

MATHEMATICS

Date:20/June/2023

Period: 8:30 am-11:30 am



END OF TERM III EXAMINATIONS

GRADE

SENIOR ONE

OPTION

ORDINARY LEVEL

DURATION:

3 HOURS

MARKS:

100

INSTRUCTIONS

- 1) This paper consists of **two** sections.
Section A: Attempt **all** questions. **(55 marks)**
Section B: Attempt **three** questions only **(45 marks)**
- 2) You may use **mathematical instruments and a calculator** where necessary.
- 3) Use a **blue or black ink pen only** to write your answers and a **pencil** to draw diagrams.
- 4) Show clearly all the working steps. **Marks will not be awarded for the answer without all working steps.**

Section A: Answer all questions (55 marks)

1. Define the term: A transversal line. **(2 marks)**

2. Copy the following and insert the correct symbol (\subset or $\not\subset$). **(3 marks)**
 - (a) $\{4, 1\}$ $\{\text{Prime numbers}\}$
 - (b) $\{5, 6\}$ $\{\text{Even numbers}\}$
 - (c) $\{5, 9\}$ $\{\text{Odd numbers}\}$

3. Given that $A = \{3, 4, 5, 6, 7, 8\}$ and $B = \{2, 4, 8, 12\}$, find:
 - (a) $A - B$ **(1 mark)**
 - (b) $B - A$ **(1 mark)**
 - (c) $A \Delta B$ **(1 mark)**

4. Write the number 3 095 542 120 in words **(3 marks)**

5. With the laws of multiplication complete the following:
 - (a) Negative \times Negative = **(1 mark)**
 - (b) Positive \times Negative = **(1 mark)**
 - (c) Negative \times Positive = **(1 mark)**
 - (d) Positive \times Positive = **(1 mark)**

6. Evaluate $\frac{3}{5} + (2\frac{1}{2} - \frac{2}{3}) \div \frac{5}{6}$ **(4 marks)**

7. Find a number such that when it is divided by 3 and 2 added, then the result is 17. **(4 marks)**

8. Solve the questions $3(2x - 1) - 5(x - 2) = 2(6 - 2x)$ **(5 marks)**
9. Find the Gradient of the straight line that passes through the points (2,3) and (-10,6). **(3 marks)**
10. Define the following terms:
- a) Corresponding angles **(1 mark)**
 - b) Alternate angles **(1 mark)**
 - c) Supplementary angles **(1 mark)**
11. Find the value of x such that the following statement is true :
 $-2x + 5 \leq 0$ **(4 marks)**
12. Find the number of sides of a polygon whose interior angle sum is 360 **(4 marks)**
13. A dealer sold 1 000 bottles of water at 140FRW each, to empty the stock. What profit or loss did she incur if she had bought each bottle at 175 Frw. **(4 marks)**
14. A solid hemisphere has a radius of 5.8 cm. Find its surface area.
Take $\pi = 3.142$ **(3 marks)**
15. The ratio of men, women, children living in a Town is 4:5:3. There are 42000 women.
- (i) How many children live in town? **(3 marks)**
 - (ii) How many Men live in town? **(3 marks)**

Section B: Attempt three questions only (45 marks)

16. A survey involving 120 peoples about their preferred breakfast showed that; 55 drink milk at breakfast, 40drink juice at breakfast and 25 drink both milk and juice at breakfast.

(a) Represent the information on a Venn diagram. **(6 marks)**

(b) Calculate the following:

(i) Number of people who take milk only. **(4 marks)**

(ii) Number of people who take neither milk nor juice. **(5 marks)**

17. a) What is the range of Probabilities of any possible event? **(5 marks)**

b) In an experiment of drawing a card from a deck of 52 cards, what is the probability of drawing an ace? **(10 marks)**

18. A rectangular container has length of 6 m, height of 4 m and surface area of 148 m².

a) Find its width. **(10 marks)**

b) Find its perimeter **(5 marks)**

19.The table below, shows the ages in years of 81 students.

Ages (years)	14	15	16	17	18	19	20
Frequency	12	8	10	21	9	11	10

Find: a) the mode age **(5 marks)**

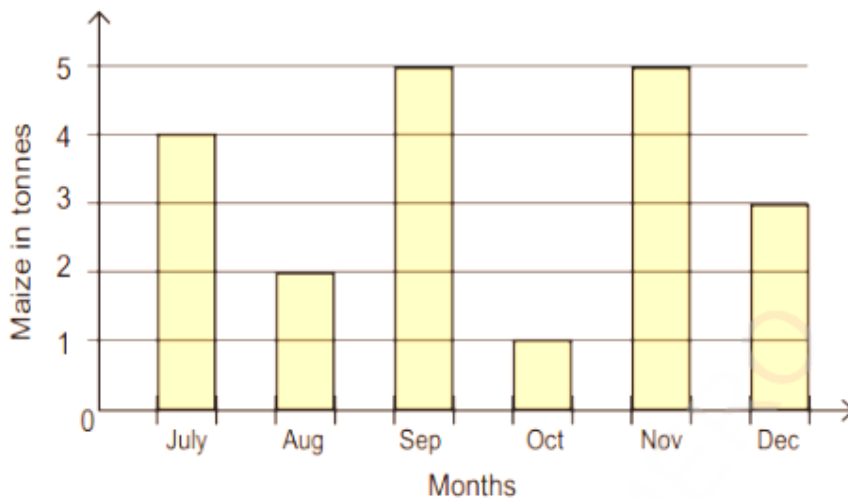
b) the median age

(5 marks)

c) the mean age

(5 marks)

20. The bar graph shows Mr. Muhire's maize exports.



(a) In which months did Mr. Muhire export the same number of tonnes?

(3 marks)

(b) How many more kg of maize were exported in November than in August?

(6 marks)

(c) Find the total tonnes of maize exported in the last half of the year.

(6 marks)

SENIOR ONE CASS MARKING SCHEME , 2023

Answer all questions 100 marks

ANSWER 1 2 marks

A transversal line is a straight line which cuts through two lines in the same plane at two distinct points. **2 marks**

ANSWER 2 (3 marks)

(a) $\{4, 1\} \not\subset \{\text{Prime numbers}\}$

1 mark

(b) $\{5, 6\} \not\subset \{\text{Even numbers}\}$

1 mark

(c) $\{5, 9\} \subset \{\text{Odd numbers}\}$

1 mark

Answer 3.

(a) $A - B = \{3, 5, 6, 7\}$

1 mark

b) $B - A = \{2, 12\}$

1 mark

c) $A \Delta B = (A - B) \cup (B - A) = \{2, 3, 5, 6, 7, 12\}$

1 mark

Answer 4. (3 marks)

Three billion, ninety-five million, five hundred forty-two thousand, one hundred twenty.

(0.5mark for each part)

Answer 5 4 marks

(a) Negative \times Negative = Positive

(b) Positive \times Negative = Negative

(c) Negative \times Positive = Negative

(d) Positive \times Positive = Positive **(1mark for each correct**

Answer 6 4 marks

workout the brackets $(2\frac{1}{2} - \frac{2}{3}) = \frac{5}{2} - \frac{2}{3} = \frac{15-4}{6} = \frac{11}{6}$ 1marks

$\frac{11}{6} \div \frac{5}{6} = \frac{11}{6} \times \frac{6}{5} = \frac{11}{5}$ 1marks

we get, $\frac{3}{5} + \frac{11}{5} = \frac{3+11}{5}$ 1mark

$= \frac{14}{5} = 2\frac{4}{5}$ 1mark

ANSWER 7 (4 MARKS)

Let x be that number

$\frac{x}{3} + 2 = 17$ 1mark

$x + 6 = 51$ 1mark

$x = 51 - 6$ 1mark

$x = 45$ 1mark

The number is 45.

Answer 8 (5 marks)

Remove like terms

$6x - 3 - 5x + 10 = 12 - 4x$

1mark

Collect like terms together

$6x - 5x + 4x = 12 + 3 - 10$ 2marks

$5x = 5$

$x = \frac{5}{5}$

$= 1$ 2 marks

ANSWER 9 3 marks

change in $y = (y_1 - y_2) = (6 - 3) = 3$

1mark

change in $x = (x_1 - x_2) = (-10 - 2) = -12$

1 mark

$$\text{Thus, Gradient} = \frac{\text{Vertical distance}}{\text{Horizontal distance}} = \frac{\text{change in y}}{\text{change in x}} = \frac{3}{-12} = -\frac{1}{4} \quad \text{.....1 mark}$$

ANSWER 10 3 marks

Corresponding angles are angles that occupy the same relative position when a transversal cuts through two straight lines. **1 mark**

Alternate angles are pairs of interior angles on the opposite side of a transversal (one on each intersection point). **1 mark**

Supplementary angles a pair of angles on a straight line **1 mark**

ANSWER 11 (4 marks)

$$-2x + 5 \leq 0$$

$$-2x \leq -5 \quad \text{..... 1 mark}$$

$$2x \geq 5 \quad \text{.....1 mark}$$

$$x \geq \frac{5}{2} \quad \text{.....1 mark}$$

$$x \in \left[\frac{5}{2}, +\infty \right[\quad \text{..... 1 mark}$$

Answer 12

$$\text{Sum of interior angles} = (n - 2) \times 180^\circ$$

$$360^\circ = (n - 2) \times 180^\circ \quad \text{1 mark}$$

$$360^\circ = 180^\circ n - 360^\circ \quad \text{1 mark}$$

$$360^\circ + 360^\circ = 180^\circ n$$

$$720^\circ = 180^\circ n \quad \text{1mark}$$

$$\frac{720^\circ}{180^\circ} = \frac{180^\circ}{180^\circ} n$$

$$n = 4 \quad \text{1 mark}$$

ANSWER 13

$$\text{Buying price} = 175 \text{ FRW}, \quad \text{0.5mark}$$

$$\text{selling price} = 140 \text{ FRW} \quad \text{0.5mark}$$

This means she made a loss

$$\text{Loss} = \text{Buying price} - \text{selling price} \quad \text{1 mark}$$

$$(175 - 140) \text{ FRW} = 35 \text{ FRW per bottle.} \quad \text{0.5mark}$$

$$\text{Total loss} = 35 \text{ FRW} \times 1\,000 \quad \text{0.5mark}$$

$$= 35\,000 \text{ FRW} \quad \text{1mark}$$

Answer 14 3 marks

Surface area of hemisphere = $3 \pi r^2$ **1 mark**
= $(3 \times 3.142 \times 5.8 \times 5.8) \text{ cm}^2$ **1 mark**
= 317.1 cm^2 (4 s.f.) **1 mark**

Answer 15

Let x be The population of the city **0.5mark**

Total ration: $4+5+3= 12$ **0.5mark**

$\frac{x+5}{12} = 42000$ **0.5mark**

$5x = 12 \times 42000$ **0.5mark**

$X = \frac{12 \times 42000}{5} = \frac{504000}{5} = 100800$ **1 mark**

The population of the city is 100800.

The children living in the Town is $\frac{3 \times 100800}{12} = \frac{302400}{12} = 25200$ **1 mark**

The Men living in the Town is $\frac{4 \times 100800}{12} = \frac{403200}{12}$ **1 mark**

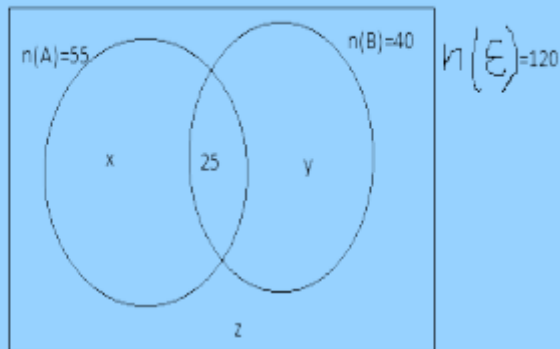
= 33600 **1 mark**

ANSWER 16

(a) Let A be the set of those who drink milk and B be the set of those who drink juice, x be the number of those who drink milk only, y be the number of those who drink juice only and z represents number of those who did not take any. By expressing data in set notation;

$n(A) = 55, n(B) = 40, n(A \cap B) = x,$ **(6 marks)**

$n(A \cap B) = 25, n(A' \cap B) = y. n(\epsilon) = 120$



(i) We are required to find the number of those who take milk only. $x = 55 - 25 = 30$ So, 30 people take milk only

1Mark

(ii) To find the value of z; $30 + 25 + 15 + z = 120$. z **1Mark**

$$= 120 - (30 + 15 + 25). Z$$

$$= 120 - 70 \Rightarrow z = 50. \text{ So, 50 people take neither eggs nor juice for breakfast.}$$

1Mark

.17 a) Probabilities of any possible events is in the range of 0 to 1.

2marks

In general, for any event A, $0 \leq P(A) \leq 1$ **3marks**

b) There are 4 aces expected (**2 marks**). So the probability of getting an ace is $P(A)$. (**2 marks**)

$$\text{This can be obtained as } P(A) = \frac{4}{52} \quad \mathbf{3 \text{ marks}}$$

$$= \frac{1}{13} \quad \mathbf{3 \text{ marks}}$$

Answer 18.

Width (w) = ?, height (h) = 4 m, length (l) = 6 m

Surface area = $2(l \times w) + 2(l \times h) + 2(w \times h)$ **1 marks**

$$148 = 2(6 \times w) + 2(6 \times 4) + 2(w \times 4)$$

$$148 = 12w + 48 + 8w$$
 2 marks

$$148 = 20w + 48$$

$$148 - 48 = 20w + 48 - 48$$
 (subtract 48 both sides) **2 marks**

$$100 = 20w$$
 (Divide by 20 both sides)

$$W=20$$
 2 marks

Therefore, the width is 5 cm. **2 marks**

Perimeter= (L+W)X2 **2marks**

$$(6+5) \times 2 = 11 \times 2 = 22 \text{ cm}$$
 3 marks

answer 19

Age(x)	Frequency(f)	fx
14	12	168
15	8	120
16	10	160
17	21	357
18	9	162
19	11	209
20	10	200
	$\Sigma f = 81$	$\Sigma fx = 1376$

(1 mark for each row except one of summation)

a) mode= 17 years **3marks**

b) median = $(\frac{n+1}{2})^{\text{th}} = \frac{1}{2}(81+1)^{\text{th}}$
 $= 41^{\text{th}} = 17$ years **6marks**

c) mean age = $\frac{\Sigma fx}{\Sigma f} = \frac{1376}{81} = 16.9 \approx 17$ years **6marks**

answer 20.

a) In the months of September and November **3marks**

(b) November = 5 tonnes and August = 2 tonnes

$(5 - 2)$ tonnes = 3 tonnes. **2marks**

but 1 tonne = 1,000 kg

3 tonnes = $3 \times 1,000$ kg = 3,000 kg **1mark**

Therefore 3,000 kg more were exported in the month of November than in August. **1mark**

(c) Total tonnes exported = $(4 + 2 + 5 + 1 + 5 + 3)$ tonnes = **4 marks**

20 tonnes.

2marks