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Methods in Mathematics (Pilot) 93651F

(Specification 9365)

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

Report on the Examination

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Unit 1: Foundation Tier

Section A

General

This paper was the second for this specification and proved more challenging than the previous paper in January 2011. There were some good attempts at the problem-solving questions which related to number, but those which involved algebra and probability proved demanding for many candidates. Most questions which required algebraic manipulation were not well answered. There was a slightly better performance on the calculator section of the paper than the non-calculator section, but not significantly so.

Topics that were done well included:

- Basic number work
- Number problem-solving
- Coordinates in all four quadrants
- The probability scale

Topics which candidates found challenging included:

- Non-calculator addition of fractions
- Venn diagrams
- Equations of horizontal and vertical lines
- Interpretation of a quadratic graph
- Algebraic manipulation, such as expanding brackets, factorising and rearranging equations

Question 1

Many candidates were able to answer parts (a) and (c) correctly but there was less success with the other parts. In (b) some candidates thought the answer was $\frac{3}{4}$.

In part (d), as many candidates marked the position of $1\frac{1}{3}$ between 1 and $1\frac{1}{4}$, or between $1\frac{1}{2}$ and $1\frac{3}{4}$, as gave the correct answer. A few marked the position of $\frac{1}{3}$ on the line. In part (e) only about half the candidates knew the correct answer.

Question 2

There were many excellent attempts at this question, and the correct answer was seen on many occasions. The setting out of most candidates' work was also very clear. Some candidates began by subtracting the cost of one or three cupcakes (instead of two) from £4. Others attempted the subtraction without working so that, for example, £3.80 instead of £2.80 was stated to be what was left. Another fairly common error was to divide the £2.80 by 2, or occasionally 5, instead of 4. Some candidates did not use correct money notation eg 70 or 0.70 with no units stated, or £0.7 or 0.70 p.

Question 3

There was confusion over the terminology in this question, so that, for example, in part (a) it was common to see 4 squared to give the answer 16 (or in some cases 8) rather than finding the square root of 4. Some candidates seemed to pluck numbers from nowhere for their answers, and few candidates scored well on this question.

Question 4

This question was well answered. The vast majority of candidates were able to write down the correct coordinates in part (a); and in part (b) most candidates were able to mark *C* on the line. The most common errors here were to mark the point (–3, 0), (–2, 2) or (–3, 2). In part (c), most candidates were able to give coordinates which added to 0, the most common error being to make both coordinates negative, eg (–1 , –1)

Question 5

Many different pairings were seen in part (a), which was not done as well as expected. Many candidates were able to describe suitable events for A and B in part (b). These were usually to do with the colour of the balls or the numbers on the balls, eg 'The ball is red' or 'The number is greater than 100' for event A. Some candidates were not quite accurate enough in their description, eg 'The number is greater than 1' for event B (instead of greater than or equal to 1). A few candidates wrote down answers such as 'likely' or 'possible' but most candidates were able to score at least 1 mark. Part (c) was not answered particularly well. A considerable number of candidates did not realise that a numerical answer was required, giving answers such as 'unlikely'. Many gave the answer 'evens'. Common incorrect probabilities given were 0.1, 1 / 99, 2 / 100, 50 / 50 and 50 / 100. Part (d) was too demanding for most candidates, who did not understand what was being asked for. Some thought the answer was 15 because the factors were listed as 1, 3 and 5 with 15 missing. A correct answer was not seen very often.

Question 6

Whilst many candidates knew the answer to part (a), there was considerably less success at the other parts. In part (b), some candidates added 15 and 11 but did not then divide by 4, thinking 26 was the answer. Quite a number of candidates simply wrote an answer, often incorrect, on the answer line, without any working. A few candidates who arrived at the correct answer of 6.5 then thought that they should round it to 7. In part (c) many began by subtracting 4 from 18 whilst others did not multiply 6 by 4 when expanding the brackets. 8 was a common incorrect answer from working of $6 + w + 4 = 18$.

Question 7

The correct answers were seen on many occasions in part (a), but as in question 5(c) there were many answers such as 'unlikely', 'certain', etc. In (a)(i) some candidates did not cancel their fraction of $\frac{4}{36}$, or did so incorrectly, and a few thought the answer was $\frac{4}{12}$. On the positive side, only a small number of candidates attempted to give their answers as ratios. Part (c) proved very demanding for the majority of candidates, many of whom did not appreciate what the problem was. Consequently, many simply listed odd numbers or multiplied two numbers together instead of three, or added three numbers instead of multiplying them. Not many candidates scored marks on this part.

Question 8

This is the first time a Venn diagram question has been set on this paper. Almost every conceivable shading was seen in part (a) but the correct one very rarely. The most common incorrect shading was to shade the intersection, sometimes with the outside of the circles as well. The description of the shading in part (b) was equally as difficult for the candidates. A' $\cup$ B' was a very common incorrect answer. Some candidates used both A and B but without any symbol, eg AB'. There was a slightly better attempt at part (c), although many candidates did not seem to know how to start. Some candidates duplicated letters or did not use a to j; sometimes the letter x was used or p in set P and q in set Q. Some candidates had 7 letters in P and 6 in Q. A few simply wrote down the number of elements or the probabilities.

Question 9

Although nearly all candidates made an attempt at this question, this was too challenging a problem for the majority and not many made meaningful progress beyond trying to add $\frac{1}{3}$ and $\frac{2}{5}$. Some who correctly obtained $\frac{11}{15}$ for this sum did not know what to do next or stated with no working that the remainder (incorrectly) was $\frac{3}{15}$. Others began by trying to work out $\frac{1}{3}$ of 44 or $\frac{2}{5}$ of 44. Some candidates tried to use decimals or percentages, where it was quite common to see $\frac{1}{3}$ = 0.3 or 30%.

The few candidates who understood the methodology involved to solve the problem usually set their working out in an organised way and were awarded the mark for quality of written communication which was being assessed in this question.

Section B

Question 10

There were a large number of correct responses to (a)(i) and (a)(iii), but less success at (a)(ii), where 1800 or 180 000 were common incorrect answers. In part (b) many candidates tried to subtract 18 from one of the other numbers but this often resulted with 8 in the units column.

Question 11

The correct answer was seen on many occasions. Errors which occurred were usually as a consequence of not being able to calculate 25% correctly for Amber's share or by splitting the 15 pieces left over into a pair which did not give the greatest number for Holly, eg 10 and 5. A few candidates who did 15 ÷ 2 = 7.5, then gave this as their answer or rounded the number to 6 instead of 7.

Question 12

There were some excellent attempts at this problem-solving question, with many candidates scoring full marks. A common error was to use a number twice, eg John's cards were occasionally stated to be 2 and 2, or to use numbers greater than 10.

Question 13

The majority of candidates were able to match up at least one pair correctly, but only about one third of candidates matched up all the pairs correctly.

Question 14

A significant number of candidates simply wrote down an answer on the answer line, with little or no working, or worked with the first ten multiples of 9 instead of the multiples beginning with 99. Some split the three-digit multiples into two numbers instead of adding up the three digits, eg the multiple 126 was split into 1 + 26 (= 27) or 12 + 6 (= 18) with the conclusion that it didn't work for this multiple. Candidates who knew how to proceed often marred their solutions by arithmetical errors, or having done the working correctly wrote 9 on the answer line.

Question 15

In part (a), a considerable number of candidates thought that Emma had not made a mistake. Nevertheless, many candidates were able to explain what had been done wrongly, or showed the correct way to work out the calculation. There were many correct answers seen to part (b)(i), but by contrast, correct answers to (b)(ii) were very rare. Even when a minus sign was put between the 20 and 5 this was more often than not followed by ÷ between the 5 and 6.

Question 16

In part (a), 1.4 was seen on as many occasions as the correct answer of 0.14. Some candidates added instead of multiplied the decimals. In part (b) many were able to calculate one of 5^2 or 2^3 correctly, but then these were often added instead of multiplied. Some thought 5^2 was 10 or 2^3 was 6 and a few began by multiplying 5 and 2. In part (c) it was common to see the numerators and denominators added separately to give $\frac{7}{12}$. This was sometimes converted to 1 and $\frac{5}{7}$ on the answer line. Sometimes the denominators were changed but not to a common one. Some candidates who correctly reached $\frac{41}{35}$ did not go on to give this as a mixed number. The correct answer, even as an improper fraction, was not seen on too many occasions.

Question 17

The majority of candidates did not understand what was being asked for in this question. In part (a) many candidates did not attempt a factorisation, preferring to try to combine the terms into a single term, eg $15x^3$. Of those who did try to factorise, many began by writing 6 or x^2 outside a bracket. Correct answers, even partially correct factorisations, were rarely seen. The question paper indicated that part (b) was a question where the quality of written communication (QWC) was being assessed. Nevertheless, there were many scripts which had an answer on the answer line with no working to support it. 3 and 6 were common answers. Of those who did make some progress $3(x + a)$ was often expanded to $3x + a$ (leading to an answer of 24 if the other expression had been correctly manipulated). Only a few candidates found their way to the correct solution and only a handful of these gained the QWC mark.

Question 18

This proved to be a challenging question for most candidates. In part (a) many simply wrote down a number or the coordinates of a point or wrote L = 3. Those who began with x and y often had them the wrong way round, eg $x = 3$ for L instead of $y = 3$. In part (b) many drew lines through the point of intersection of L and M or though (0, –1) and the correct line was not seen very often. Correct answers for part (c) were extremely rare.

Question 19

The majority of candidates did not understand what was being asked of them here and many did not attempt an answer. Some candidates thought they were being asked to write down the coordinates of the minimum point, while others simply wrote down one or two numbers. 1, –1, 2 and –2 were common incorrect answers.

Question 20

This question was very poorly attempted. Correct answers were rarely seen and many candidates did not understand what was being asked of them, making no attempt at all. In part (a), some candidates simply wrote down a number (often the number 2) while others wrote down another letter of the alphabet. $1n$ and $2n$ were other common incorrect answers seen. In part (b), all types of expressions, equations and even inequalities were seen, including quadratics. Some thought that the expression for Olivia was $n + 2$ or $n + 3$. Most candidates who scored a mark usually did so for the expression for Ben.

Mark Range and Award of Grades

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