

**THE UNITED REPUBLIC OF TANZANIA
PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT**



**KIGOMA REGION
FORM FOUR MOCK EXAMINATION
BASIC MATHEMATICS**

041

TIME: 03:00 HOURS

15TH JULY, 2025 a.m

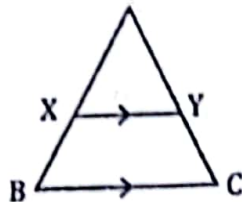
INSTRUCTIONS

1. This paper consists of sections A and section B with a total of 14 questions.
2. Attempt **ALL** questions in both sections.
3. Each question in section A carries 6 marks while each question in section B carries 10 marks.
4. Write your examination number on every page of your answer sheet(s) provided.
5. Mathematical tables and non-programmable calculator may be used.

SECTION A (60 MARKS)

1. (a) Use factors concept to identify a number that is not belonging to the given set of numbers and give mathematical reason for your choice: {2, 17, 37, 47, 87, 97}
(b) Three bells ring together at a certain starting point of time. Then, they ring at the intervals of 20, 25, and 50 minutes, respectively. After what interval of time will they ring together again?
2. (a) (i) Find the smaller of 2^{60} and 7^{20} without using a calculator or mathematical tables
(ii) Solve for x if $9^x - 4(9^{-x}) = -3$
(b) Solve $\log_5 x + \log_5(x - 3) = \log_5 10$

3. (a) A city has two daily newspapers, Seypalm and Palm journal. The following information was obtained from a survey of 100 residents of the city. 35 people subscribe to the Seypalm, 60 subscribe to the Palm journal, and 20 subscribe to both newspapers.
- Represent this information on the Venn Diagram
 - How many in the survey subscribe to the Seypalm but not to the Palm journal? people
 - How many do not subscribe to either paper?
- (b) A red and white die are rolled. What is the probability of the number on red die being less than 4 and the number on the white die being greater than 4?
4. (a) (i) Find the value of x and the equation of the later line so that the line containing $(4, 8)$ and $(2, -1)$ is perpendicular to the line containing $(x, 2)$ and $(-4, 4)$
- (b) If $\underline{u} = 3\underline{i} - \underline{j}$, $\underline{v} = -2\underline{i} + 3\underline{j}$, and $\underline{w} = -2\underline{i}$, find the value of $|\underline{u} + \underline{v} - \underline{w}|$
5. (a) The ratio of the sides of similar triangles is 1: 3. The area of the larger triangle is 351 cm^2 , find the area of the smaller triangle.
- (b) Given the following figure whereby $AX : BX = 3: 5$



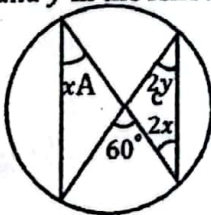
- Prove that $\Delta AXY \sim \Delta ABC$.
 - Calculate segment BC if segment XY is 18 cm.
6. (a) Mr Ogango from Kenya visited Tanzania. He had 5000 Kshs and wanted to change the money into USA Dollar. If 1 USA Dollar was equivalent to 2500 Tshs and 1 Kshs was equivalent to 20 Tshs. How much USA Dollar did he get?
- (b) (i) A gardener has found that the time (T) to cut grass on square field varies directly as the square of its length (L) and inversely as the number of men (M) doing that job. If 5 men cut grass on the field of side 50m in 3 hours. How many more men are required to cut a grass on field of side 100m in 5 hours? Assume that the men are working on the same place.
7. (a) The following transactions belong to ABC traders. Prepare cash account for ABC Traders and balance it.
- | | | |
|---------|-------------------------------------|-----------|
| October | 1: Started business worth | 500 000/= |
| | 2: Bought furniture for cash | 100 000/= |
| | 4: Purchased goods for cash | 20 000/= |
| | 5: Bought goods on credit from Juma | 40 000/= |
| | 6: paid rent | 5 000/= |
| | 7: Sold goods to Amina on credit | 60 000/= |
| | 8: Bought goods on credit from John | 56 000/= |

9: Paid electricity bill in cash	10 000/=
10: Sold goods to Frank on credit worth	80 000/=
11: Received cash from Amina	20 000/=
12: Withdraw cash for office use	70 000/=
15: Paid cash to Frank	30 000/=

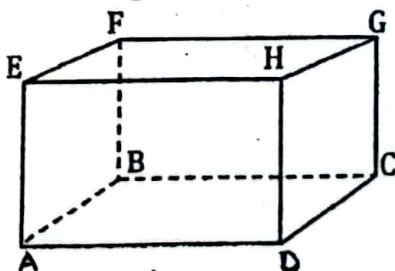
- (b) A suit is tagged 258 000 shillings. How much cash does one pay if given a discount of 7%?
8. (a) A business man invested 800 000 shillings in a bank account paying 6% interest compounded semi-annually. How long will it take for the sum of money to be 1 075 133 shillings?
- (b) A car whose original value was \$ 25600 decreases in value by \$ 90 per month. How long will it take before the car's value falls below \$ 15 000?
9. (a) If $\tan \theta = \frac{-3}{4}$ and θ is a reflex angle, find the value of (i) $\cos \theta$ (ii) $\sin 2\theta$
- (b) The angles of elevation from the top of the building of two points which are 210 m apart are 46° and 63° accordingly. Find the height of the building
10. (a) Factorize the following
- (i) $x^3y - 9xy^3$
- (ii) If $a * b = 3a^2 + 2b$, find the value of n if $(2 * 3) * n = 984$
- (b) Solve: $2 + \frac{5}{u} = \frac{3}{u^2}$

SECTION A (60 MARKS)

11. (a) A group 28 students did a biology test. The marks obtained out of 50 marks were Recorded as follows:
- 34 40 30 43 33 41 25 32 30 33 15 34 23 28
47 20 33 23 39 24 36 21 23 43 42 33 16 23
- (i) Prepare a frequency distribution table by using class marks: 17, 22, 27,...
- (ii) Calculate the mode score.
- (iii) Calculate the mean score.
- (b) Calculate x and y in the following mathematical challenge:



12. (a) A and B are two towns on latitude $40^\circ N$. If town A is on longitude $25^\circ E$ and town B is on Longitude $55^\circ E$, find the arc length AB. (Use $\pi \approx 3.142$ and Radius of the Earth is about 6370 km) (leave the answer to 2 decimal places)
- (b) The following diagram shows a cuboid with sides $AB = 5 \text{ cm}$, $AD = 6 \text{ cm}$, and $AE = 7 \text{ cm}$. Find the following:



- (i) The diagonal AG (leave the answer to 2 decimal places)
- (ii) The angle diagonal AG makes with the base ABCD

13. (a) (i) Evaluate the following matrices operation with mathematical reason(s)

$$\begin{pmatrix} 5 & 0 & -2 \\ 1 & -3 & 8 \end{pmatrix} + \begin{pmatrix} -1 & 7 \\ 0 & 6 \\ -2 & 8 \end{pmatrix}$$

(ii) Calculate x, y, w and z so that

$$\begin{pmatrix} 4 & x \\ y & 0 \end{pmatrix} + \begin{pmatrix} w & -2 \\ -3 & z \end{pmatrix} = \begin{pmatrix} 2 & -3 \\ 0 & 5 \end{pmatrix}$$

(iii) Solve the following simultaneous equations by inverse matrix method

$$\begin{cases} 6x + 5y = 3 \\ 7x + 8y = 10 \end{cases}$$

(b) Find the image of point $Q(5, 2)$ when reflected on the line $y = -x$

14. (a) Given the function $f(x) = \frac{(x^2+2x)}{x^2-x-6}$, find the values of x for which function $f(x)$ is undefined.

(b) A mining company operates two mines, each of which produces three grades of ore. The west summit mine can produce 2 tons of low-grade ore, 3 tons of medium-grade ore, and 1 ton of high-grade ore per hour of operation. The North Ridge mine can produce 2 tons of low-grade ore, 1 ton of medium-grade ore, and 2 tons of high-grade ore per hour of operation. To satisfy existing order, the company needs at least 100 tons of low-grade ore, 60 tons of medium-grade ore and 80 tons high-grade ore. The cost of operating each mine varies, depending on the conditions encountered while extracting the ore. If it costs 600 000 shillings per hour to operate the West Summit mine and 900 000 shillings per hour to operate the North Ridge mine:

- (i) How many hours should each mine be operated to supply the required amount of ore and minimize the cost of production?
- (ii) What is the minimum production cost?