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Principal Examiner Feedback

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Pearson Edexcel GCSE
In Mathematics A (1MA0)
Foundation (Calculator) Paper 2F

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GCSE Mathematics 1MA0
Principal Examiner Feedback-Foundation Paper 2

Introduction

Many students showed sufficient working out to gain method marks when the final answer was incorrect. Working was often well set out. However, failure to show working and incorrect arithmetic were major issues that prevented students gaining the marks their understanding probably deserved.

Many more marks could have been achieved by students if they had made effective use of a calculator. It would appear that “show your working” is often interpreted as not using a calculator.

Students showed a good understanding of statistical topics, eg drawing a suitable diagram or chart in question 6 and interpreting a scatter graph in question 22.

Too many students gave a description of a probability, eg ‘likely’, when a numerical probability was required and some students used incorrect notation, eg ratios, when writing probabilities.

Algebra is often an area of uncertainty at this level. Many students struggled to solve the equations in questions 5(b) and 5(c) and question 13 was answered very poorly.

When questions were set out in an unfamiliar way, students often found them inaccessible – this was the case with finding the area of the triangle in question 18 and also with question 26 which required the use of Pythagoras's Theorem.

Report on individual questions

Question 1

Many students correctly identified the shape as a cylinder in part (a). Some thought it was a sphere. Part (b) was also answered well. A common incorrect answer was 'rectangle'.

Question 2

In part (a), many students worked out the length of time as 2 hours 20 minutes or as 140 minutes but some failed to include correct units with their answer. Common incorrect answers were 2.20, 1 hr 20 mins, 3hr 20 mins and 2 hrs 10 mins.

Part (b) was also answered well with many students working out that Jan would get home at 21 32 and then stating that she would not be home by 21 30. The most common approach was to add 18 minutes and 24 minutes to 20 50. Some students made errors when adding 18 minutes to 20 50. Students with an incorrect arrival time could be awarded a method mark if they had shown that they were adding 18 minutes and 24 minutes to 20 50. Many chose to convert from 24 hour notation and were usually successful. Overall, understanding of 12/24 hour clock systems and time intervals seems to have improved.

Question 3

In part (a), many students found both missing costs but some of these students failed to write the correct monetary units with both their answers and only achieved 2 of the 3 marks. When only one of the missing costs was correct it tended to be the cost of the peas although some students with an incorrect cost for the peas followed through correctly from this cost to find the cost of the salmon. £1.70 was a common incorrect answer.

Part (b) was answered well with many students showing correct calculations. The most common method was to find the total of the voucher and the coins. A significant number of students with correct calculations made an incorrect decision and wrote that Pat could buy the book.

Question 4

The table in part (a) was usually completed correctly. Mistakes were more common in finding the missing input. Part (b) was also answered very well. A few students wrote '7' rather than '+7'.

Question 5

Part (a) was answered very well. Students were slightly less successful in part (b) where some thought that if $5p = 14$ then $p = 9$. Part (c) was generally answered well and it was pleasing that many students used an algebraic approach. When a correct method was shown this usually resulted in the correct answer. A common incorrect answer was $x = 2$, from $4 + 2 + 3 = 9$.

Question 6

This question was well answered with most students choosing to present the data using a dual bar chart, with the months labelled along the bottom and a key to identify Tyler and Fletcher. If a sensible scale had been chosen for the vertical axis the bars were almost always drawn at the correct heights but some students used awkward scales and made plotting errors. Using a scale involving 3 should be avoided – those students who used 1 square = 3 units almost always had difficulty plotting. Many students lost the final mark through not labelling the vertical axis or, less often, for a non-linear scale. A small number of students drew line graphs or compound bar charts. Students should be reminded that their answers are scanned to black and white, so different coloured lines are difficult to distinguish.

Question 7

In part (a), the vast majority of students were able to complete the diagram to show pattern number 4. Occasionally, an extra circle was included to the left of the fourth triangle.

In part (b), many students worked out that pattern number 7 has 15 circles. Some drew a diagram but often no working was shown. Those who extended their diagram in part (a) to show pattern number 7 sometimes lost the mark for part (a) as they did not separate or identify the diagrams sufficiently.

Although part (c) was answered less well, some good explanations were seen. Usually students explained either that pattern number 17 has 35 circles or that there is always an odd number of circles. Many students, though, gave an incorrect number of circles for pattern number 17. Some said that there were 51 circles because $17 \times 3 = 51$. Some explanations given in part (c) contradicted the answer given in part (b), eg explaining in (c) that there are no even numbers in the pattern with an answer of 14 given in (b). Some also showed some understanding but gave a partly incorrect statement, such as ‘must be odd so is 37.’

Question 8

Mistakes were rarely made in part (a). Part (b) was also answered very well. A common error was to shade four of the squares. Part (c) was not answered as well as might have been expected. Many students either interpreted 0.75 of 200 as 0.75% of 200 or divided 200 by 0.75. Some carried out the correct calculation but then proceeded to divide 150 by 100 or to subtract 150 from 200. A few students did not attempt the question. In part (d), students often explained that Michael is wrong because the correct answer is 4/35. Some of the students who did not work out the correct answer were able to score one mark for recognising that Michael should have used a common denominator. Quite a number of students changed the problem to a multiplication and some to a division.

Question 9

Very few students failed to identify the correct companies in part (a) and part (b). The range was generally well understood in part (c). Some of the students who knew how to work out the range made a mistake when identifying the largest value and the smallest value. A common error was to calculate the mean rather than the range.

Question 10

Neither part (a) nor part (b) were answered as well as might have been expected on a calculator paper. In part (a), a significant number of students dealt with only one of the two changes in temperature and it was common to see only 12 – 18 = –6 or –5 – 18 = –23. Some students worked out –5 + 12 = 7 but then followed it with 18 – 7 instead of with 7 – 18. Some of those who did show a correct method that resulted in –11 then wrote 11 on the answer line and were awarded one mark only.

In part (b), 18 – 6 = 12 and –6 + 18 = 12 were common incorrect responses. Some of the students who gained the method mark for writing 18– –6 or –6 – 18 then went on to give the answer as 12. When a number line was used to find the difference between –6 and 18 counting errors frequently resulted in an answer other than 24, such as 23 or 25.

Question 11

Many students were able to work out the total number of adults and children as 14. Those who gave the answer as 10 adults and 4 children were awarded both marks. It was common to see 4, the number of adults with children, multiplied by 2 to give 8. Instead of adding 6 to 8, some students either gave 8 as the answer or added 10 to it and gave 18 as the answer.

Question 12

In part (a), the mode was well understood.

In part (b), the majority of students knew that the median was the middle number but some identified the middle number without first writing the numbers in order. The two negative numbers were sometimes written at the wrong end of an otherwise ordered list.

In part (c), many students knew how to work out the mean. However, a common error was to add up the numbers and give 22 as the answer, failing to divide by 11. Some students added up the numbers but arrived at an incorrect total. Those who divided an incorrect total by 11 could be awarded a method mark if it could be seen that the incorrect total had come from an attempt to add up the numbers. Students should be encouraged to take note of the statement that tells them how many numbers there are in the list.

A small number of students confused the averages, giving the mean for the median and vice versa.

Question 13

Overall, this question was answered very poorly. In part (a), few students identified $2n - 1$ as an odd number. Incorrect answers included 'even' and 'prime' but many students gave numerical answers or expressions involving n. Students were slightly more successful in part (b). Many of the incorrect answers were attempts at expressions in n, eg $5n + 5$ and $n + 5$, but answers such as '25' and '$n = 5$' were also quite common. Part (c) was answered very poorly. Common incorrect answers were '$4t$', '$4t - 1$' and '$t = 4$'.

Question 14

Most students were able to draw an angle of 40º in part (a). A small number drew an angle of 140º. In part (b) the majority of students gained at least one mark. Those who used a pair of compasses and drew the appropriate arcs were usually successful. A significant number of students, however, gained only one mark because they failed to show construction arcs and merely drew the required triangle instead of constructing it – some used a vertical line from the centre of the base as a guide.

Question 15

Most students were able to substitute the values of *e* and *g* and get an answer of 19. Some, though, did not know how to use BIDMAS or calculate '$2 \times 6.5 + 3 \times 2$'. Arithmetical errors were made by a significant number of students. Some worked out $2 + 6.5 + 3 + 2$ and gave an answer of 13.5 and some made an attempt at substitution but retained e and g in their answer.

Question 16

This question was well answered with many students able to design a suitable table for a data collection sheet with three columns and labels of sport, tally and frequency for the columns. Some tables had only two columns, typically sport and tally or sport and frequency, and some tables had a column that was unlabelled which meant that its purpose was unclear. A few students lost a mark as they had columns headed frequency and total rather than tally and frequency though total was condoned instead of frequency. It is important that the 'total' or 'frequency' part of the collection sheet is usable for totalling the tallies and not just a total at the bottom of the tallies. Some students designed a question for a questionnaire and scored no marks and a few drew a graph.

Question 17

It was pleasing that many students gave sensible estimates for the height of the bus. These estimates were usually given in metres or in feet and inches. Students who did not have a sensible estimate for the height of the bus driver often achieved one mark for multiplying this height by a number in the range 2 to 2.5. Some of the students who estimated the height of the bus driver in feet and inches got into difficulties when attempting to multiply this height by 2, e.g. 5ft 7in × 2 = 10ft 14in or 5.7ft × 2 = 10.14ft. Some students worked only in centimetres, using actual measurements from the diagram, and some failed to include units with their answer.

Question 18

Instead of using the area of the rectangle to work out the length of *BD*, many students assumed it to be 4.5 cm and gained no marks at all. Those who worked out the length of *BD* as 5 cm often went on to work out the area of the triangle correctly. The most common error was not dividing by 2 after multiplying 4.5 by 5. Pythagoras' Theorem was often used to calculate the length of CD which was not needed.

Question 19

In part (a), many students were unable to evaluate $\sqrt[3]{42.875}$ correctly. The common incorrect answers were 19.64 from $3 \times \sqrt{42.875}$, 280.74 from $(\sqrt{42.875})^3$, and 6.547 from $\sqrt{42.875}$. Students were more successful in part (b) and the correct answer was often given with no intermediate working. The most common incorrect answer was 6.41, from keying in 3.4 × 5.2 ÷ 2.6 – 0.39. Some students gained one mark for evaluating either the numerator or the denominator correctly. Some obtained both 17.68 and 2.21 but did not know what to do with these values.

Question 20

Many students gained at least one mark in part (a). Most shaded 4 sectors in diagram A but this did not always result in a shape with rotational symmetry of order 4. Some students shaded diagram B so that it had rotational symmetry of order 2 but shaded only 2 sectors, not 4 sectors as required. It was quite common to see the two correct answers reversed. The majority of students gained at least one mark in part (b) with many drawing a correct enlargement. When only one mark was awarded this tended to be for drawing a triangle with the base enlarged correctly. A common error was to draw a triangle with height 5 cm. Some students drew triangles that were not isosceles and ought to have realised that they had made a mistake.

Question 21

Part (a) was generally answered well. A common error was to give the answer as a fraction rather than as a ratio. Part (b) was also answered well. Students who did not get the correct answer in part (b) often gained one mark for a fraction with a correct denominator. Incorrect probability notation, eg 6 : 10, was seen a few times. Too many students made the error of giving the answer as 'likely'.

Question 22

Part (a) was answered extremely well with the vast majority of students able to plot the point at (22, 50). Sometimes, rather than the point being plotted, a horizontal line was drawn from 50 to meet a vertical line drawn up from 22 and this was not awarded the mark. In part (b) most students identified the correlation as positive. Some students described the relationship between time and distance instead of stating the type of correlation and a few students identified the correlation as negative. Most students answered part (c) correctly, often without drawing a line of best fit. Students should be encouraged to show a clear method on the graph as, without this, answers just outside the required range cannot be awarded any marks. Part (d) was also answered very well.

Question 23

Correct answers were quite common and it was pleasing that some of these came from an algebraic approach. However, many of the students using algebra got no further than writing down an expression for Bhavara's age or for Ceris's age. A common error was to give Ceris's age as $2y - 3$, rather than $y - 3$. Relatively few students were able to use their expressions to set up an equation. Some solved $2y - 3 = 125$ to get $y = 64$ and gained a method mark. The majority of correct answers came from a trial and improvement method rather than from an algebraic approach. Students who used a trial and improvement approach that did not result in the correct answer gained no marks.

Question 24

The problem for many was the assumption that only Celina and Zoe were singing. Many students were able to work out 65% of 80 minutes to find that Celina sang for 52 minutes. Fewer students worked out 5/8 of 80 minutes to find the time that Zoe sang for. A common error was to subtract 52 from 80 and state that Zoe sang for 28 minutes. Students who did this usually went on to find the difference between the two times and gained two of the four marks. A few managed to answer this question correctly using decimals or percentages throughout.

Question 25

In part (a), many students could not simplify n^3/n. A common incorrect answer was n^3. Students were more successful at simplifying $a^3 \times a^4$ in part (b). The most common incorrect answer was a^{12}.

Question 26

This proved to be a difficult question for Foundation tier students. Many of the students who realised that they needed to find the length of the sloping edge did not know how to do so and gained no marks. Those who did use Pythagoras' theorem were often able to find the length of the sloping edge and then go on to find the perimeter of the field. Some, however, included more than the four sides of the trapezium in their perimeter calculation. Area calculations were very common indeed with students comparing the area they had found with the 50m of fence available.

Question 27

Those students with some idea attempted this question in a variety of ways although many found the cost per ml or the number of ml per £1 (or 1p). Some students misinterpreted their own calculations. Those who calculated the number of ml per £1, for example, often concluded incorrectly that the 75ml tube was best because they thought that the smallest number represented the best value. Many different approaches were seen. Some students used a comparable amount such as 750ml or 25ml. Some used 150ml as a comparable amount for the 50ml tube and the 75 ml tube but then did not know how to make a comparison with the 125ml tube. A common error was to add the cost of the 50ml tube to the cost of the 75ml tube and compare the result with the cost of the 125ml tube. Some students simply worked out the difference in price and the difference in ml between the 50ml tube and the 75 ml tube and between the 75ml tube and the 125ml tube and thought they had done enough to make a decision. Some students were quite ingenious and got correct answers from correct calculations that were far from obvious.

Summary

Based on their performance on this paper, students should be advised to:

- choose a suitable scale when drawing a bar chart and label the axes
- practise writing algebraic expressions
- write probabilities as fractions, decimals or percentages
- read the information given in each question very carefully
- not to make assumptions about lengths in diagrams that are not accurately drawn
- use calculators effectively
- not to interpret questions with ‘show your working’ as not requiring use of a calculator
- think carefully about whether a question requires an area calculation or a perimeter calculation.

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