Pearson

Examiners' Report
Principal Examiner Feedback

November 2017

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 vast majority of students seemed to be entered at the appropriate level and coverage of the specification was good. Students were generally well prepared, however many clearly had little idea of the nature of an error interval in Q23(b). It was also very clear that there were several other questions on the paper that were beyond the capability of many students at this level; namely questions, Q22, Q24 and Q26b.

Very few students showed evidence of not having access to a calculator. There was, however, evidence of some students not having a ruler. This was needed for drawing straight lines in two graphical questions, Q13 and Q19b, as well as for measuring in Q8.

Students do not always appear to know when to show calculations and a conclusion and when to write a statement for their answer.

Presentation of work was on the whole very good and few scripts proved difficult to read.

This paper did identify a concern with many candidates not knowing standard conversions; eg. pence to pounds, millilitres to litres, centimetres to metres, grams to kilograms and minutes to hours.

Report on individual questions

Question 1

Very few incorrect answers here although 3800 was a common error.

Question 2

Most students were able to give an acceptable form of the correct answer. However, some did not fully simplify their answer, for example, a few students gave an answer of $4y - 2y$ or $y + y$; this gained no credit.

Question 3

The majority of students scored at least one mark in this question for identifying at least 3 factors of 18. A significant number of students failed to include 1 and/or 18 in their list. Pleasingly, unlike in previous years, candidates clearly showed that they knew the difference between a factor and a multiple.

Question 4

This was answered well and many fully correct solutions were seen. On many occasions, incorrect monetary notation prevented full marks; it was common to see answers of 0.90p or just 0.90. £1.10 was a common incorrect answer found as a result of incorrect subtraction.

Many students failed to read the demand of the question carefully enough and after fully correct arithmetic, often simply said “the family ticket is the cheaper”, without working out the required difference in cost. A significant number of students never actually showed their final subtraction and so incorrect differences quoted failed to gain any the second method marks since the method was never seen.

Some candidates worked out the cost of 4 child tickets and one adult ticket or two child tickets and one adult ticket. These were deemed inappropriate attempts and received no credit. Despite this being a calculator paper, there were errors in calculating 5.80 + 5.80 + 5.80 + 7.80.

Part (b) was also answered well. Students who realised that 102 minutes is equal to 1 hour 42 minutes usually went on to correctly complete the solution.

Some converted 102 minutes to 1 hour and 2 minutes and failed to score, and some students converted to a decimal, 1.7, gaining some credit but rarely full marks.

There was also evidence of poor mental arithmetic, with addition errors common. This should not happen on a calculator paper when students can, and should be encouraged to, check their calculations.

Question 5

A significant number of students converted 2 litres incorrectly to 200ml. Such attempts failed to gain any credit since this error trivialised the question. Others realised that division was required, but did 150 divided by 2 to reach 75. However, many students demonstrated a good understanding of what was required and either divided 2000 by 150 or used build up methods to reach the 2000 ml. Answers then varied, many giving 14 (often from premature rounding of 1000/150 to 7) and sometimes 12 as their answer and others gave an answer of 13.3 not realising that they needed a whole number answer.

Many responses attempted a method of calculating 1 litre; some did not complete the process of doubling up (giving an answer of 6) or failed to account for the extra bottle when they did double their answer.

Question 6

The vast majority of students gained at least two marks and usually three in this question. It was common to see the three quarters (on Saturday) split into one half and one quarter circles. This was then often shown in the key. This was perfectly acceptable.

Some students defined their own, incorrect key and changed the whole diagram accordingly. This received no credit. Centres should note that a key in words without showing an appropriate diagram, was not acceptable.

Question 7

Although a few students tried to show that the triangle was isosceles by assuming that it was and working 'backwards', most students did try to find the size of the required angles *BCA* and *CAB*, using a standard approach. Quite often reasons were omitted, or those given were incomplete, usually omitting the word 'angles'.

Many students tried to use 'angles on a straight line' to find angle *BCD*, only to show incorrect working of 180 – 117 – 54 = 9 Subsequent working to find angle *CAB* was then incorrect and gained no credit.

Having correctly found the size of the required angles, together with correct reasoning, many failed to complete the solution with a statement explaining why the triangle is isosceles. There were regular mentions of two equal sides but not angles. Many candidates just explained that the triangle is isosceles because it has two equal angles without also giving the reasons relating to how they calculated the angles. Others gave the reason that an isosceles triangle has two equal sides rather than two equal angles. Some students incorrectly assumed that angle *BCA* was 54º stating the reason "base angles of an isosceles are equal".

Question 8

30m was the modal correct answer for this question, where the height of the building was estimated at two and a half bus lengths.

Many students however used the height of the bus for comparison with the height of the building and made many errors. It was not enough for the award of the method mark to simply say that there were about 6 to 7 bus heights equivalent to the height of the building. Students had first to make a sensible comparison between the length of the bus and its height, possibly using the scale of 2cm = 12m.

Question 9

At least one mark was gained by most students for either correctly identifying two prime numbers or two numbers whose sum is a square number less than 30.

An answer of 1 and 3 was a common error where students assumed the number 1 to be a prime number, similarly 7 and 9 was quite common with many students regarding 9 as a prime number.

Question 10

This question was poorly answered with many students simply finding either five sixths of 48 (= 40) or two thirds of 48 (= 32). A few attempted to use decimals usually getting inaccurate answers due to premature rounding.

Question 11

Most students gained one mark for a correct cost of £264 for Offer 1. Those failing to get this answer usually ignored the free lesson and just worked out £24 × 12 (£288).

Working out the cost of 12 lessons with the 5% discount in Offer 2 proved more of a challenge. Some used 50% instead of 5%, a common error seen was simply subtracting 0.05 or 0.95 from 24 or from 288 and some calculated the cost of 11 lessons with this offer.

Others thought “off” means “of” and assumed the cost of a driving lesson in Offer 2 was 5% of £24. A few students having shown fully correct calculations, failed to answer the question and quote the cheaper offer thus denying themselves an easy final mark. A small number did not state ‘Offer 1’ and just circled their choice. Centres must understand that this is not acceptable.

Question 12

Attempts to find the cost of 1 kg (or 0.5 kg) of apples were usually accurate and usually lead to the correct answer. The most common error was to find one and a half lots of £3.60 and £5.40 was the modal incorrect answer. Some candidates simply added £1 to £3.60 assuming that the difference was the ‘same’ as that between 2.5kg and 3.5kg. A few candidates tried to find the weight of apples that could be bought for £1. This approach only gained any credit when a complete method was used but this was very rare.

Question 13

Accurate completion of the table of values in part (a) was common; the most popular error was in working out the value of y when $x = 1$, often + 0.5 was seen. Surprisingly a correct graph, in part (b), often did not follow a correct table. Many students just plotted their points thinking that this was all that was required. Some started again and failed to produce a correct graph. Students should realise that a straight line graph is required and that any variation is an indication of an error. A number of students reversed the x and y coordinates when plotting.

In part (c), some students correctly found the value of x by simply solving the equation. This was acceptable but a fully correct answer of 2.6 was required for any credit. Many students, even some with a correct graph, clearly had no idea how to use their graph to answer this question.

Question 14

Many students gained the one mark for correctly describing the transformation as a reflection. Although a lot of students did not use the correct terminology instead using ‘mirrored’ or ‘flipped’ so getting no mark. However significantly fewer were able to fully describe it. Reflection in the line x or about the origin were common errors. Several appeared to refer to the x-axis as $x = 0$.

Question 15

Most students gained at least one mark for a correct entry in the table in the ‘cotton fabric’ row, usually the first entry of £18; many then incorrectly completed this line as an arithmetic progression. Fewer students were able to deal with the ratio in order to gain any success for values in the ‘silk fibre’ row. Very few gained full marks on this question. It was rare to see working in this question; students should be reminded to show all working no matter how trivial.

Question 16

Both parts of this question were poorly answered. Confusion with the conversion between metres and centimetres prevented very many students completing a solution. Many found the volumes and but then divided the volume of a box by the volume of the van. A significant number of students correctly attempted to find the maximum number of boxes by finding the correct numbers, (6, 5 and 4), fitting in each dimension of the van. Unfortunately, many simply added these numbers (to get 15) or selected the lowest value and divided by 3 to find the time. Many students calculated the time by dividing the least number (in this case 4) by 3.

Some students calculated surface areas rather than volumes.

In part (b), very few students answered the question given. A correct response described how the time might change (greater or less) together with a coherent reason. Many students simply said that the time will change, without reason, or argued that there will be less boxes or it will be more difficult to fill the van without ever mentioning the time implication. Centres are advised to give their students more guidance on how to fully answer this type of questions.

Question 17

In part (a), the most common incorrect response was an answer of $16m$.

Part (b) was poorly answered with many students seemingly selecting their choice at random.

Clearly the meaning of these words is an area that needs clarification for students.

Question 18

The predictable incorrect answer of $n + 3$ was the most common error made, in part (a). $4n + 3$ was another incorrect answer seen. However, it was pleasing to see so many students scoring at least 1 for giving $3n$ as a part of their nth term, and often 2 marks.

Only a minority of students were able to use their nth term to solve part (b). It was more common for students to gain success by laboriously writing out the complete sequence up to 91. Many students incorrectly tried to substitute 90 into their nth term.

Question 19

In part (a), many students simply selected the middle interval of the five intervals in the table; showing a lack of understanding of the concept of median in such a context.

In part (b), most students scored at least one mark for making at most one error in their diagram. It was common for plots to be at the end of the intervals and many students insisted upon joining their first and last plots. Quite a few students having accurately plotted the points failed to make any attempt to join them.

Many weaker students just drew a histogram. This gained no credit even when all heights were ‘correct’.

Question 20

Many students at this level found the demands of this question too great. Often students were able to make a start at a solution by quoting one correct conversion, usually 1.089 × 3.785 or 2.83 ÷ 1.46, but very few went further.

Many students incorrectly converted 108.9p to pounds with values of 1.89 being the most common error or simply £108.9 A great many did give New York as the most economical city for petrol but very few gave two correct comparable values. The failure to find two comparable values was very much linked to the fact that pupils didn’t really know what values they were finding when they were dividing or multiplying numbers, students should be encouraged to write their units with their calculations to help make sense of their answers.

Question 21

This question was very poorly answered with few students knowing the formula Volume = Mass/Density. The great majority either multiplied the mass by the density or divided density by the mass.

Again conversion between units was poor, many not knowing that 1kg = 1000g.

Question 22

Only a very few students understood the need to compare both ratios with a common element representing the green pens.

Triple ratios of 2 : 9 : 1 or 2 : 5 : 1 or 2 : 4 : 1 were common errors followed by divisions of 100 by 12, 9 or 7 Many students tried to use the two given ratios independently. Some candidates found a number of equivalent ratios, but didn’t stop once they had found a pair that would work.

Question 23

In part (a), those students understanding the meaning of ‘reciprocal’ usually found the correct answer. Very many students did not. Fewer numbers of students understood the term ‘error interval’ in part (b). Some scored 1 mark for quoting either 9.75 or 9.85. Those few giving inequalities with the correct limits often made mistakes with the actual inequality signs chosen.

Question 24

Only a very small minority of students made any sensible algebraic attempt to solve this problem. Those that did, usually made errors when giving the algebraic lengths in the perimeter of the 8-sided shape. 70 divided by 8 was a common, incorrect starting point.

There were a few trial and improvement successes but usually this approach failed.

Question 25

The digits ‘7452’ were often seen and many students gained one mark for this. Often the answer was correctly given in Standard Form instead of as an ordinary number and often correct Standard Form was converted incorrectly; 0.00007452 and 74520000 were common errors.

Question 26

Both parts to this question were poorly answered. In part (a), clearly the demand for the best estimate for the drawing pin to land “point up” was a distractor as many students gave their reason for selecting Mel to be because she/he had the greatest number for the times the pin landed point up. This was not acceptable. A number of students felt the pin should have a 50% chance of landing point up, presumably because there were two outcomes, and selected Tom accordingly.

In part (b), the very few students that separately found the probability of the drawing pin landing point up and the probability of the drawing pin landing point down rarely multiplied them together to answer the question.

Question 27

The ability to solve a pair of simultaneous equations was only demonstrated by the few more able students, although many did attempt it. Of those who did make a correct start by multiplying one equation with the intention of eliminating one of the unknowns, often the method was flawed by more than one error. A common error was to use the wrong operation when attempting to eliminate a variable.

Trial and improvement methods were very rarely successful.

Summary

Based on their performance in this paper, students should:

- Learn standard metric conversions E.g. 1 litre = 1000 millilitres
- Ensure they read each question carefully.
- Show working whenever a calculation is carried out, no matter how trivial.
- Learn the meaning of words such as ‘expression’, ‘identity, ‘inequality’ etc.
- Learn all the necessary formulae for this tier of entry, including that for density

Grade Boundaries

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