this paper covered a good range of the specification for a non-calculator paper and offered an opportunity for students of all abilities to demonstrate their understanding of a variety of mathematical concepts.
Students were generally well prepared, however many clearly missed having access to a calculator. Questions 11, 14c, 20, 21 and 27 in particular were littered with arithmetical errors.

The early questions acted as good confidence builders and provided an accessible way into the paper, many students gaining a good proportion of the early marks.
It was pleasing to see so many students successfully expressing their communication skills when required, as exemplified in questions 6, 8, 10, 11 and 14. Some would have benefitted from re-reading over their work to check the sense of their sentences.

The quality of handwriting from some candidates made their responses difficult to read. Students are advised to avoid rushing through their work. More students failed to present their work in a logical way which caused them to lose track of their own working. It was noticeable how many students also gave a choice of method and failed to use the answer line for their final answer. Candidates should be encouraged to use the space provided for responses more effectively and be reminded that writing above a question itself could mean that their work is not seen by the examiners.

Areas of the curriculum that need more attention are, Estimations (Q11bc), Equation of a straight line (Q9d), Fractions (Q15 and Q21), Algebraic expressions/formulae (Q18), Long Division (Q20) Venn diagrams (Q24), Reverse percentages (Q26) and Using probability tree diagrams (Q31).

REPORT ON INDIVIDUAL QUESTIONS

Question 1

This first question was generally well answered although incorrect answers of 3.8 and 0.38% were not uncommon. A significant number failed to give their answer as a decimal and often an answer of $\frac{38}{100}$ was seen.

Question 2

This question was usually answered correctly although answers in an incorrect form were sometimes seen, eg. 30% and 0.3 Occasional miscounting of the number of sections led to an incorrect fraction e.g., 3/9

Question 3

Many students failed to read this question carefully and offered an ordered list of the given numbers, often correctly. This was only accepted if the correct answer of 0.5 was then explicitly chosen as the smallest number. Some wrote 0.50 for their answer. This was perfectly acceptable.

Question 4

Although –4 was the modal answer, answers of –14 and 4 were common.

Question 5

It was not uncommon to see an answer of 1 coming from (3 – 2), although many correct answers were seen.

Question 6

When the diameter was identified as the label which was wrong, a correct explanation usually followed although some found difficulty in describing a diameter unambiguously. Many students thought that the circumference was wrong and some even questioned the nature of the centre. A few candidates drew additional line segments on the diagram to support their answer. Some students said the diameter was wrong because it was not drawn at the correct angle, perhaps indicating the need to stress that radius and diameter can be at any angle, not just a horizontal or vertical line.

Question 7

Whilst, on the whole, this question was answered well, many students did try to over complicate their solutions by first constructing factor trees and some even giving 20 as a product of its prime factors; $2^2 \times 5$ or 2 × 2 × 5, both of which earned one mark for identifying two correct factors. Product pairs were often seen, eg 4 × 5, etc. and these were an acceptable alternative way of identifying the factors of 20. Some students listed multiples of 20 failing to understand what a factor was.

Question 8

Part (a) was usually answered well, although 130 (180 – 50) and 40 (90-50) were very common errors. In part (b), those students explaining that 50^o is an acute angle were awarded the mark provided they did not contradict themselves with incorrect statements. Many realised that 50^o was not an obtuse angle but often failed to give a satisfactory reason why. “An obtuse angle is over 180” and “an obtuse angle is 90^o or above” were often seen. Students should think about their statements carefully to ensure they are correct, ‘obtuse angles are more than 90 degrees’ is a correct statement, whereas ‘all angles more than 90 degrees are obtuse’ is not.
It was clear that most students knew what an obtuse angle was but did not use the correct vocabulary or terminology to gain marks here.
Students were more likely to score if they defined the 50^o angle as acute, rather than trying to explain why the angle isn’t obtuse.

Question 9

Parts (a), (b) and (c) were usually answered correctly. Failure tended to be when students reversed the *x* and *y* coordinates. Some candidates drew multiple points and were not awarded any marks in (b). They need to be reminded to label points when requested. Part (d) was poorly done, many just labelling the point (0, −4) or drawing the line $x = -4$, thinking it had to be parallel to the y-axis. Weaker students often joined the point (0, −4) to A or B or their C.

Question 10

It was very pleasing to see many students clearly reading and comprehending the demand of this question and achieving full marks. Repeated addition was a preferred method rather than multiplication. Other than losing marks through arithmetic errors, marks were lost if the student hadn't fully understood the 'special offer' either by just finding the cost of 6 large plates and 6 small plates at their normal prices or by thinking that the offer applied to large plates as well as small.

Question 11

The modal answer in part (a) was the correct answer 248 but a great many students showed a complete inability to compute this subtraction accurately. Answers of 252, 352 and 348 were very common. A mark was often obtained by writing out the subtraction even if the technique was poorly executed.
In part (b) many students insisted on trying to find the exact cost of the 696 tickets and consequently spent an inordinate amount of time following long multiplication processes. This life skill of estimating calculations is clearly an area that needs to be addressed. The numbers in the question are chosen to encourage, in this case, rounding up to values of 300, 400, 10 and 20 enabling the calculation to be straightforward. Those that did this usually gained the mark in part (c) for a correct reason for their answer being an overestimate. Some candidates thought rounding to the nearest 10, 100 etc explained that they had rounded up. Many students correctly said it was an overestimate but followed it up saying it had been rounded to the nearest whole number.

Question 12

The majority of students understood the concept of the mean of a set of numbers and divided the sum of the six numbers by 6. Arithmetic errors here were plentiful, both in the addition and division stages.
Many students tried to find the median by ordering the list of numbers and selecting a number between 5 and 8. Fortunately a correct answer of 7 from this incorrect approach was rarely seen. The range of 10 was a common answer for weaker candidates.

Question 13

In part (a), answers of 5A and $\frac{5a}{1}$ were sometimes seen and they were acceptable as alternatives for $5a$ for the award of the mark. This was answered well but incorrect answers of 5, 45, $3a$, $5a/3$ and $45a$ were often seen.
Many students found difficulty in dealing with negative expressions in part (b). $12b$ ($5b + 7b$) and $3c$ ($4c - c$) were very common errors made. Some wrote 19 + - $2b + 5c$ for their answer failing to simplify the two signs. This lost the accuracy mark. A significant number of students correctly collected the like terms but then tried to simplify their answers further, usually giving $17b + 5c$ or 22bc as their final answer losing the accuracy mark. Factorisation in part (c) was not well done. The most common incorrect answer was $2d$.

Question 14

Part (a) was answered well with very few failing to subtract 73 from 100 correctly. In part (b), $\frac{2}{5}$ was the most common error made.
Part (c) offered a different challenge and while many were able to find 70% of 500, fewer were able to find $\frac{5}{8}$ of 720 and thus complete the solution. Some divided by 8 but were unable to then multiply their answer by 5. An interesting way round this was to find one half of the 720 and conclude that this was already larger than 350 and that as $\frac{5}{8}$ was larger than one half then Kasim was wrong.
Others multiplied by 8 first and then divided by 5. Some attempted to convert 5/8 to a percentage. Those achieving this correctly were often unable to calculate 62.5% of 720.
Many students assumed that an equal number of people watched the film on each day and simply compared 70% with $\frac{5}{8}$, concluding that more children watched the film on Friday as 70% is greater than $\frac{5}{8}$. A number failed to state 'No' despite all workings being correct so did not gain the final mark.

Question 15

Very few students started by cancelling the 6 and 12. Those who did invariably got full marks. The most common correct approach was to find the product of the numerators and the product of the denominators to give $\frac{30}{84}$ although there were many arithmetic errors along the way. A great number then failed to cancel the fraction to its simplest form, often simply dividing by 2. Another common approach was to find a common denominator giving $\frac{72}{84} \times \frac{35}{84}$
This gained no credit until the student demonstrated how to multiply two fractions together, which they rarely even attempted. A high proportion of incorrect answers showed an attempt to find equivalent fractions first followed by addition of numerators.
Weaker students often crossed multiplied to get $\frac{35}{72}$. This of course also gained no credit.

Question 16

This question was generally well answered although arithmetic errors were common. Many students wasted valuable time by working out the amount of all three ingredients required to make 60 biscuits. Most correctly found 3 lots of 250 but some did try to find the amount of flour required to make one biscuit and then multiplied by 60. The method here gained credit but rarely was a correct final answer seen because of poor division of 250 by 20.
Some students misinterpreted the question and assumed that Harry already had 250g of flour and that the question was asking how much more was needed. Multiplying 250 by 4 was also a common mistake.

Question 17

The vast majority of students were able to find the actual number of yellow and green counters in the bag (55 of each) but were unable to work this out as a percentage of 200. The usual answer was to simply offer 55 as their percentage. Very few showed their method for the final percentage which would have gained a method mark. When students attempted to write 55/200 as a percentage, they usually took the approach to halve numerator and denominator but often couldn't divide 55 by 2, 22.5 being a common error.

Question 18

Understanding of algebraic formulae was very poor indeed, with the most common incorrect answer being $T = b + c$ but 33 = 5 + 28 and $33T=5b + 28c$ were also regularly seen.
Often when students did find the correct formula, they tried to simplify it giving $T = 33bc$ as their final answer.
Weaker students struggled to gain any credit at all in this question.

Question 19

Many students correctly found the difference of 8 between terms but were unable to offer a complete expression for the nth term, $n + 8$ and $8n$, the latter gaining one mark, were common answers. After finding $8n$ many candidates were unable to find the correct number to subtract. Other common incorrect responses were $13n – 8$ and $–13n + 8$

Question 20

Many students did not know how to approach long division, especially with decimals. Far too many arithmetic errors prevented many students getting more than maybe one mark in this question. Even when division was carried out correctly accurate placement of the decimal point was rare. Some were unable to deal with the remainder of 6 and an answer of 56.6 was common. Several students who found the correct answer 56.4 in their working then divided by 100 and wrote 0.564 on the answer line.
Some students tried build up methods. These rarely resulted in a fully correct final answer but credit was often earned along the way with 5 as the first digit and often a correct size of their final answer.

Question 21

It was pleasing to see many students making valiant efforts to work with the given fractions. The whole numbers 7 and 2 were usually correctly dealt with and the difference between $\frac{3}{8}$ and $\frac{1}{2}$ ($\frac{4}{8}$) was usually correct although many left this as a positive one eighth leading to an answer of $5\frac{1}{8}$ Students who converted both mixed numbers to improper fractions often fared better and were able to give a correct final answer. The most common incomplete answer seen was $\frac{39}{8}$.

Weaker students often gave answers of $5\frac{2}{6}$ or, if they had converted to improper fractions, $\frac{54}{6}$
However, in many solutions of students at all levels, simple arithmetic errors were made, 7×8 was often seen not equal to 56

Question 22

Many students found this question far too demanding, not realizing that the total surface area of a cube was 6 times the area of one face. 150 divided by 4 was a common error. Even when the area of one face was correctly found many were able to go no further, often giving

the volume as 25 × 25 × 25 or attempting to divide 25 by 4 (rather than finding the square root).
For the students who did gain credit on this question the vast majority only scored 1 mark for dividing 150 by 6.

Question 23

It was pleasing to see many students plotting the required points consistently within the given intervals although many did not use the mid-interval values; upper limits were commonly used. Accuracy of plotting was generally good, but students must realise that a polygon has straight sides, not curves. Many mistakenly joined the first and last point.

Many drew histograms, which are acceptable in finding the specific points, but single points must be identified and joined with line segments.

Question 24

The completion of a fully correct Venn diagram in part (a) was rare. Many did not recognise "1" as a square number and many ignored the remaining numbers 2, 6, 8 and 10 from the universal set. Often students duplicated values in more than one section.
In part (b), it was very clear that only a very few students understood the complement notation preferring instead to just give the probability that the number chosen was in set *B*.
Many students gave their probability as a decimal without previously writing it as a fraction out of 10. 0.7 the correct answer of course gained full marks but an answer of say 0.3 alone begs the question, where has it come from, $\frac{3}{10}$? or $\frac{6}{20}$? etc.

Question 25

Descriptions of the relationship between age and weight were usually acceptable in part (a) where an increase in age related to an increase in weight. Some answers were vague quoting babies being "bigger" or "as babies grow". Some students were drawn into talking about the development of babies in the first 12 months without actually answering the question.
Positive correlation was accepted as a description of the relationship but "positive" alone was not. Direct proportion was another common answer that gained no marks.
In part (b), a correct answer in the given range was often seen (gaining full marks) although often the evidence shown on the graph was less convincing. Some read from the graph from 5.8kg but then approximated their readings to 2 months (outside of the range). Finding 5.8 on the axis was poorly executed. Very few candidates drew a line of best fit and if they did, it was often not in the correct place.

Question 26

This was poorly answered with very many students simply finding 20% of 240 and either decreasing £240 to give £192 or increasing £240 to give £288
Those that started with 20% = £240 usually went on to work accurately leading to a correct answer. Occasionally answers of 960 or 1440 were seen and these gained one mark.

Question 27

Inability to find the area of the cross-section of the cylinder prevented any chance of success in this question, rarely was1200 divided by 40 correctly, 300 being a common incorrect result but that did lead to the possibility of picking up another mark by attempting to divide it into 90. Some tried to use the formula for the volume of a cylinder in an attempt to find the radius of the circular base and then its area.

Question 28

Very few realised that the solution of the simultaneous equations was determined by the point of intersection of the two lines. Many spent far too much time trying to solve the simultaneous equations algebraically usually without any success.

Question 29

Some did some good work showing an understanding of the rules of indices but ultimately often failed to work out the value as required; 4^2 was a common answer.
$4\frac{3}{4}$ was often seen but rarely converted to 16. 1^3 was a common answer following from this. Whilst 4^2 was a common answer it had often been derived from incorrect working. $\frac{16^3}{4}$ was often seen from incorrect working of the numerator. This then was usually simplified to 4^2 gaining no credit. Unfortunately, some candidates spent a lot of time trying to evaluate the separate elements.

Question 30

Only the most able students were able to quote 0.5 oe as their answer. Some wrote $\frac{\sqrt{1}}{2}$ and we even saw $\frac{\sqrt{4}}{4}$ but these gained no credit unless simplified to give an ‘exact value’ as required.

Question 31

Few solutions were fully correct in this question. 0.2 + 0.3 (= 0.5) was the most common error. Those correctly trying to find the product often gave an answer of 0.6 instead of 0.06 Often a lack of showing working out meant that 0.6 didn’t gain any credit. Students need to be encouraged to show their calculations for this reason.
Many students highlighted the correct probabilities but did not go any further.

Summary

On the evidence of performance on this paper, students need to:

- take more care when reading the questions.
- take care when carrying out arithmetical operations and check their working to avoid careless errors. Also, they need to check that they have answered the question e.g. Q10 and Q14c.
- write clearly so that correct values quoted are not altered in subsequent working.
- show clear methods of working particularly in basic calculations such as finding fractions or percentages of quantities.
- set their working out clearly and systematically, crossing out working that is being replaced.
- write the decision when asked for e.g. Yes or No and keep comments short and simple to avoid contradiction. Explanations should be brief, but comprehensive (concise).
- estimate the demand of a question by looking at how many marks a question is worth (Q28 for example) in allocating time.

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