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Unit M1: Methods in Mathematics (Algebra and Probability) - Foundation

Report on the Examination

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Unit 1: Foundation Tier

Section A

General

The majority of students attempted all the questions on the paper. Once again there were some good responses to the number problem-solving questions. Answers to probability questions were better than in previous series, with fewer answers being given as a ratio and fewer descriptive words (such as 'likely') being given instead of a numerical answer. However, most questions requiring algebraic manipulation were not well answered, and basic number work left much to be desired in a number of questions, even in Section A when a calculator could have been used to perform the calculation.

Topics that were done well included:

- coordinates in the first quadrant
- number problem-solving
- simple probability models
- completing a two-way table, listing outcomes for two successive events.

Topics which students found challenging included:

- basic non-calculator number work, especially division
- knowledge of prime numbers
- expressing one quantity as a percentage of another
- algebraic manipulation.

Question 1

The question eased the students into the paper and there were many fully correct solutions seen. In part (c) some students repeated the point A as one of their answers and some gave coordinates of the form (x , 5).

Question 2

In this question the quality of written communication was being assessed, so it was particularly pleasing to see a large number of students carefully writing down the stages of their working. The main errors came from incorrectly adding the individual totals or from working in pence but not then converting 586 p to pounds. There were, however, many correct answers seen.

Question 3

There were many correct responses seen in part (a). In part (a)(ii) some students gave answers which added up to an odd number between 20 and 30 but the numbers were not consecutive; and a few gave consecutive numbers which added up to an even number.

Part (b) proved a more challenging problem for many students. Some thought that, for example, 3:45 was a consecutive time while others thought that 01:23 meant 1:23 pm. Some students simply wrote 23 hours 45 minutes on the answer line while others started to add on from 12:34, but without indicating what time they were trying to reach. A few thought that the next consecutive time would be reached after 12 hours.

Question 4

There were many correct answers seen to both parts of (a). The main errors occurred in (ii) with $\frac{2}{4}$ and $\frac{3}{4}$ being the most common incorrect answers.

Part (b), however, proved much more demanding. A large number of students did not understand the concept of the question and simply listed the codes 00 to 09 or 10. This was usually followed by 10 or 11 on the answer line. Students who began a systematic list of codes often miscounted or miscalculated how many they had. 99 was a fairly common incorrect answer and the correct answer was not seen very often.

Question 5

The response to this question was disappointing. Most students did not know how to use a calculator to work out a cube root or convert a fraction to a decimal. In part (a) many students tried to cube 64 000 or divide it by 3, while others tried to find the square root.

Question 6

In part (a) less than half the students could correctly work out the y value for $x = –3$, even though this question was on the calculator section. –5 was an incorrect answer frequently seen. Plotting the points in part (b) also proved more problematic than expected, particularly the point (0, –1) which was often plotted at (–1, 0). Also the point for $x = –3$ was often plotted at $y = –3$. Some students who plotted the correct points did not join them up to get the line.

Question 7

Most students were able to complete the table correctly in part (a), but a great many were unable to identify the primes for part (b). Some students seemed to think that odd numbers were being referred to by including 9 and 15 when calculating the probability.

Question 8

Quite a wide variety of methods were employed. A considerable number of students did not know how to write one million in digits or how many days are in a year. Students worked in days, months and years, but some became confused with where they were up to in the calculation process. Many did not know how to progress once they had either worked out how many minutes are in a year or had worked out that 1 million minutes was 694 days or 1.9 years.

Question 9

The majority of students were able to evaluate one of the two answers, with many correctly working out both. The main error occurred in calculating $(5 + 4) \times 4$, the answer of which was sometimes stated to be 21. A few students divided instead of multiplied when using the instructions for both Serena and Thomas.

In part (b) hardly any students understood what was being asked for. Attempts to show the result using algebra were extremely rare. Some tried to give a narrative reason, often describing the calculations performed in (a). Those who chose a different starting number and showed that the difference was again 12 did receive some credit.

Question 10

Most students made an attempt at this question, but many had difficulty evaluating the y value correctly in part (a). The points were usually plotted correctly in part (b), although a considerable number of students did not attempt to join them up or did so with straight lines. Many of the students who drew a curve were able to read from it correctly to answer part (c).

Section B

Question 11

There were many correct answers to the first two parts. In part (a), common incorrect answers were 874, 784 and 786 which were often obtained by splitting the subtraction, eg 800 – 20 – 6 rather than the traditional method of writing the numbers in columns, which proved more successful.

Less than half the students correctly answered part (c). 9, 1 and –1 were commonly seen.

In part (d) a common error was to build up to 420 and then say the remainder was 30. Others said that since 7 × 70 = 490 the remainder must be 40. Of those who chose the more traditional method of setting out, some became confused as to what to carry from one column to the next and some 'borrowed' as if doing a subtraction. Only about a quarter of students were able to obtain the correct answer.

In part (e) many students wrote the numbers in a column, but some placed the 5 in the hundredths column. Of those who chose to add two numbers at a time, a common error was to add 12.4 and 0.76 to give 12.80.

Question 12

There were many successful answers to parts (a) and (b) but many students were unable to cope with the negative answer in part (c).

Question 13

Sometimes students repeated numbers in order to make the right hand column and bottom row add up to 12, but many fully correct solutions were seen.

Question 14

Some students identified that a number should be moved from group C to group A, but not which particular number. Nevertheless, most students knew how to solve the problem and many fully correct solutions were seen.

Question 15

Most students were able to substitute correctly in part (a) (i). Many correct answers were also seen in part (a) (ii). The most common error here was to substitute 20 for w to obtain 24. Some students divided 20 by 4 whilst others who correctly obtained 16 then divided by 2 to obtain 8. A few students simply repeated their answer from (a)(i).

By contrast, most students did not know how to approach part (b). Of those who made an attempt, many substituted in numbers to obtain numerical values for P and T while others equated P and T. The correct answer was not seen on many occasions.

Question 16

Some students did not understand the concept of a square number and simply paired off the eight digits, seemingly at random. Of those students who tried to make square numbers, many were able to make two or three, but could not then make a square number with their remaining digits or repeated digits in order to do so. The most successful strategy was to begin by writing down the square numbers and realise that the first number in the list, 1, could only be paired with 35 and the last number, 37, could only be paired with the 12.

Question 17

There were many incorrect calculations seen, eg 600 – 66, 600 × 66, 600 ÷ 66. Some students began by writing down 66 / 600, but could not progress further. The two most successful approaches were to realise that 10% = 60 and 1% = 6 or that 66 needed to be divided by 6. A few students simply gave the answer 66%.

Question 18

There were some good attempts at this question. The most common errors in part (b) arose from not knowing how to deal with the seven students in the intersection. Sometimes they were left out in (i) and included in (ii). 13/16 was also seen on quite a few occasions in (ii). Sometimes the number of students was given, eg 10 for (i), but not expressed as a probability, or the probability was then thought to be 1/10.

Question 19

Many students were able to work out the value of x, but a considerable number did not then substitute this value into the second equation. Instead they proceeded to the expression to be evaluated with a value for y which did not come from any obvious working. Those that did attempt a substitution into the second equation often floundered due to the y value being negative. Students who found the correct values usually obtained the correct final answer, although a few simply stated the x and y values without evaluating the expression $2x + 4y$.

Question 20

There were many correct responses to parts (a) and (b), but many students struggled to understand the problem in part (c). One misconception which was prevalent was to think that there was only 1 red marble in Farook's bag at the beginning, so that since 6 reds were added there should now be 7 reds (and therefore 7 blues) giving 14 marbles altogether. Others thought that that there were only 5 marbles in Farook's bag and so with the 6 added there would now be 11 marbles altogether. Some students simply doubled 6. The correct answer was not often seen.

Mark Range and Award of Grades

Grade boundaries are available on the Results statistics page of the AQA Website.

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