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General Certificate Secondary of Education
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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

Most students seemed to find the paper accessible, completing it in the allowed time and scoring marks on a range of questions and topics. The questions on probability yielded the least amount of marks proportionately, perhaps due in part to the question about relative frequency, which was the first time that this part of the specification had been tested and for which many students seemed unprepared. There was a slightly better performance on the calculator section of the paper than the non-calculator section.

Topics that were done well included:

- basic whole number work
- coordinates in the first quadrant
- drawing a straight line graph
- constructing a two-way table.

Topics which students found difficult included:

- percentage increase
- working with ratios
- non-calculator multiplication involving fractions
- relative frequency.

Question 1

There were many correct responses to part (a) and part (b).

In part (c) the quality of written communication was being assessed. This led some students to write about the days in each month or extra days in leap years and how often they occur. Others thought it was sufficient simply to state that 7 did not divide into 365 or 366 without showing any calculations. Students should understand that in a three mark question, mathematical calculations are invariably required to support a conclusion and that methods should be shown. Of those students who did this, the main method seen was to divide both 365 and 366 by 7. Some students, however, very neatly answered the question by showing that there are 364 days in 52 weeks.

Question 2

In part (a) the majority of students knew what to do and had few problems. Occasionally £6.30 was subtracted from £10 instead of £8 or subtracted from £8 to give an answer of £1.30 or £2.30. A few students simply subtracted 42p from £2 or began by dividing 42 by 15. A small number of students gave incorrect money notation in their final answer of 1.7 instead of 1.70 and sometimes it was difficult to read whether students had written 1.70 or 170.

Many students were successful with part (b), although not too many divided £10 by 42p, instead preferring to multiply 42p by various numbers, until the answer just below £10 was obtained. Some even had a string of additions of 42. A few of those who did divide to obtain 23.8 then rounded this to 24 instead of down to 23.

Question 3

A few arranged the numbers so that the row added up to 9, but not the column (or vice versa). The vast majority of students realised that 3 needed to be in the middle and there were many correct responses to this problem.

Question 4

A common error was to think that ‘half of the counters were blue’ was a true statement, not realising there may be other colours. Nonetheless, this question was well attempted.

Question 5

A large number of students gave fully correct solutions to this problem. Some students, however, did not give the number of sweets that Asif had at the beginning, but instead gave the total number of sweets (18) or how many each person had after they had been shared out evenly (6).

Question 6

There were many correct responses to each part of this question with the most commonly seen incorrect answers being $2x$ in part (a), $4 - x$ in part (b), x^3 in part (c), and $x \div 0.5$ in part (d).

Question 7

This proved quite a demanding question. Many students thought that there were 3 red cards, leading to an answer of 7. A few said that $\frac{2}{3}$ was 0.6, so that P (black) = 0.4. Others thought the ratio of black to red was 2 : 3 (or occasionally the other way round) and so there must be 6 reds and 10 cards in total. Some who correctly found there were 8 red cards did not give the total number of cards in the pack for their final answer.

Question 8

In part (a), –0.5 and –1 were common incorrect responses for the missing y value, but the majority of students were able to obtain the correct value.

In part (b) a few students were confused by the scaling so that, for example, (3, 2.5) was plotted at

(3, 2.25). Some students plotted the points but did not join them up and even when the plotted points lay in a straight line, a considerable number drew freehand instead of using a ruler.

Question 9

In part (a) common errors were to add the x terms or to subtract the y terms. Some, having successfully achieved $7y$, then made the term negative (obtaining $5x - 7y$). A few students collected only the y terms but not the x terms (or vice versa), whilst others simply worked with the coefficients to obtain a numerical answer.

In part (b) less than half the number of students were able to multiply out the bracket. Common errors were to add 5 to 2 rather than multiply, or only to multiply a by 5.

Question 10

The most common approach was trial and improvement. However, some who attempted the question this way did not give totals to their four numbers. Another common method was to begin by dividing 100 by 4, but nearly all students who did this were unable to complete the method, often thinking that to subtract another 4 from their 25 was sufficient to get the answer. Those who began by subtracting groups of four from 100 usually did not subtract enough and often did not divide their answer by 4. A few algebraic approaches were seen and these invariably led to the correct answer.

Question 11

The majority of students began by working out the increase from 1600 to 2200 but many did not know how to proceed from there. Sometimes 600 then became 6% or 60% on the answer line. Many continued by stating various percentages of 1600, for example, 10%, 5%, 1%, etc but few were able to build up to the correct answer, either because of arithmetical errors or because they did not know how to deal with the $\frac{1}{2}$%. Not many students used the method of 600/1600 × 100. Some used

1600/2200 × 100 and others added 1600 and 2200.

Question 12

About half the number of students worked out the correct answer to part (a)(i) and about one third the correct answer to part (a)(ii). Some ignored the letters and simply subtracted the coefficients, for example 14 – 4 in part (a)(i).

In part (b) some did manipulate the expressions (often realising $18 = 2 \times 5 + 8$) but most students made up values for r, s and t which made the given equations work. They then wrote down another expression which worked for their chosen values. Sometimes this expression included only two of the three variables.

Section B

Question 13

Nearly all students were able to find the two numbers that added up to 100 in part (a)(i), although part (a)(ii) proved more difficult with only just over $\frac{3}{4}$ of students being able to find the two numbers successfully. In part (a)(iii) students who chose to evaluate 25% by dividing by 4 had no difficulty in obtaining the correct answer but those who began by trying to find 10% and building up from there, sometimes struggled with the decimals. A few students calculated $\frac{3}{4}$ of 84 and a minority simply wrote down the incorrect answer of 24.

In part (b) many students knew what to do but their solutions were marred by many arithmetical inaccuracies. Some added up the numbers incorrectly but then did not show the subtraction from 400, so that it was sometimes impossible to know what number they were trying to make with their two answers. A few students completely misunderstood what was being asked for and simply wrote down two numbers that added to 400.

Question 14

There were many fully correct responses to this question. In part (b) some students positioned C at the midpoint of AB, rather than two squares above it, or at some other point along the line $y = 4$.

Question 15

Many methods were employed to do the multiplication with the grid method being the one seen the most often. In this method 200×30 and 70×30 proved the most difficult to perform; sometimes they were stated to be 600 (or occasionally 60 000) and 210 respectively. In the traditional method some students did not have a zero at the end of their number for multiplying by 30. Some students simply multiplied 200 by 30 and then added 74 or wrote 2, 7, 4, 3 and 1 in a grid and multiplied these single digit numbers, with no regard to place value.

Question 16

Some thought that since $\frac{2}{5}$ is 40% which is greater than $2 \times 10\%$ then the answer was yes and no calculations were needed. Students need to appreciate that when the quality of written communication is being assessed that they must set down all the steps, even when a conclusion might seem obvious to them. Thus in this question, having obtained the number of men and women who wear glasses (20 and 9), students needed to make it clear that they were comparing 20 with 18. Some who correctly worked out 20 and 9 did not appreciate the “more than” aspect of Khalid’s statement and thought the answer was no because 20 did not equal 18.

Question 17

In part (a) only just over $\frac{1}{4}$ of students were able to identify the only answer as $\sqrt{81}$. More students thought the answer was $\sqrt{10}$.

In part (b) it was necessary to work out both sides of the equation and show that the answer was the same and those familiar with powers usually did this. However, a few students who evaluated the right hand side as 32 then simply said that $2^5 = 32$ without explaining what 2^5 meant. Quite a number of students evaluated one or both of 2^5 and 5^2 as 10 and some evaluated 2^5 to be 64 or 128.

Question 18

Many correct tables were seen in part (a)(i), although a few students multiplied the numbers instead of adding and some simply completed the rows using the numbers 3, 6 and 7 in a pattern. In part (a)(ii) $\frac{5}{9}$ was a common incorrect answer and some students did not consider the score but the numbers on the spinner, thus giving $\frac{2}{3}$.

Many students did not seem to realise that the situation in part (b) was similar to part (a) and few checked their numbers on the spinner with a two-way table. Fully correct solutions were seldom seen, although many students were able to write numbers which satisfied one or two of the criteria.

Question 19

It was all too common to see both 5 and 11 multiplied by 9 to give $\frac{45}{99}$. A few students even cancelled this down to arrive back at $\frac{5}{11}$ while others who appreciated that their answer should be a mixed number then inverted this fraction to give $\frac{99}{45}$ in order to be able to obtain a mixed number. Those who successfully achieved $\frac{45}{11}$ usually went on to score all three marks, although a few interpreted 'mixed number' as meaning a decimal.

Question 20

This question was very demanding for a large number of students and correct methods were uncommon. Many simply subtracted 4 from 12, giving 8 as their answer or subtracted 9 from 12. Others found the ratio of 4 : 3 but then added or subtracted the parts to give an answer of 7 or 1. Another incorrect concept was that since 4 small glasses had been filled, then 9 – 4 would lead to the answer. Some worked on the basis that they thought 1 large glass was the same as 2 small glasses.

Question 21

There were many correct answers to part (a).

In part (b), some students let themselves down by not knowing the correct answer to 28 ÷ 4. A few thought that 28 was the solution to the equation while another misconception was to calculate 28 – 4. Part (c) proved demanding for many students. Of those who realised that 5 should be substituted for x into the equation, some tried to expand the bracket on the left hand side, but obtained $5a - 3$. Of those who correctly obtained $2a = 20 - b$, the coefficient of a was then often ignored so that values of a and b satisfying $a = 20 - b$ were written down instead. A few students only gave one pair of values.

Question 22

In part (a) many students wrote down a relative frequency in the table which was often wrong and without any supporting working to suggest where their figure had come from. Indeed, adding the decimals proved too difficult for a great number of students and 0.35 was seen on many occasions for this sum. Having done this, many thought they had completed this part of the question and only a few went on to multiply by 200. Some thought the frequency was obtained by multiplying by 100 while others thought they should subtract their relative frequency from 2.00. A few who did get 0.2 for the missing relative frequency then thought this meant the dice was rolled 20 times.

There was a good response to part (b), but in part (c), although many students gave the answer ‘yes’, their reason was so that the results could be compared or an average worked out. Very few referred to there being more trials which should lead to better reliability.

Mark Range and Award of Grades

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

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