# MINISTRY OF EDUCATION AND VOCATIONAL TRAINING

## CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

## URBAN WEST REGION – ZANZIBAR

## FORM FOUR (IV) MOCK EXAMINATION – 2025

# BASIC MATHEMATICS

**(For Both School and Private Candidates)**

**041**

**TIME: 3: 00 HOURS** **MONDAY 16TH JUNE 2025**

## INSTRUCTIONS:

1. This paper consists of sections **A** and **B** with a total of **fourteen (14)** questions.
2. Answer **all questions** in section **A** and **B.** Each question in section **A** carries **six (6) marks** while each question in section **B** carries **ten (10) marks.**
3. **All** necessary working and answers for each question must be shown clearly.
4. **NECTA** mathematical tables and non-programmable Calculator **may be used.**
5. Write your **Examination Number** on every page of your answer booklet(s)
6. Cellular phone and unauthorized materials are **not allowed** in the examination room.

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## SECTION A:

**Answer all questions in this section**

1. (a) A wall is 120 cm by 270 cm. I want to cover it with square tiles. What is the largest tile I can use so that I don't have to cut any?

   (b) (i) In a mixed school of 880 pupils, $^3/_5$ are girls. Of the boys, $^4/_{11}$ study biology. How many boys do not study biology?

   (ii) A farmer has 140 hectares on his farm. He uses 35 hectares to grow crops. What percentage of the farm is not used to grow crops?

2. (a) Solve these equations:

   (i) $4^{8x-3} = 8^{5x+1}$

   (ii) $\log_2(x+5) = \log_2 x + 2$

   (b) Rationalize the denominator and simplify $\frac{\sqrt{2}}{\sqrt{3} - \sqrt{2}}$

3. (a) Out of 20 farmers, 15 had sheep and 12 had goats. 10 had both. How many:
   (i) Had neither animal?
   (ii) Had goat only?
   (iii) Either animal?

   (b) A jar contains 2 black marbles, 3 blue marbles and 1 white marble. If one marble is drawn and put aside and then another drawn and put aside, determine:

   (i) The probability that both marbles drawn are black.
   (ii) The number of black marbles to be added to the jar to make the probability of drawing 2 black marbles equal to $^1/_7$

4. (a) Given vectors $\underline{a} = 2i + 3j$, $\underline{b} = 3i + 7j$, and $\underline{c} = 11j$. Find scalars p and q such that $\underline{c} = p\underline{a} + q\underline{b}$.

   (b) $\Delta ABC$ has vertices A(1, 5), B(4, -1), and C(-2, -4). Show that it's a right-angled triangle and find its area.

5. (a) The areas of two similar triangles are in the ratio 2:3. If the altitude of the smaller triangle is 15cm, find the altitude of the larger triangle.

   (b) (i) Find the circumference of a circle that inscribes a regular pentagon of perimeter 72cm.
   (ii) A kite has an area of 12cm². If it's longer diagonal is 5cm more than the shorter diagonal. Find the length of the shorter diagonal.

6. (a) A man is paid 10,000 to build 5 animal huts at the same rate. How much will he be paid to build 16 huts?

   (b) The resistance R ohm's of an electrical wire varies with the length $L$ cm and inversely with the square of the radius $r$ cm. If the radius is 0.1cm and the length is 20cm, the resistance is 0.4 ohms. Find R in terms of $r$ and $L$.

7. Given:
Opening Stock 1.1.2023 is 34,430/=
Closing Stock 31.12.2023 is 26,720/=
Net purchases during 2023 is 219,290
Gross profit mark up 50%
Expenses for year is 45,880/=
Using the above transactions, find the following:

(i) Cost of goods sold

(ii) Sales

(iii) Net profit

(iv) Gross profit

8. (a) Write down the first 5 terms of the following sequence governed by the following rules:

(i) $An = 3^n + n$

(ii) $An = n(n+1)(n+2)$

(b) (i) If $n, n+1, n-1$ are in G.P, find the value of n. Hence, find the $4^{th}$ term.

(ii) The fourth term of an A.P is twice as great as the 3rd term and the $12^{th}$ term is 30. Find the first term and common difference.

9. (a) A rope of length 18cm is tied to the top of a flagpole. The other end of the rope is fixed to a point 13cm from the base of the flagpole. How high is the flagpole?

(b) In triangle ABC, if $\angle C = 90°$, AB = 5cm, BC = 4cm, and AC = 3cm. Find sin B and cos A, as well as angle A and angle B.

10. (a) (i) Solve for from $x$ from $(3+x)(14-3x) = 30$.

(ii) Solve for x by using completing the square $3x^2 - 2x - 1 = 0$.

(b) A father is 28 years old than his son. If the sum of their ages is 54, find the son's age.

## SECTION B:
**Answer all questions in this section**

11. (a) In the Final Examination of a Certain School, the Scores of Students in Commerce Subject were grouped as shown in the table:

| Scores | 65 - 69 | 70 - 74 | 75 - 79 | 80 - 84 | 85 - 89 | 90 - 94 | 95 - 99 |
|---|---|---|---|---|---|---|---|
| Cumulative Frequency | 10 | 22 | 43 | 49 | 58 | 62 | 66 |

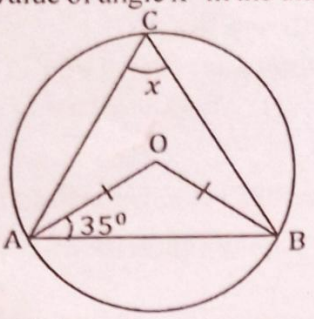
Using the information given in the table:

(i) Find the mean score correct to 2 decimal places, given an assumed mean of 82.

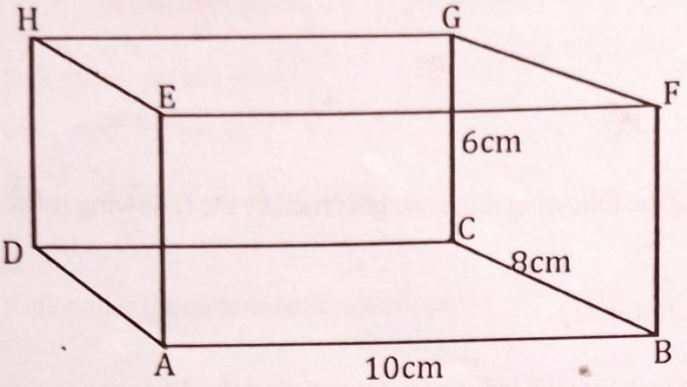
(ii) Calculate the median score.

(iii) Calculate the mode of the scores correct to 3 decimal places.

(b) Find the value of angle x° in the diagram given below that $\angle O\hat{A}B = 35°$.




12. (a) In the figure below shows a rectangular prism in which AB = 10cm, BC = 8cm and CG = 6cm.




(i) Calculate the length $\overline{BH}$ or $\overline{AG}$. Correct in 2 decimal places.

(ii) Calculate the angle that $\overline{AG}$ makes with the plane ABCD.

(b) (i) Find the shortest distance (in kilometers) between two points along a parallel of latitude 60°N, one is on longitude 30°E and other is 15°W. (Radius of the Earth is 6400km, Use $\pi = 3.14$)

(ii) A and B are any two points on the equator with longitude 40°W and 25°E respectively. Calculate the shortest distance of the two points in kilometers along the equator between A and B. (Use $R_E = 637\text{km}, \pi = 3.14$ )

13. (a) (i) Find the value of $x$ and $y$ given that:

$$\begin{bmatrix} x & 4 \\ 3 & y \end{bmatrix} + \begin{bmatrix} 3x & 5 \\ -3 & 7 \end{bmatrix} = \begin{bmatrix} 8 & 9 \\ 0 & 9 \end{bmatrix}$$

(ii) The sum of two numbers $x$ and is 140. If $x$ is 34 greater than $y$. Write down two equations in $x$ and $y$ then solve them to find the two numbers by using the inverse matrix method.

(b) By using the matrix method find the image of the point (3,-2) after a reflection in the line $y = -x$ followed by another reflection in the line $x = 0$

(c) A translation takes point (5, 5) to the point (-7, -7) If it takes point $(x,y)$ to (-4, -4) find the values of $x$ and $y$.

14. (a) Show that the functions f and g are inverse of each other:

(i) $f(x) = 2 - 3x$ and $g(x) = \frac{2}{3} - \frac{x}{3}$

(ii) $f(x) = 4x - 5$ and $g(x) = \frac{1}{4}(x + 5)$

(b) A person requires 10, 12 and 12 units of chemical A, B and C respectively for his garden. A liquid product contains 5, 2 and 1 units of A, B and C respectively per jar and each jar is sold at Tsh 3000/ = A dry product contains 1, 2 and 4 units of A, B and C. respectively per carton and each carton is sold at the Tsh 2000/=. How many of each should he purchase to minimize the cost and still meet the requirement?