

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



WEEK 2
FORM FOUR MOCK EXAMINATION
BASIC MATHEMATICS

CODE: 041

TIME: 3HRS

Saturday 18th February 2023

INSTRUCTIONS:

1. This paper consists of sections **A** and **B**
2. Answer **ALL** questions in **BOTH** sections, **A** and **B**.
3. **ALL** working for each question must be shown clearly.
4. **Mathematical tables** and non-programmable calculators may be used
where necessary
5. Write your **Index number** on every page of your answer sheet(s).
6. Whenever necessary use $\pi = 3.14$ and radius of the earth $R = 6400\text{km}$.

SECTION A (60 MARKS)

Answer all questions from this section

1. a) A village received **40,376** bags of fertilizers to be distributed to **392** farmers.
Estimate
how many bags each farmer got.
b) Given $A = 6.4 \times 10^2$ and $B = 3.2 \times 10^{-2}$, find $A+B$ by expressing answer in standard form.
2. a) Without using tables, evaluate $3\log 5 + 5\log 2 - \frac{1}{2}\log 16$.
b) Solve for x if $\left(\frac{1}{3}\right)^{x+1} \times 9\left(\frac{1}{9}\right)^{2-x} = \frac{1}{81}$
3. a) If $A = \{X: 9 < x < 18\}$ and $B = \{X: 10 < x < 21\}$, given that x is an integer, find $A \cup B$ and $A \cap B$.
b) A pair of dice is thrown. What is the probability of getting;
i. At least one six
ii. At total score of seven
4. a) Given that $\underline{u} = 7\hat{i} + 3\hat{j}$, $\underline{v} = 2\hat{i} + 5\hat{j}$, $\underline{w} = \hat{i} + 2\hat{j}$, find $\underline{d} = |\underline{u} + \underline{v} + \underline{w}|$,
direction cosines and hence show that the sum of their squares of direction cosines is 1.
b) A line L_1 has the equation $x+2y=4$. The line L_2 is perpendicular to L_1 and passed through the origin. Determine the equation of L_2 .
5. a) If $\overline{AB}$ is parallel to $\overline{CD}$ and $\overline{PQ}$ is a transversal, sketch the line segments and label on the same diagram the following pairs of angles.
i) Corresponding angles a and g .
ii) Alternate interior angles f and g .
iii) Vertically opposite angles c and d .
b) Find the area and perimeter of a six-sided regular polygon inscribed in a circle having a radius of **10** cm.
6. a) A full water tank serves 50 students for 10 days. For how long will the same tank serve 125 students?
b) How many seconds are there in a week?
7. a) A car is bought for Tsh 10,000,000/- and sold at a profit of 5%. Find the selling price of a car.

- b) Mr. Mwinyi started a business on 1st January 2010 with a capital in cash of 2,000,000/=
- January 2 Bought shelves for cash 1,400,000/=
- 3 Sold goods for cash 1,000,000/=
- 6 Purchased goods for cash 600,000/=
- 15 Paid rent for cash 220,000/=
- 26 Paid wages for cash 220,000/=
- 15 Sold goods for cash 600,000/=
- Prepare cash account and trial balance.

8. a) Mary invests Tshs. **600,000** into a Bank account for **3** years at a rate of **3.4%** per year compound interest. Calculate how much money will be in the account at the end of **3** years period.

- b) How many terms are there in the sequence : 2187, 729, 243, _ _ _ _ $-\frac{1}{9}$

9. a) A ladder **17m** long is placed on a ground in such a way that it touches the top of a vertical wall **15m** up . Find the distance between the foot of the ladder and the wall.
- b) In $\triangle ABC$, $AB=5\text{cm}$, $BC=4\text{cm}$ and $CA=6\text{cm}$, find $\angle ABC$.

10. a) Use elimination method to solve a pair of simultaneous equations.

$$\begin{cases} \frac{x}{6} + \frac{y}{3} = 2 \\ \frac{2y}{3} + \frac{x}{2} - 5 = 0 \end{cases}$$

- b) Twice of certain whole number subtracted from 3 times the square of the number gives 133. Find the number.

SECTION B (40 MARKS)
Answer all questions in this section

11. (a) Given the marks obtained by 20 students in a mathematics test done by St. Gasper Sec. School:

85, 87, 90, 87, 89, 90, 88, 89, 90, 87, 90, 87, 87, 85, 86, 86, 86, 87, 89, 90.

Find

- (i) Mean mark.
- (ii) Mode
- (iii) Median

- (b) AB is a diameter of a circle having a centre O and C is a point on the circumference. AB = 29m and BC = 21m. Find;

- i. AC
- ii. $\angle ABC$.

12. a) Sketch a square pyramid whose base is ABCD, vertex is at V and center is at O, then answer the questions that follow:

- i) State the projection of $\overline{VD}$ on ABCD.
- ii) Name the angle between VB and the plane ABCD.

- b) Given two points: N (25°N, 40°E) and M(70°N, 40°E).

- i) Find the angle subtended by the arc NM and hence find its distance
- ii) If 750km/hr is used in order to pass from point N to M, what time will be taken?

13. a) By using inverse matrix method find the solution of the equation: $\begin{cases} 2x-2y=7 \\ -3x+4y=9 \end{cases}$.

- b) The equation $4x - 3y = 8$ and $kx + 6y = 14$ do not have a solution, find the value of k.
- c) If T maps (3, 0) to (-3, 3) and (1, -3) to (-7, -11), and T is a matrix of transformation, find the matrix T.

14. a) A cinema room has a maximum number of 400 seats. Each cheap seat uses 1m^2 of space, and each expensive seat occupies 2m^2 . There is 600m^2 of space available. Suppose X cheap and Y expensive seats are allocated.

- i) Write down all inequalities in X and Y and illustrate them on a graph.
- ii) If a cheap seat costs 600/= and an expensive seat costs 1,000/=, what allocation of seats will bring in most money?

- b) If $f(x) = \frac{x^3 - 2x^2 + 5}{x^2 + 4x - 5}$, find the possible values of x when the function f(x) is defined