MATHEMATICS 2

1. GENERAL COMMENTS

The standard of the paper compares favourably with that of the previous years.

The chief examiner stated that candidates' performances was average compared to that of the previous year.

2. SUMMARY OF CANDIDATES' STRENGTHS

Candidates showed strengths in the following areas:

(a) solving set problems;

(b) algebraic factorization;

(c) ratio problem relating to sharing;

(d) solving problems on vectors;

(e) solving problems on frequency distribution table.

3. SUMMARY OF CANDIDATES' WEAKNESSES

Candidates' weaknesses were found in the following areas:

(a) applying laws of indices to simplify given expression;

(b) clearing fraction and solving of linear equation;

(c) solving word-problems;

(d) finding rule of a given mapping;

(e) simplifying fractions and converting to the nearest whole numbers.

4. SUGGESTED REMEDIES

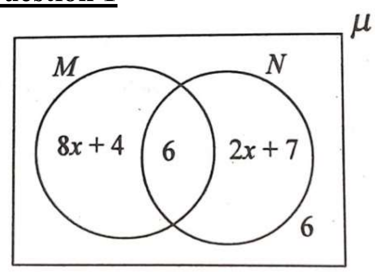
(a) Teachers should use activities, Teaching and Learning Materials and involve students in teaching concepts and solving examples.

(b) Candidates should be encouraged and motivated by teachers and parents to practice what they have been taught.

(c) Candidates should be given enough exercises on their areas of weaknesses.

5. **DETAILED COMMENTS**

Question 1



In the Venn diagram, *M* and *N* are intersecting sets in the universal set μ.

(a) **Express $n(M)$ and $n(N)$ in terms of x.**

(b) **Giventhat $n(M) = n(N)$, find the:**

- **(i)** **value of x;**
- **(ii)** **$n(\mu)$.**

(c) **Simplify : $2^6 \div (2^2 \times 2^1) \div 2^5$.**

This question was popular. Candidates' performance in part (a) was not encouraging because they found $n(M)$ and $n(N)$ together instead of separating them.

The value of x and $n(\mu)$ were well calculated. Candidates equated $n(M)$ and $n(N)$ and simplified to arrive at the value of x.

In the part (c), candidates were to apply laws of indices to simplify the expression. Most of the candidates could not answer the question. Candidates were expected to solve the question as follows:

(a) $n(\text{M}) = 8x + 4 + 6$

$= 8x + 10$

$n(\text{N}) = 2x + 7 + 6$

$= 2x + 13$

(b)(i) $n(M) = n(N)$

$8x + 10 = 2x + 13$

$8x - 2x = 13 - 10$

$6x = 3$

$x = \frac{1}{2}$

(ii)$n(\mu) = (8x + 4) + 6 + (2x + 7) + 6$

$= 10x + 23$

$= 10\left(\frac{1}{2}\right) + 23$

$= 5 + 23$

$n(\mu) = 28$

(c) $2^6 \div (2^2 \times 2^1) \div 2^5$

$= 2^6 \div (2^3) \div 2^5$

$= 2^{6-3-5}$

$= 2^{-2}$

Question 2

(a) **Factorize the expression $5ay - by + 15a - 3b$.**

(b) **Solve: $\frac{6}{4p-1} = \frac{4}{3(p+4)}$.**

(c) **Esi and Kofi shared an amount of GH₵21,000.00 in the ratio of 2:5 respectively.**
How much more did Kofi receive than Esi?

In part (a),candidates were able to factorize the algebraic expression very well. however,for the (b) part, most of the candidates could not clear and expand the fraction. As a result, this part was poorly answered by most candidates. In part (c), the question was testing candidates on sharing an amount in a given ratio. Most of the candidates found the totalratio and used it to find Esi and Kofi's share. They were able to find how much more Kofi received than Esi but failed to leave the answer in two (2) decimal places and also omittedthe Ghana cedi sign. Candidates were expected to solve the questions as follows:

(a) $5ay - by + 15a - 3b$

$= y(5a - b) + 3(5a - b)$

$= (y + 3)(5a - b)$

(b) $\frac{6}{4p-1} = \frac{4}{3(p+4)}$

$18(p + 4) = 16p - 4$

$18p + 72 = 16p - 4$

$18p - 16p = -4 - 72$

$2p = -76$

$\frac{\cancel{2}p}{\cancel{2}} = \frac{-76}{2}$

$p = -38$

(c)

Esi : Kofi

2 : 5

Total ratio = 2 + 5

= 7

Kofi's share = $\frac{5}{\cancel{7}_1} \times \cancel{21}^3,000$

= GH₵15,000.00

Esi's share = $\frac{2}{\cancel{7}_1} \times \cancel{21}^3,000$

= GH₵6,000.00

How much more Kofi receives

= GH₵15,000.00 – GH₵6,000.00

= GH₵9,000.00

:. Kofi received GH₵9,000.00 more than Esi.

Question 3

(a) **If $r = \begin{pmatrix} -4 \\ -5 \end{pmatrix}$ and $m = \begin{pmatrix} -1 \\ -2 \end{pmatrix}$, find p given that $p = r - m$.**

(b) **The sum of two numbers is 81. If the second number is twice the first, find the second number.**

(c) **The floor of a rectangular hall is of length 9 m and width 4 m. How many tiles of 20 cm by 30 cm can be used to cover the floor completely?**

In part (a),candidates were tosubtract two given vectors. The substitutions were well done and simplified to get the vector *P*. Most of the candidates who attempted this question were able to form an equation in one variable and solved the equation. The question was well answered.

For the part (c), most candidates did well by finding the areas of the floor and tiles but were unable to convert them to the same unit, hence, they could not find the number of tiles used to cover the floor completely.

Candidates were expected to answer the questions as follows:

(a) $\boldsymbol{r} = \begin{pmatrix}-4\\-5\end{pmatrix}$, $\boldsymbol{m} = \begin{pmatrix}-1\\-2\end{pmatrix}$

$\boldsymbol{p} = \boldsymbol{r} - \boldsymbol{m}$

$$= \begin{pmatrix}-4\\-5\end{pmatrix} - \begin{pmatrix}-1\\-2\end{pmatrix}$$

$$= \begin{pmatrix}-4+1\\-5+2\end{pmatrix}$$

$$= \begin{pmatrix}-3\\-3\end{pmatrix}$$

(b) Let x = the first number

y = the second number

$x + y = 81$ ……….. (1)

$y = 2x$ ……….. (2)

(2) into (1)

$x + 2x = 81$

$3x = 81$

$x = 27$ and $y = 54$

(c) Area of rectangular Hall = 9m × 4m

= $36m^2$ or $360000cm^2$

Area of square files = 20cm × 30cm

= $600cm^2$

= $0.06m^2$

Number of tiles that can cover the room

$$= \frac{area\ of\ the\ rectangular\ Hall}{area\ of\ the\ tiles}$$

$$= \frac{\cancel{360000}^{600}}{\cancel{600}_1}$$

= 600

Question 4

(a) Antwiwaa bought 25 mangoes, 7 of which were unripe. What percentage of the mangoes were ripe?

(b)

$$\begin{array}{ccccccc} x & 1 & 2 & 3 & 4 & \ldots 8 & \ldots n \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ y & -1 & 2 & 5 & 8 & m & 29 \end{array}$$

The mapping shows the relationship between *x* and *y*. Find the:
(i) rule for the mapping;
(ii) values of *m* and *n*.

(c) A bus left town X at 6:30 am and arrived at town Y at 1:00 pm. If the bus travelled at an average speed of 100 km per hour, calculate the distance from town *X* to town *Y*.

In part (a), candidates were given 7 unripe mangoes out of 25 and to find percentage of ripe mangoes. Most of them found the ripe mangoes and were able to express the percentage well.

For the part (b), candidates were expected to find the rule of a given mapping and use it to find values of *m* and *n*. Most of the candidates could not find the rule. The candidates performed poorly in this question.

In part (c), most of the candidates could not calculate the difference in time. Hence the distance from town *X* to *Y* was not well calculated. Candidates were expected to solve the question as follows:

(a) Number of ripe mangoes = 25 – 7
= 18

Percentage of ripe mangoes = $\frac{18}{\cancel{25}_1} \times \cancel{100}_4$
= 72%

(b)(i) Rule : $y = mx + c$

Gradient$(m) = \frac{5-2}{3-2}$

$m = 3$

$y = 3x + c$

From the mapping, when $x = 2$, $y = 2$ and$c = -4$

$y = 3x - 4$

(ii) When $x = 8$

$m = 3\,(8) - 4$

$m = 24 - 4$

$m = 20$

When $x = n$, $y = 29$

$29 = 3n - 4$

$3n = 29 + 4$

$n = 11$

(c) Time used to travel = 1:00pm – 6:30am

= 6hrs 30minutes

Distance from x to y = 6 hrs 30 minutes ×100

$= 6\frac{1}{2} \times 100$

$= \frac{13}{2_1} \times \cancel{100}^{50}$

= 650km

Question 5

(a) Simplify: $(4x + 2)(x - 2) - 3x^2$.

(b) The following are the angles formed at the centre of a circle: 40^0, 60^0, 100^0, $3x^0$ and $5x^0$. Find the value of x.

(c) The cost (C) in Ghana Cedis of producing a book of x pages is given by $C = 25 + 0.6x$.

(i) Find the cost of producing a book with 220 pages.

(ii)How many pages are in a book produced at a cost of GH₵145.00?

In part (a), most of the candidates could not expand and simplify the expression. For the part (b), candidates were given angles at a centre of a circle and are to find the value of x. Most of the candidates who attempted it did well by adding the angles and equated to 360^0. Theyfoundthe correct value of x. However, only few failed to equate to 360^0.

In part (c), candidates were given cost function in Ghana Cedis and were expected to find cost given 220 pages and number of pages for GH₵145.00. The substitution was well done. However, most of them got the answer without two (2) decimal places and also omitted the Ghana Cedis (the unit).

Candidates could not simplify the division to find the value of x. Candidates were expected to solve the question as follows:

(a) $(4x + 2)(x - 2) - 3x^2$

$= 4x^2 - 8x + 2x - 4 - 3x^2$

$= 4x^2 - 3x^2 - 8x + 2x - 4$

$= x^2 - 6x - 4$

(b) $40^0 + 60^0 + 100^0 + 3x^0 + 5x^0 = 360^0$

$200 + 8x = 360$

$\frac{\cancel{8}x}{\cancel{8}} = \frac{\cancel{160}_2}{\cancel{8}_1}$

$x = 20$

(c) $C = 25 + 0.6x$

(i) When $x = 220$

$C = 25 + 0.6(220)$

$= 25 + \frac{6}{1\cancel{0}} \times 22\cancel{0}$

$= 25 + 132$

$C =$ GH₵157.00

(ii) $145 = 25 + 0.6x$

$0.6x = 145 - 25$

$0.6x = 120$

$\frac{6x}{10} = 120$

$6x = 120 \times 10$

$x = \frac{\cancel{120}^{20} \times 10}{\cancel{6}_1}$

$x = 200$

Question 6

(a) **The table shows the number of marbles students sent to class for Mathematics lesson.**

Number of Marbles (x)	**Number of Students *(f)***	***fx***
1	**4**	**-**
2	**5**	**-**
3	**-**	**42**
4	**9**	**-**
5	**-**	**30**
6	**2**	**12**

(a) **Copy and complete the table.**

(b) **How many:**

(i) **students were in the class?**

(ii) **marbles were brought altogether?**

(iii) **marbles did most of the students bring?**

(c) **Calculate, correct to the nearest whole number, the mean number of marbles brought for the lesson.**

In part (a), candidates were given a table to copy and complete, then use the table to answer (b)(i) number of students in the class, (ii) marbles brought altogether, (iii) marbles most students brought and (c) calculate the mean to the nearest whole number.

This was the most popular question. Candidates were able to answer all the questions except the mode. Most candidates failed to simplify the mean and correct the answer to the nearest whole number.

The solution is as follows:

(a)

Number of marbles (x)	Number of students (f)	fx
1	4	4
2	5	10
3	14	42
4	9	36
5	6	30
6	2	12

(b)

(i) Number of students in class = 4 + 5 + 14 + 9 + 6 + 2
= 40

(ii) Marbles brought to class = 4 + 10 + 42 + 36 + 30 + 12
= 134

(iii) 3

(c) Mean = $\frac{134}{40}$
= 3.35 or 3.4

Mean = 3