MATHEMATICS

1. STANDARD OF THE PAPER

The standard of the paper compared favourably with that of the previous years and the performance of candidates was encouraging.

2. SUMMARY OF CANDIDATES' STRENGTHS

Candidates strengths were catalogued in the following areas as ability to:

(i) use Venn diagram to solve two set problem;

(ii) use ruler and a pair of compasses only to construct a given triangle and the perpendicular bisector of a side and an angle of the triangle;

(iii) determine the modal age and mean age of students from a given data;

(iv) plot and indicate the coordinates of a set of given points on the graph as well as drawing a straight line passing through the points;

(v) substitute given values into a relation to find the value of a variable;

(vi) solve inequality expression and illustrating the answer on a number line.

3. SUMMARY OF CANDIDATES' WEAKNESSES

Candidates weaknesses were recorded as difficulty in:

(i) finding the total shaded area of a plane figure;

(ii) writing the equation for finding the two consecutive odd numbers from a story problem;

(iii) finding the rate of production of an item within a given period of time;

(iv) solving problems involving vectors;

(v) finding the quantity and profit of a given item;

(vi) identifying vertically opposite angles and alternate angles from two parallel lines cut by a transversal.

4. **<u>SUGGESTED REMEDIES</u>**

The Chief Examiner suggested that:

(i) teachers should use relevant teaching and learning materials to teach the topics outlined in the syllabus as this will enable candidates to understand the underlying concepts of the topics;

(ii) teachers should encourage candidates to read, understand and analyse questions before solving them;

(iii) teachers should encourage candidates to work more examples of all topics treated.

1. (a) In a class of 30 girls, 17 play football, 12 play hockey and 4 play both games.

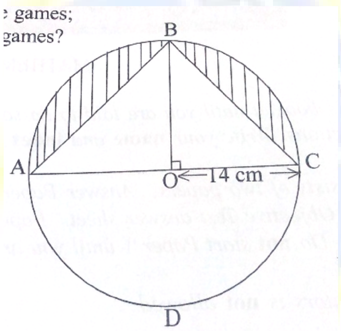
(i) Draw a Venn diagram to illustrate the given information.

(ii) How many girls play:

(α) one or two of the games?

(β) none of the two games?

(b)



In the diagram, ABCD is a circle of radius 14cm and centre O. Line BO is perpendicular to line AC. Calculate, the total area of the shaded portions.

[Take $\pi = \frac{22}{7}$]

In part (a), most candidates were able to draw a well labelled venn diagram showing the two intersecting sets. However, some candidates did not label the venn diagram while others labelled one of the sets and left the other unlabeled.Most candidates showed mastery in finding the number of girls who played one or two of the games, likewise none of the two games. It was observed that some could not find none of the two games.

At part (b), candidates were expected to find the area of the semi-circle and the area of the triangle. Candidate were expected to deduce the area of the semi-circle and the area of the triangle. Most candidates could not visualize that the shaded portion is within the semi-circle. Rather, they considered the entire circle as having the shaded area so they messed up with the concept for finding the shaded portion.

2. (a) **Two consecutive odd numbers are such that seven times the smaller, subtracted from nine times the bigger, gives 144. Find the two numbers.**

(b) **A paint manufacturing company has a machine which fills 24 tin with paint in 5 minutes.**

(i) **How many tins will the machine fill in:**

(α) **1 minute, correct to the nearest whole number?**

(β) **1 hour?**

(ii) **How many hours will it take to fill 1440 tin?**

(c) **Given that s = $\frac{n}{2}$ [2a + (n – 1)d], a = 3, d = 4 and n = 10, find the value of s.**

In part (a) candidates were expected to write the two consecutive odd numbers as x and $x + 2$. Having written the two numbers in algebraic form they were expected to write the required equation as $9(x + 2) - 7(x) = 144$ and then find the value of x.

It was observed that, most candidates were not able to write the required equation as stated above. They resorted to try and error method to solve the problem. However, few candidates showed mastery in solving the problem. They read the question carefully and deduced the facts which enabled them to write the required equation.

Also in part (b), candidates were expected to apply the concept of simple proportion to find the number of tins a machine can fill in a minute. The question was well answered by most of the candidates, but some of them did not correct the final answer to the nearest whole. The other aspect of the question was simple and straight forward, but unfortunately some candidates could not simplify it.

In part (c), all that they were expected to do was to substitute the given values into the relation and evaluate. It was observed that most candidates used the concept of BODMAS to obtain the required answer, while those who have no idea about BOADMAS evaluated it anyhow.

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

   (i) a triangle ABC with $|BC|$ = 9cm, $|AC|$ = 8 cm and $|AB|$ = 6cm;

   (ii) the perpendicular bisector of line BC;

   (iii) the bisector of angle ACB.

   (b) Label the point of intersection of the two bisectors as Y.

   (c) Draw a line to join B and Y.

   (d) Measure:

   (i) $|BY|$;

   (ii) $|YC|$;

   (iii) the base angles of triangle BYC.

   (e) What type of triangle is BYC?

Most candidates attempted this question using a pair of compasses and ruler only to construct the three given sides of the triangle accurately.

They went ahead to construct the perpendicular bisector of line BC as well as the angle bisector of angle ACB. Candidates had no difficulty in locating Y as point of intersection of the two bisectors, as well as drawing a line to join B and Y. They measured the lengths of lines BY and YC and had the same dimensions so they identified triangle BYC as an Isosceles triangle.

Some candidates also did not read the rubrics so they used only ruler to draw the triangle since all the dimensions of its sides were given. This was a total deviation and it affected their performance.

4. **(a) The table below shows the ages of students admitted in a hospital.**

Age (years)	**10**	**11**	**12**	**13**	**14**	**15**
Number of Students	**5**	**1**	**7**	**10**	**3**	**4**

Use the information to answer the following questions:

(i) What is the modal age?

(ii) Calculate, correct to two decimal places, the mean age of the students.

(b) Rice is sold at GH¢56.00 per bag of 50kg. A trader bought some bags of rice and paid GH¢1, 344.00.

(i) How many bags of rice did the trader buy?

(ii) If the trader retailed the bags of rice at GH¢ 1.40 per kg, how much profit was made on 1 kg of rice?

The part (a), was well answered by most candidates. They were able to find the modal age with ease. However, few candidate missed the concept so they stated the highest frequency that is 10 as the modal age instead of 13years being the corresponding age of the highest frequency. Again, they showed mastery in calculating the mean age of the students, as well as leaving the final answer in two decimal places as demanded.

It was also observed that, some candidates could not simplify the mean by using the long division method to obtain the required answer while others also reversed the mean formula. That is **mean** $= \frac{\Sigma f}{\Sigma fx}$ instead of **mean** $= \frac{\Sigma fx}{\Sigma f}$.

In part (b), most candidates were able to solve the (b)(i) so easily by dividing the total cost of the rice by the unit cost per bag of rice. It was realized that they had difficulty in finding the profit made on 1kg of rice. Instead of analyzing the question and applying the concept of finding profit made per 1kg of rice they did not take cognizance of the profit made on 1kg of rice but rather they used the normal concept of finding profit and had it wrong. They were expected to find the profit made on 1kg of rice as:

Cost price = GH¢1344.00

Retailed price = Gh¢1.40 x 1200kg = GH¢1680.00

Profit on each kg = $\frac{1680-1344}{1200} = \frac{336}{1200} = \frac{28}{100}$ = 0.28GP or GH¢0.28

5. (a) Using a scale of 2 cm to 1 unit on both axes, draw on a graph sheet two perpendicular axes 0x and 0y for $-5 \leq x \leq 5$ and $-5 \leq y \leq 5$.

(i) Plot, indicating the coordinates of all points A (2, 3) and B (-3,4). Draw a straight line passing through the points A and B.

(ii) **Plot on the same graph sheet, indicating the coordinates of the points C (4, 2) and D (-2, -3). Draw a straight line passing through the points to meet line AB.**

(b) **Using the graphs in 5 (a):**

(i) **find the values of y when x = -2;**

(ii) **measure the angle between the line AB and CD.**

The part (a) was well answered by most candidate. They were able to draw the two perpendicular axes ox and oy accurately on the graph. They potted and indicated all the coordinates of the given points. Again, they were able to draw the straight lines passing through the points as expected.

However, few candidates committed some errors such as unequal interval, non-labelling and wrong labelling of axes. Other errors were non-labelling of points and their corresponding coordinates. Also it was realized that if they had taken their time to work meticulously all these errors would have been avoided. The other part of the question depended on part (a), so those who could not do the part (a) as expected also couldn't do the part (b). It was also observed that some candidates who had the part (a) well answered could not use protractor to measure the angle between lines AB and CD accurately.

6. **(a)** **If m =** $\begin{pmatrix} 2x+1 \\ 2-3y \end{pmatrix}$**, n =** $\begin{pmatrix} 6 \\ -8 \end{pmatrix}$ **and m + n =** $\begin{pmatrix} 9 \\ -12 \end{pmatrix}$

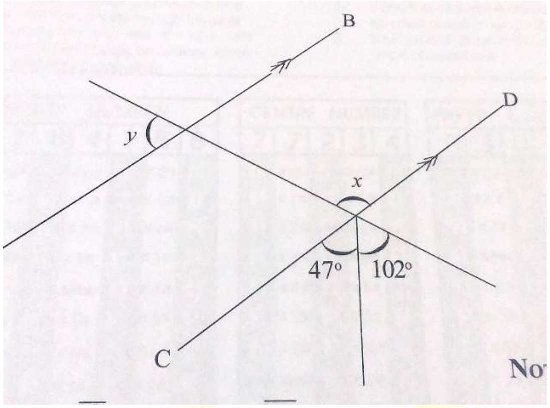
(i) **values of x and y;**

(ii) **components of m.**

(b) **(i)** **Solve the inequality:** $\frac{3}{4}(x+1)+1 \leq \frac{1}{2}(x-2)+5$**.**

(ii) **Illustrate the answer in b (i) on a number line.**

(c)



In the diagram $\overline{AB}$ is parallel to $\overline{CD}$. Find the value of:

(i) x;

(ii) y.

Most candidates attempted this question. In part (a), they substituted the given component vectors into the given equation and applied the concept of equal vectors to solve the linear equations derived to obtain the values of x and y. Those who were familiar with component vector, substituted the values of x and y into vector m and manipulated to obtain the required components, while others did not attempt the question at all.

It was also observed that some candidates wrote the component vectors as fraction which was totally wrong.

The part (b), was also attempted by most candidates. Some were able to clear the fractions, expand the terms and group like terms. They solved for the value of x and illustrated it on a number line. However, few candidates messed up with the grouping of the like terms in order to solve for the value of x. Others also changed the inequality sign to "equal to" sign which was unacceptable. It was also found out that some candidates did not show the inclusiveness of the point on the number line.

In part (c), most candidates did not answer the question. However few candidates who answered it used a wrong concept in finding the values of x and y.

Some candidates could not relate x to 47° and 102°. From the diagram, it could be seen that the sum of the two angles is vertically opposite the angle marked x and therefore they were equal. ie $x = 47° + 102° = 149°$.

The sum of y and the corresponding angle is equal to the straight angle.ie $y + 149° = 180°$
$\Longrightarrow y = 180° - 149° = 31°$

Just few candidates were able to identify the relationship between the angles, and establish the correct facts about the unknown angles.