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Principal Examiner Feedback

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GCSE Mathematics (2381)

Foundation Non-Calculator Paper (11F)

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1. PRINCIPAL EXAMINER'S REPORT – FOUNDATION PAPER 11

1.1. GENERAL COMMENTS

1.1.1. Candidates generally found this a challenging paper but several questions were very well attempted. Q3(a), Q5(a), Q6(a), Q6(b) and Q10(i) were answered with the most success.

1.1.2. It was apparent that most candidates had a ruler and protractor. Although many candidates did not use compasses in the construction of the perpendicular bisector in question 13 it was not clear whether this was because they were not available or because the candidates did not think to use them.

1.1.3. The general standard of numerical work on this non-calculator paper was weak. Many candidates, for example, could not multiply 2.58 by 10 or divide 380 by 1000. Errors were frequently made when subtracting one whole number from another and when multiplying one whole number by another. The manipulation of fractions remains a problem at this level.

1.1.4. Candidates handled negative numbers quite well in the context of temperatures in question 6 but struggled when substituting negative values in question 14.

1.1.5. It was pleasing that many candidates showed working out and were able to gain method marks when the final answer was incorrect. Sometimes, though, working was poorly presented and difficult to follow. Too many candidates displayed little, if any, working out which meant that method marks could not be awarded if the final answer was incorrect. Centres must continue to encourage candidates to take care when setting out their answers and to show all stages in their working.

1.2. REPORT ON INDIVIDUAL QUESTIONS

1.2.1. Question 1

Overall, this question was not answered as well as might have been expected. In part (a) 0.24 was a very common incorrect answer. Part (b) was the best answered of the four parts. The most common incorrect answers were 258 and 20.58. Part (c) was answered quite poorly. Not surprisingly, both 0.07 and 7 were common incorrect answers but a bewildering variety of different answers were seen. Candidates were even less successful in part (d). Many incorrect answers resulted from the decimal point being wrongly placed.

1.2.2. Question 2

In part (a) a large number of candidates were able to write down the correct order of rotational symmetry. Relatively few candidates failed to achieve at least one mark in part (b). A very common error was for two diagonals to be drawn in addition to the two lines of symmetry.

1.2.3. Question 3

Part (a) was answered very well with the majority of candidates being awarded full marks. A variety of methods were seen. Some candidates multiplied 6.20 by 4, some multiplied 6.20 by 2 and by 2 again and some added up 4 lots of 6.20. Some candidates gained a method mark for '6.20 × 4' but were then unable to complete the calculation correctly. Multiplying £6 by 4 and then adding 20p was one of the errors seen.

Part (b) was answered less well. Candidates who worked out the correct answer frequently did so by adding 6.2 and 6.2 and then subtracting the result from 15.5 to find 3.1. A common error was for candidates to write the answer as 2.30 instead of 2.5 or 2½. Some candidates did not seem to realise that Barry could have worked for part of an hour and gave an answer which was a whole number. In both parts of this question many candidates showed no working. When the answer was incorrect these candidates could not be awarded any marks.

1.2.4. Question 4

Part (a) was generally well answered with most candidates recognising the need for subtraction. A variety of methods were used but many of the candidates who got full marks used the decomposition method. The working of candidates, particularly those who used an adding on method, was often difficult to follow. Working out was sometimes very complex with several abortive attempts given in the working space. When the subtraction was written correctly in columns it was apparent that some candidates simply subtracted the smaller digit in each column from the larger digit which resulted in 752 being a common incorrect answer. A small minority misunderstood the question and added 1485 and 737.

There were many correct, and often well presented, responses to part (b). The most common method was to multiply 53 by 5 and then subtract 259 from the result. A common mistake was failing to include the 13 teachers. Addition, whether it was adding 13 onto 246 or the use of repeated addition to work out 53 × 5, was particularly prone to errors. A small number of candidates incorrectly calculated 53 × 5 to a value smaller than 259 and then misinterpreted the question. Candidates who used a repeated subtraction method often made mistakes with the subtractions and were noticeably less successful. Attempts to divide 259 by 5 rarely resulted in any marks. A significant number of candidates failed to show all steps in their working.

1.2.5. Question 5

The angle in part (a) was measured accurately by the majority of candidates. Many of the incorrect answers were in the range 128^o to 132^o and resulted from candidates using the wrong scale on the protractor.

Part (b) was also answered well; the angle was usually accurately drawn and correctly placed on the line at *A*. The most common error was to draw an angle of 30^o rather than an angle of 150^o. Most candidates used a ruler although a small number of freehand attempts were seen.

Candidates were less successful in part (c). Many realised that the triangle was equilateral and wrote down the correct size of each angle but a surprising number of candidates drew a triangle and measured one of the angles. These attempts were very often unsuccessful.

1.2.6. Question 6

Part (a) was answered very well indeed with most candidates identifying 6 am as the time with the lowest temperature. Some candidates wrote down the lowest temperature rather than the time with the lowest temperature. A small number thought that the lowest temperature occurred at 2 am.

Slightly fewer candidates were successful in part (b). The majority of candidates attempted to find the difference between 7 and –3 but a common mistake was 7 – 3 = 4. Two other common incorrect answers were 9 and 11.

Part (c) was answered quite well. Most of the incorrect answers consisted of two times although some candidates misread the question and wrote down two temperatures.

1.2.7. Question 7

The question seemed to be well understood by most candidates but many answers were spoilt by poor arithmetic. Relatively few candidates achieved full marks. Many started in the correct way by attempting to subtract 12478 from 12642 and quite a few did this subtraction by writing 642 – 478. Errors were often made in the attempted subtraction and a common incorrect distance was 236 miles. A significant number of candidates tried to subtract 12642 from 12478. Some candidates added the two distance readings together and in many responses it was not clear how the candidate had worked out the number of miles travelled. The majority of candidates did attempt to multiply the number of miles by 40, although the methods used were not always easy to follow, and many did then attempt to divide the result by 100 to convert their answer into pounds. Some candidates combined the two steps and multiplied the number of miles by 0.4. The multiplication, whether it was × 40 or × 0.4, often contained errors.

1.2.8. Question 8

Many candidates gave the name of the shape as a 'square-based pyramid' or as a 'pyramid'. The majority of the incorrect answers included the word 'triangular' with the most common such response being 'triangular prism'. 'Triangular-based prism' and 'triangular pyramid' were also seen frequently.

1.2.9. Question 9

Most candidates made an attempt at this question with the majority gaining at least one of the two marks. When one mark was awarded this was more often for the correct length of the line *AC* rather than for the angle of 40^{o}. Marks were lost mainly through lack of accuracy rather than through candidates not knowing how to tackle the question although a few wrong answers did appear to be attempts to reproduce the triangle in the question.

1.2.10. Question 10

The majority of candidates worked out the correct output for the input of 7. Candidates were less successful at working out the input for the output of 36. A common incorrect answer was 10. Some candidates applied the inverse operations in the wrong order.

1.2.11. Question 11

Many candidates were able to simplify the ratio in part (a). The most common incorrect answers were 1 : 3 and 2 : 11.

Using the scale of the map in part (b) proved to be a problem for candidates and only a small number were awarded full marks. Of those candidates who managed to measure the distance between the church and the castle on the map and use the scale correctly, the majority then failed to convert from centimetres to metres and gave 80 000 as the final answer.

Other common incorrect answers were 8, 80 and 8000 but as many candidates did not show any working it was usually not possible to see where errors had occurred.

1.2.12. Question 12

There were very few fully correct answers to this question. Answers were often given with little or no working and a large number of candidates failed to gain any marks at all. Some did not answer it. Many candidates did, however, attempt to convert both values to the same type of number. Those who decided to work with fractions could usually write 40% as 40/100 or 4/10 but the addition of 40/100 and 3/8 proved to be beyond most candidates. A small number of candidates who correctly added to get 31/40 then failed to subtract from 1. Candidates who decided to work with percentages often failed at the first hurdle. Many wrote 3/8 as 38% without working, and gained no marks, and 3/8 = 24% was also very common. Attempts at division were generally unsuccessful. Some candidates attempted to divide 8 by 3 instead of dividing 3 by 8. Few candidates tried to convert both values into decimals.

1.2.13. Question 13

Part (a) was answered quite well. Candidates seemed to understand the principle of creating a net for the triangular prism and many managed to achieve at least one mark. Most candidates drew a net with 5 faces. A common error was for candidates to draw triangles which were clearly not right-angled in an otherwise correct net. In some nets with right-angled triangles the triangles were incorrectly positioned.

Many of the candidates who attempted part (b) did not seem to know that they had to bisect the line. When candidates did attempt to bisect the line they usually gained at least one mark and when they also knew they should be using compasses they often gained full marks. A significant number of candidates, though, used only one pair of intersecting arcs to draw the perpendicular bisector. Some candidates correctly drew two pairs of intersecting arcs but then failed to join them with a line. A large number of candidates constructed triangles or drew circles or semi-circles.

1.2.14. Question 14

Part (a) was well attempted with most candidates showing some working out. Manipulation of negative numbers, though, was generally poor and a large proportion of candidates failed to gain full marks. Many who gained one mark for $2 \times 5 = 10$ and $3 \times -1 = -3$ went on to give the answer as 13 or, less often, as –13 or –7. Although $2 \times 5 = 10$ was very common this was often followed by $3 - 1 = 2$, leading to an answer of 12. Other commonly seen incorrect answers were 56 (from 25 + 31), and $5ab$ (from $2a + 3b$).

Part (b) was generally not well answered. The manipulation of negative numbers caused a lot of problems but the most common error was using an incorrect order of operations. Many candidates first worked out 3×-4 and then squared the result, leading to answers of 144, –144, 24 or –24. Almost half of those who did use the correct order of evaluation made arithmetical errors such as squaring –4 to get –16

(or even 8 or –8). Some candidates wrote '$3 - 4^2$' which was usually followed by either -1^2 or $3 - 16$.

Part (c) was answered very poorly and clear, well-presented solutions were rare. Many candidates gave a numerical answer and a significant number failed to make an attempt. A large number of those who used algebra simply swapped the x and y in the formula or copied the question onto the answer line, replacing the fraction with '÷ 3'. Some candidates did attempt to multiply both sides of the formula by 3 and those who did so correctly generally went on to get full marks. A common mistake was to apply the inverse operations in the wrong order and subtract 2 before multiplying by 3. The incorrect answer $x = y - 2 \times 3$ was sometimes given without any working. Some candidates used a flow chart and these attempts met with mixed success.

1.2.15. Question 15

Fewer candidates than might have been expected were able to work out the value of 2^4 in part (a). The most common incorrect answer was 8. Instead of working out the value of 2^4 some candidates wrote $2\times2\times2\times2$ on the answer line.

Slightly more candidates were successful in part (b). The most common incorrect answer was $3t$ and some candidates gave the answer as 3^t.

Part (c) was attempted by the majority of candidates but was generally poorly answered. Many candidates who worked out $n^3 \times n^2 = n^5$ then gave n^9/n^5 as the final answer. n^{14} was another common incorrect answer. A frequently seen first step was $n^3 \times n^2 = n^6$. Where this was followed by $n^9 \div n^6 = n^3$ candidates gained one mark for a correct second step but in many cases n^9/n^6 was given as the final answer. Some candidates failed to write indices in an acceptable way, writing n^4 as $n4$ for example.

1.2.16. Question 16

Almost all candidates attempted part (a) and the vast majority drew a shape that was congruent to shape ***A***. Many drew a reflection of shape ***A*** but there were relatively few fully correct answers as the majority of candidates did not know the position of the line $x = -1$. Shape ***A*** was most commonly reflected in the y-axis or the x-axis. In many answers, though, the shape was drawn in the third quadrant and was the result of a rotation rather than a reflection. Some candidates drew more than one shape. Those candidates that gained full marks had usually first drawn the line $x = -1$.

In part (b) very few candidates were able to describe the transformation fully and achieve both marks. Those that were awarded one mark generally described the movement as '6 left 1 down'. Those who tried to write a column vector often wrote the numbers the wrong way round or had no negative signs. Few candidates knew it was a translation.

1.2.17. Question 17

This question was poorly answered with very few candidates able to work out that Ben got £32.40. Some candidates wrote down the ratio 1 : 3 : 6 but most did not go on to divide £54 by the sum of their ratios and multiply by 6. The most common method used to work out Ben's share was trial and error and candidates often managed to gain one mark by writing down a set of numbers in the ratio 1 : 3 : 6. Usually this approach did not lead to the correct answer. Some candidates thought the ratio was 1 : 2 : 3 rather than 1 : 3 : 6 and many simply divided 54 by 2 or 3 or both. Ben's share was sometimes greater than £54.

1.2.18. Question 18

Only a handful of candidates gained any marks at all. The most common response was to state that Callum was correct because $4 \times 100 = 400$. Many candidates confused $4\,m^2$ with 4^2 and $400\,cm^2$ with 400^2.

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