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Principal Examiner Feedback

March 2012

GCSE Mathematics (1380) Foundation
Paper 1F (Non-Calculator)

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GCSE Mathematics 1380
Principal Examiner Feedback – Foundation Paper 1F

Introduction

The paper appeared accessible to nearly all candidates, with nearly all questions being well attempted and a large proportion of responses obtaining full (or at least part) marks.

Some figures and letters were badly written and examiners had difficulty reading some responses. Candidates must ensure all writing is legible. Where a number is crossed out, it is best to rewrite the number rather than superimpose it on the original number.

Basic arithmetic such as addition and subtraction proved to be a stumbling block for a significant number of candidates in several questions
eg $\frac{1}{3}$ of 24 = 6 or $\frac{1}{3}$ of 12 = 6 or 4.8 + 4.8 = 8.16

Articulating reasons for angle calculations taxed many candidates who lacked recall of the various angle terms and their precise usage. This paper is the last of the legacy papers. The forthcoming specifications require precise wording for geometric rules so candidates will need to be well prepared to provide reasons.

Report on individual questions

Question 1

This proved to be a very accessible first question with over 90% of the candidates getting parts (b), (c) and (d) correct.

In part (a) 403 was seen many times and only 86% of candidates wrote 430.

Question 2

70% of candidates could multiply 24 × 20 correctly. The most common errors were to add the two numbers or multiply by 0 as if it were a 1.

In part (b) it was discouraging to see that many candidates are still unable to subtract a 2-digit number from a 3-digit number without a calculator. There were lots of decomposition errors and evidence of poor number skills or carelessness. Some credit was given for two digits in the correct place. Some relied on repeated subtractions but made errors along the way. The most common error was to write 1, 10, 15 at the top getting an answer of 178. Others wrote 268 ... candidates should be encouraged to check that their answer is not greater than the top number in the subtraction and check for reasonableness. Only 70% of the candidates were able to write the correct answer.

Part (c) was a very accessible question yet over 7% of candidates failed to add the 3 numbers correctly. A few forgot to add in the carry figure from the unit's column.

Question 3

83% of candidates scored full marks for parts (a) and (b).

The most common mistake in (a) was to include an extra vertical line by drawing separate rectangles. A few drew the diagonals incorrectly. Even where candidates had failed to gain the mark in part (a) the overwhelming majority completed the table correctly suggesting that candidates recognised the pattern in the table and used this to generate the values for patterns 4 and 5.

Very few candidates used their incorrect diagram to part (a) as a basis to fill in the missing numbers in part (b).

73% of candidates got part (c) correct. The most common error was to double their number of sticks for Pattern number 4 getting an answer of 34.

Just under half of the candidates gained the mark for (d) but often with poor mathematical language, most referring to odd or 100 being even. A few of the more able candidates referred directly to the sequence, stating the terms 97 and/or 101. Common incorrect answers referred to going up in fours (or threes), 100 not being in the 4 times table, or there not being enough sticks.

Question 4

Nearly 90% of candidates gave the correct answer of 26 in (a). The most common incorrect answer was 28, where candidates may have confused this question with cumulative frequency tables and simply added the new input of 8 to the last output of 20. There were a few more errors with the second number with many writing an answer of 10 from 40 ÷ 2 – 10 = 10.

Nearly 80% of candidates got (b) correct. The most common error was to omit the operation, putting 6 rather than +6.

Question 5

97% of candidates were able to correctly match the solid to its name with 88% correctly writing the number of faces of the cuboid.

Question 6

The correct answer for part (a) was given by 60% of the candidates with a further 29% able to write $\frac{8}{10}$ and then not simplify it or write an answer of $\frac{1}{5}$ (the answer for the non-shaded part of the diagram).

Nearly 80% of candidates provided the correct answer of 5, usually with no working shown, for part (b). A significant number were not able to calculate 10% of a number. Some candidates used ineffectual build down methods such as 50%, 25%, 12.5 %. A few candidates got to 5 but then subtracted from 50. Marks were often thrown away with mistakes such as 50 ÷ 10 = 10.

Only 56% of candidates could write $\frac{3}{4}$ as a decimal. Nearly all incorrect responses were 3.4 or 0.34 with the occasional 7.5 seen.

Question 7

Most candidates scored the first method mark for stating that 12 men were wearing a red shirt. Those candidates who found both 12 and 8 usually subtracted their sum from 24 to obtain 4 as a correct answer. A common incorrect method was to halve 12 to give 6 as the number of men wearing a green shirt. The second method mark was earned when a clear statement similar to 24 – 12 – (24 ÷ 3) was seen.

A small number of candidates lost the final mark due to a mistake in subtraction. A substantial minority of candidates found a third of 12 red to give an answer of 4 and this did not score either of the last two marks.

A small number of candidates wrote $\frac{1}{2} + \frac{1}{3} = \frac{5}{6}$ of men not wearing blue, which scored one mark, but few could then proceed further. Overall, 41% wrote an answer of 4 from correct working, 35% scored 1 mark (mostly for 24 ÷ 2 = 12) and 20% failed to score.

Question 8

74% of candidates realised they had to add 4 lots of 4.8cm to 3 lots of 3.6cm although a few thought there were four grey as well as four white rectangles and in some rare cases 3 lots of both were seen. The main difficulty was their inability to add 4.8 four times or even if they achieved 19.2 and 10.8 they often did not total correctly. Only 49% of candidates scored both marks with 25% unable to work out 4 × 4.8 + 3 × 3.6 accurately. A noticeable feature was the inability of some candidates to carry decimal quantities into the unit's column or to realise that the digits have very different values with 4 × 4.8 = 16.32 and 3.6 × 3 = 9 + 18 = 27 frequently seen.

Question 9

78% of candidates wrote $2x + 2x = 4x$. The most common incorrect answer was $4x^2$

86% of candidates could simplify $5y - 2y$ correctly. 3 on its own was occasionally seen.

78% of candidates wrote $2 \times 4y = 8y$. The most common incorrect answers were $6p$ and $4p^2$

Question 10

Over 80% of candidates scored at least 2 marks on this question, mostly for 800 × 5 = 4000. However, only 31% then went on to correctly convert the 4000 metres to km. Incorrect attempts at conversions were division by 100 or 10, and sometimes multiplication often by 10. It was disappointing to see many incorrect arithmetic calculations such as 800 × 5 = 4500.

In a small number of cases the students attempted conversion from m to km but thought m stood for miles, leading to answers of 6400 etc.

Question 11

It was pleasing to see that over half the candidates scored all 4 marks on this question with only 12% failing to score.

In part (a) the majority had this correct. However the words 'area' and 'perimeter' often causes confusion amongst many candidates at this level and this year was no exception. Some could not calculate 4 × 10 having written it down whilst many wrote 4 × 10 = 40 but then went on to double or halve 40.

In part (b) many wrote the length of 20 and the width of 8. A significant number chose to swap length with width even though the question and answer line offered them in the same order. The most common error was simply adding 2 leading to 12 and 6, but 30 and 12 were commonly seen where candidates added two more lengths on.

Question 12

94% of candidates scored all 4 marks for this question.

The most common error in (b) was 10 and many drew 2 circles and a quarter circle in (d).

Question 13

92% of candidates could identify row A as the row with all even numbers. The most common error was row B where candidates had mixed up their understanding of odd and even numbers.

Only 57% of candidates could write down the next prime number after 17. Many wrote 23 (missing out 19) whilst others wrote 21 seeing a pattern in 13, 17, 21.

Only 44% of the candidates could write down a square number from row D. A common error was to write 2, possibly from
$1 \times 1 = 2$. Others wrote a square number (such as 25) which was not in row D so could not score.

81% of candidates were successful in doubling 64 to get 128. Many more attempted 64×2 or $64 + 64$ but their poor arithmetic let them down.

Question 14

68% of candidates knew that the sum of the angles in a triangle was 180 degrees and wrote the answer in the answer space. There was a wide variety of incorrect answers, eg 90, 190, 240, 205, 280; but the most common were 60 and 360. Some did not notice the answer line and did not read the wording above the diagram which led them to leaving the answer space blank.

67% of candidates wrote the value of w as 40°. The most common incorrect answer was 80° where they thought the triangle was isosceles. Many others gave an answer of 60°. Only 43% of candidates could give a clear and precise reason for why "w" was equal to 40 or even write 'opposite angles' which would have scored the mark. Please note that in the GCSE Mathematics 2012 Linear specification, 1MA0, we need to see 'vertically opposite angles are equal' to score the mark.

54% of candidates were able to work out the value of x correctly. Some candidates made errors in subtracting 80 and 90 from 180. There were many incorrect answers, such as 25, 40, 80 and 100

64% of candidates scored both marks in (d) for either writing an answer of 60° or working out 180 – 80 – 'w' correctly. The most common incorrect answer was subtracting the value of w from 360, or adding
80 and 40 = 120 and giving this as their value of y.

Question 15

Candidate success in this question was mixed. Overall part (a) was well answered. A significant number of candidates achieved both marks, with the majority of these using the notation given in the question. One of the most common mistakes was a complete set of responses plus omelette as a separate singular possibility. Some candidates made up their own starter to fill the empty space. A few combined everything together to make pairs including either starters or 2 main courses. Candidates who lost marks tended to have a lack of a logical approach to the question.

Part (b) was answered very poorly. The most common mistake was an answer of $\frac{1}{5}$ where candidates ignored the given (S, C) and $\frac{2}{5}$ with candidates simply citing melon and chicken as 2 options out of 5. There were the usual responses of candidates expressing the probability using ratios or words (which scored no marks), showing an inability to transfer written information into a probability value, but fractions were given by the majority.

Overall, 47% of candidates scored all 3 marks for parts (a) and (b) with a further 39% scoring 2 of the 3 marks.

Only 45% scored the mark in part (c). A high number of candidates did not consider 'fruit juice' a food and so said a meal could not have a 'drink' as a starter, or confused the terms meal with main course. However many candidates did understand that there would be 3 more meals and either stated this or listed the extra meals.

Question 16

This question was generally answered well, with many well-presented and accurate pencil and ruler constructions. Over 90% of candidates managed to draw *AB* accurately. Most errors came from the confusion between acute and obtuse angles and using the incorrect reading on their protractor. Only 13% of candidates failed to score on this question and this was usually the result of the candidate not having the necessary equipment. Over 44% scored all 4 marks with a further 19% scoring 3 marks and a further 16% scoring 1 mark.

Question 17

In part (a) there were many cases of students correctly multiplying but either failing to cancel at all or failing to cancel fully. Common errors included attempting to add by putting over a common denominator of 30, or by calculating the numerator and denominator separately but not writing them as a fraction.

Part (b) was answered less successfully than part (a). Many realised they could multiply the fraction by 7 or add the fraction 7 times and were rewarded for showing the method. In most cases this led to an answer of $\frac{14}{21}$. Many just wrote $\frac{14}{21}$ or did not show their method clearly and so could not score. Others used diagrams to show their method. This was rewarded where they ended up with 4 full circles and 2 out of 3 parts shaded on the fifth. However, many just drew 7 circles and shaded 2 out of 3 parts in each. This could not score. Others rounded their answer to 5. This was acceptable as long as the correct $\frac{14}{3}$, or equivalent, was also shown.

Overall 26% failed to score on this question, 30% scored 1 mark, 25% scored 2 marks and 7% scored all 4 marks.

Question 18

67% of the candidates answered this part (a) correctly. It was pleasing to see most of the probabilities were written using the correct notation. Incorrect notation such as 5 : 12, 5 out of 12 etc could not score all the available marks. Some less able candidates thought that there were 5 red and 7 other colours giving answers of $\frac{5}{7}$ for part (i) and $\frac{7}{5}$ for part (ii).

In part (b) only 20% of candidates wrote that there were 4 green counters now in the bag using correct working whilst 72% of candidates failed to score. Many gave an answer of 3 with no working. They possibly thought that they had to say how many more green were added instead of how many green were now in the bag. It is important that candidates read the question carefully and show all working to score method marks. Had they written 3 more or shown a total of 15 somewhere they could have scored the method mark. The correct answer of 4 directly from incorrect working such as (5 + 6 + 1) ÷ 3 = 4 did not score.

Question 19

Many candidates failed to score and only 4% scoring all 3 marks. 25% did score one mark for either converting two of the three numbers correctly to one significant figure or often for evaluating their numerator correctly (dependent on at least1correct initial estimation to 1 significant figure). Multiplication and division of decimals were particular weaknesses and place value was invariably incorrect. A substantial minority tried to evaluate the expression accurately, with no success, or indeed any prospect of scoring a mark.

Question 20

Part (a) was not well answered with 'mixed up' methods showing major misconceptions of solving equations. Many were able to isolate one of the terms. This lead to partial solutions such as $24x = 7$ and $2x = 9$ which could score 1 mark. Others tried to isolate each term independently but then did not write this as an equation at any point which meant they could not score the method mark.

In part (b) it was not uncommon to see embedded solution in their working which they did not transpose to the answer line, often writing 4 or 20 on the answer line. Many others showed no working at all.

Question 21

Part (a) was poorly answered with 70% of candidates failing to score. Many responded with a histogram rather than a frequency polygon, suggesting that there was a lack of knowledge of this terminology. Common errors included not plotting at mid points, not joining the points, joining the points but omitting to join to '(55, 0)' or missing out this point completely. Only 7% scored both available marks.

Over 67% of candidates were able to show that there were 56 branches on the bush. = The absence of working out was a real issue and many candidates threw marks away simply through not explicitly showing their method. Where an answer close to 56 (eg 54) was seen without working we could not assume they had added the frequencies. At times poor arithmetic skills in simply adding the numbers let some candidates down. Common incorrect answers were 46 and 66. 29% failed to score.

74% of candidates could not provide an indication that the modal class interval was $0 < L \leq 10$. The most common incorrect answer was to just provide the frequency.

Question 22

Half the candidates got part (a) fully correct with a further 16% scoring the method mark for showing $2a - a$ or $3b - b$ or equivalent. Many candidates lost the final mark by writing the answer as $a \ \ 2b$. The most incorrect answers were a – 2b, 3a + 2b and 3a + 4b. Others showed the first step to combine like terms but were then unsure how to complete the simplification, often combining the terms as a + 2b = 3ab

45% of candidates were able to expand the expression in part (b) correctly. Common incorrect answers were $8m - 3n$, $8m - 12n = -4mn$ and $8m + 3n$

Question 23

In part (a) 48% gave the correct answer of 150. Common incorrect responses included giving an answer of 85 or working out 180 –150 = 30.

In (b) 20% of candidates correctly wrote down the value of y. Many simply stated that it was equal to 85° without giving a reason. Only 2% of candidates scored 2 marks by stating full reasons why the angle was 95°. It was insufficient to simply state that the sum of the angles on a straight line was 180. The additional reason using parallel lines such as alternate angles are equal or corresponding angles are equal was also required.. An alternative statement that vertically opposite angles are equal and co-interior (or allied) angles add up to 180 was a possibility but very rarely seen.

Question 24

This question proved to be a good discriminator with 27% scoring all 5 marks and 26% not scoring at all. 11% scored 2 marks either for providing a correct table or getting 1 value in the table correct but then plotting the points in their table of values correctly and 16% scored 4 marks generally for getting parts (a) and (b) fully correct. A large number of candidates plotted the points correctly but failed to join the points with a straight line.

In a very small minority of scripts, pupils attempted part (c) algebraically, though this was generally unsuccessful.

Question 25

Many less able candidates did not attempt this question. Only 5% of candidates scored all 6 marks with 48% failing to score. 32% of candidates scored one mark generally for finding a missing length or calculating the area of the square. 9% of candidates scored 2 marks usually for finding a missing length and calculating the area of the square. This was often followed by a lot of incorrect working without any explanation such as 9×6 or $12 + 12 + 12 + 12$ and other incorrect statements. Of those who continued coherently, most went for the method of finding the area of *ABCD* and subtracting the areas of the unshaded triangles. Many of these candidates failed to halve 12×3 and halve 9×6. However, with clear working they were able to score 3 marks.

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