

# MATHEMATICS

## 1. GENERAL COMMENTS

The standard of the paper compares favourably with that of previous years. Candidates' performance was generally poor.

## 3. SUMMARY CANDIDATES' STRENGTHS

Candidates' performance was commendable in the following areas:

- (1) Drawing correctly labeled Venn diagram;
- (2) Construction of  $90^\circ$ ,  $45^\circ$  and  $60^\circ$ ;
- (3) Manipulating vectors: scalar multiplication, addition of vectors;
- (4) Good knowledge and understanding of number bases.

## 4. CANDIDATES' WEAKNESSES

Some weaknesses related to:

- (1) Differentiating between cost price and selling price.
- (2) Determining and applying the converting factor when an equivalent pair is given.
- (3) Solution of a triangle; inability to apply relevant rules of geometry.
- (4) Observing the convention of writing currency to two decimal places.
- (5) Arithmetic operations involving signs (+), (-ve) etc. removal of brackets.
- (6) Inability to read and understand mathematical problems.

## 5. RECOMMENDATIONS

- (1) There should be working of enough examples of questions on topics taught in class.
- (2) Close supervision of pupils' attempt at question after section on worked examples, enough homework, quizzes which should be marked promptly and feedback given to pupils for corrections to be made.
- (3) Awareness creation of the importance of Mathematics in educational progression for change in pupils attitude.

## QUESTION 1

(a) In a school of 255 students, 80 of them study Arabic only and 125 study French only. Each student studies at least one of the two subjects.

(i) Draw a Venn diagram to represent the information.

(ii) How many students study

(a) both subjects?

(b) French?

(b) Make  $h$  the subject of  $v = \frac{1\pi r^2 h}{3}$

(c) A bookseller bought 80 copies of books at GH¢3.50 per copy. He sold each of them at GH¢4.20. Find

- (i) the total cost price;
- (ii) his percentage profit.

Q.1 (a) Candidates were required to represent the given information on a Venn diagram, write down relevant expression and use them to find specific membership of given sets. Most candidates presented accurate Venn diagrams which were correctly labelled. A few candidates made the correct entries, wrote the correct equation and expression correctly to answer the questions. A good number of candidates made wrong entries and had wrong equation of the form;  $80 - x + 125 - x = 255$  instead of the correct equation;  $80 + x + 125 = 255$ . Some candidates used 225 instead of 255 given in the question.

(b) Given the relation  $v = \frac{1\pi r^2 h}{3}$ , candidates were required to clear the fraction, divide through by  $r^2$  and thus make  $h$  the subject of the relation.

A good number of them made a good attempt at this question. Some of them, however, left the answer as  $h = \frac{v}{\frac{1\pi r^2}{3}}$  or

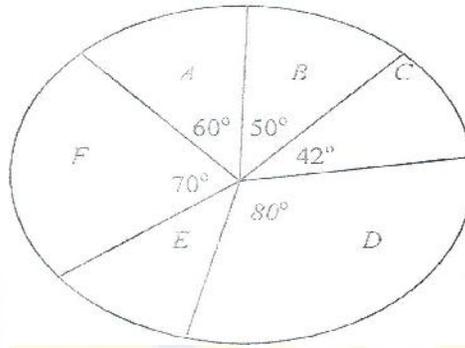
$h = \frac{v3}{\pi r^2}$  instead of  $h = \frac{3v}{\pi r^2}$ . Others had wrong answers of the form  $h = v - \frac{1\pi r^2}{3}$ .

(c) The cost price (GH¢4.20) per copy of 80 books were given for candidates to find total cost price and percentage profit. A few candidates worked through correctly. Some left the profit/cost price ratio as the answer. Others calculated the selling price as the cost price and vice versa.

The two decimal places currency convention was not observed by many candidates.

## QUESTION 2

(a) The pie chart below shows the distribution of exercise books to six schools A, B, C, D, E and F in a town. School D was given 8,000 exercise books.



**NOT DRAWN TO SCALE**

- (i) **How many exercise books were given to each of the rest of the schools?**
- (ii) **What is the average number of exercise books given to the schools?**
- (iii) **How many schools had less than the average number of exercise books?**

**(b) Solve the inequality below and illustrate the answer on the number line.**

$$\frac{1x}{3} + 1 \geq \frac{1x}{2} + \frac{1}{4}(2 - x)$$

- (a) A pie chart with identified sectional angles (except one) and exercise books (8,000) equivalent of one sector angle ( $80^\circ$ ) were given for candidates to find the missing angle i.e. ( $360 - \text{sum of given angle} = 58$ ) The converting factor ( $8,000/80 = 100$ ) should be  $8,000/80$  and multiplied by each angle to obtain the corresponding exercise books for each sector (school). Also, candidates were to find average number of schools that had less than the average number of exercise books.

Very few candidates got the  $58^\circ$  and 100 and worked through the question. Majority made errors which were arithmetic. Most candidates did not show any evidence of finding and working with the converting factor. Candidates, who did not find the  $58^\circ$ , divided the total exercise books by 5 instead of 6 (the correct total number of schools). Most candidates were able to state the number of schools that had less than the average number of exercise books.

- (b) Question requires candidates to multiply through given inequality by the LCM to clear fractions, remove brackets, collect like terms and simplify for an answer and illustrate the answer on a number line.

Most candidates used the correct LCM, and worked through. Any errors committed were arithmetic. Very few candidates made reasonable attempt at the illustration on the number line, which in some cases did not have the reference point, O.

### **QUESTION 3**

**(a) Using a ruler and a pair of compasses only, construct:**

- (i) Triangle  $ABC$  such that  $|AB| = 8$  cm, angle  $CBA = 45^\circ$  and angle  $CAB = 60^\circ$ ,**
- (ii) The bisector of angle  $ACB$  to meet  $|AB|$  at  $T$ .**

**(b) Measure**

- (i)  $|CT|$**
- (ii) angle  $CTB$ .**

**(c) A boy spent  $\frac{3}{8}$  of his money and had GH¢15.00. How much did he have left?**

For parts (a) and (b) candidates were required to draw a line segment  $AB = 8$ cm, construct a  $90^\circ$  angle and bisect it to obtain  $45^\circ$  at B, (or otherwise) construct angle  $60^\circ$  at A, and completing the triangle formed at C, construct the bisector of  $ACB$  to meet  $AB$  at T and measure  $CT$  and  $CTB$ .

Quite a number of candidates showed evidence of good grasp of the geometrical constructions required. In few of such cases, the line segments  $AC$  and  $BA$  did not pass exactly through the points of intersection of the respective constructing arcs. Some candidates drew the perpendicular bisectors of the sides  $AC$  and  $BA$  instead of the bisector of angle  $ACB$  and thus located T incorrectly. Most candidates were able to measure the line segment  $CT$  correctly. Angle  $CTB$  was incorrectly measured.

In part (c), given the fraction  $\frac{3}{8}$ , of the amount spent and the remaining amount as GH¢15.00, candidates were expected to find the fraction,  $\frac{5}{8}$  of the amount, x left, write and solve the relevant equation  $\frac{5x}{8} = 15$ ; or  $x - \frac{3}{8} = 15$ .

Very few candidates made reasonable attempt at this question. Most candidates could not find the remaining fraction  $\frac{5}{8}$ , let alone write and solve any of the relevant equations.

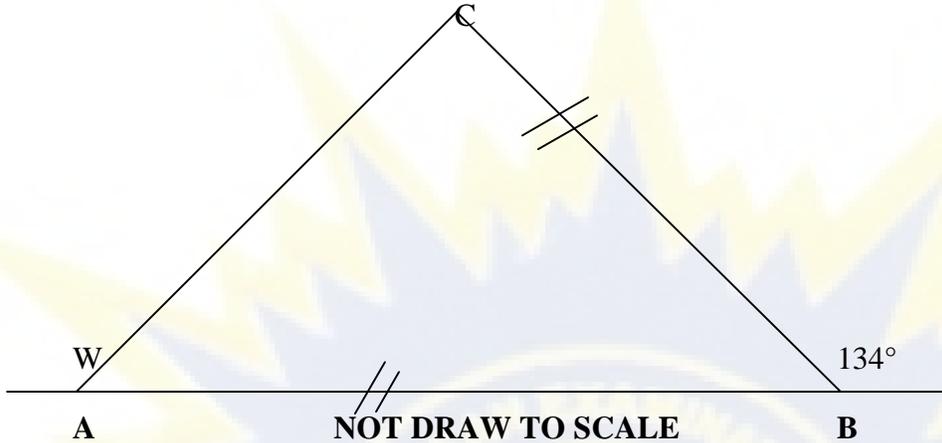
### **QUESTION 4**

**(a) The perimeter of a rectangular plot of land whose length is  $(2x + 5)$ m and width  $(x - 10)$ m is 80 m.**

**Find the**

- (i) value of  $x$ ;
- (ii) area of the plot;
- (iii) cost of weeding the plot at GH¢0.24 per  $m^2$ .

(b) Find the value of  $x$  and  $w$  in the diagram below if  $|AB| = |BC|$ .



Part (a) required the application of the formula for the perimeter of a rectangle  $[2(\text{length} + \text{breadth})]$ , in formulating the relevant equation  $2[(2x + 5) + (x - 10)] - 80$  and solving for  $x$ . Subsequently, substituting  $x$  into the expression for length and breadth and taking their numerical product give the area of the plot. Multiplying the area by the cost per unit area (GH¢0.24 per  $m^2$ ) give the total cost of weeding the plot.

Few candidates applied the formula correctly and worked through. Some of them, however, did not show the expected details of the multiplication of the area by the weeding rate (i.e.  $175 \times 0.24$ ) but only an answer of GH¢2.00.

Most candidates got the formula wrong and had the equation  $(2x + 5) + (x - 10) = 80$ . They therefore had an incorrect value for  $x$ .

(b) Part (b) involved the application of the following rules: equality of base angles of an isosceles triangle;

sum of interior opposite angles equals the external angle; sum of angles with common vertex on a straight line is  $180^\circ$  and sum of angles of a triangle is  $180^\circ$  were required to solve the question.

Very few candidates' solutions showed any knowledge, understanding and correct application of the above rules. This question was unpopular with candidates. In all, question 4 seems to be the least attempted.

**QUESTION 5**

(a) Given that  $a = \begin{pmatrix} -3 \\ 3 \end{pmatrix}$  and  $b = \begin{pmatrix} 4 \\ -6 \end{pmatrix}$ , calculate

- (i)  $a + 2b$ ;
- (ii)  $\frac{1}{2}(2a - b)$ .

(b) The number of pupils in a primary school is given in the table below:

Class	One	Two	Three	Four	Five	Six
Number of Pupils	24	35	35	20	21	45

- (i) Find the number of pupils in the school;
- (ii) What is the mean number of pupils in a class?
- (iii) What percentage of pupils are in class six?

(c) Convert  $312_{\text{five}}$  to a base ten numeral.

Part (a) defined the vectors  $a = \begin{pmatrix} -3 \\ 3 \end{pmatrix}$  and  $b = \begin{pmatrix} 4 \\ -6 \end{pmatrix}$  and require candidates to substitute and evaluate the vectors  $a + 2b$  and  $\frac{1}{2}(2a - b)$ .

Generally candidates carried out the substitutions correctly and continued to obtain the correct answers.

Given the number of pupils per class one, two, ..., six in a table in Part (b), candidates were required to find the number of pupils in the school by adding the number of pupils per class for the six classes (180). The mean number of pupils per class by finding the quotient,

total no. of pupils  $\left(\frac{180}{6}\right)$ . The percentage of pupils in class six = finding the ratio

$$\frac{\text{no. of pupils in class six}}{\text{total no. of pupils}} \times 100 \left(\frac{45}{180} \times 100\right).$$

Very few candidates got the 180, the mean (30) and the percent age (25). Most candidates replaced the classes one ..... six by numbers, 1, ....., 6 and multiplied each by

the corresponding number of pupils and used  $\frac{\sum fx}{\sum f}$ . Some candidates got the percentage of pupils in class six as  $\frac{45}{180}$  and did not multiply by 100.

- (c) In part (c) the question required candidates to convert a number in base five to base ten. There was clear evidence in candidates' working that they have good knowledge, clear understanding and correct application of place (position) value of each of the digits in the base five number vis-à-vis base ten. The question was very popular with the candidates.

### **QUESTION 6**

- (a) **Copy and complete the table for the relation  $y = \frac{x}{20}$  where  $y$  is the cost (in Ghana cedis) and  $x$  is the weight (in grammes) rice sold in a market.**

<b><math>x</math> (weight in grammes)</b>	<b>50</b>	<b>100</b>	<b>150</b>	<b>200</b>	<b>250</b>	<b>300</b>
<b><math>y</math> (cost in GH¢)</b>		<b>5.00</b>			<b>12.50</b>	

- (b) (i) **On a graph sheet, draw two perpendicular axes  $OX$  and  $OY$ .**  
(ii) **Using a scale of 2 cm to 50 grammes on the  $x$  – axis and 2cm to GH¢2.00 on the  $y$ -axis draw the graph of the relation  $y = \frac{x}{20}$ .**
- (c) **Using the graph, find**  
(i) **the cost of 175 grammes of rice;**  
(ii) **the weight of rice that can be bought with GH¢14.00.**
- (d) **Factorize  $3a^2 - 8bc + 2ba$ .**

In part (a) given the relation  $y = \frac{x}{20}$  candidates were expected to substitute given values of  $x$  to complete a table for  $x$  and  $y$  and draw the graph of  $y = \frac{x}{20}$ .

They were to use the graph to find  $y$  when given  $x$  and  $x$  when given  $y$ .  $x$  is weight (in grammes) and  $y$  is the cost (in Ghana cedis) of rice sold in a market.

The question was poorly attempted generally. Few candidates did the substitution correctly but did not observe the two decimal places currency convention.

The graph was virtually not drawn and when efforts were made, only perpendicular axes  $ox$  and  $oy$  were drawn correctly. Further efforts at plotting the graph did not produce the required straight lines required to facilitate the required answers. Few candidates answered this question correctly.

In part (d) the question required candidates to re-arrange the expression into groups (two), factorize each group separately, identify the common factors of the groups and express these factors as products.

Few candidates got the two groups, factorized further and got the correct product. Others could not group the terms correctly and therefore got stuck.

