

**THE UNITED REPUBLIC OF TANZANIA
PRESIDENT’S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT
SUMBAWANGA MUNICIPAL COUNCIL**



FORM THREE TERMINAL EXAMINATION

041

BASIC MATHEMATICS

TIME: 3 Hours

Wednesday 17th May, 2023 a.m

Instructions

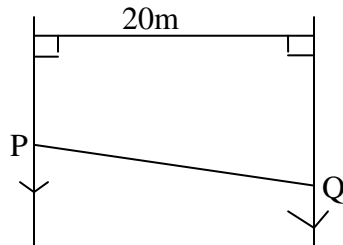
1. This paper consists of sections A and B with a total of **fourteen (14)** questions.
2. Answer all questions.
3. Each question in section A carries **six (6)** marks while each question in section B carries **ten (10)** marks.
4. ALL necessary working and answers for each question must be shown CLEARLY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

SECTION A (60 MARKS)

Answer **all** questions in this section

1. (a) Find the percentage of numbers which are multiples of 5 from the set $\{1,2,3,4,\dots\text{up to } 52\}$.
Write the answer correct to one decimal place.
(b) Arrange the following fractions in ascending order: $\frac{1}{2}, \frac{2}{9}, \frac{3}{8}, \frac{1}{12}$ and $\frac{2}{5}$
2. (a) Find the value of x if $8^{x-1} = 16$.
(b) (i) Simplify the expression $\log_a \sqrt{a} + \log_a (a^2)$.
(ii) Rationalize the denominator of the expression $\frac{-5+\sqrt{2}}{\sqrt{6}-\sqrt{2}}$.
3. (a) If $P = \{\text{all multiples of 5 less than 35}\}$ and $Q = \{\text{all odd numbers between 14 and 30}\}$.
Find $P \cap Q$.
(b) In a village of 50 farmers, 25 grow cashew nut, and 16 grow both cashew nut and maize. If 10 farmers grow neither cashew nut nor maize, find the number of farmers who grow maize only. (Do not use Venn diagram).
4. (a) A line whose equation is $y = mx + c$, passes through $(-1, 4)$. If x -intercept for this line is 3. Determine the value of m and c .
(b) A line whose gradient is $\frac{3}{2}$ has x -intercept of -3 . Find the equation of the line in the form of $y = mx + c$, where m and c are constants.
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 of a and g .
(ii) alternate interior angles of f and g .
(iii) vertically opposite angles c and d .
(b) The lengths of two similar rectangles are 6cm and 8cm. If the area of the small rectangle is 73.8cm^2 , find the area of the large rectangle.
6. (a) A piece of length 7.42m is cut off from a string that is 13.5m long. If the remaining part of the string is divided into equal pieces of length 32cm, how many pieces are there?
(b) (i) A dealer sells mattresses whose cost price (c) is directly proportional to the selling price (s). If the selling price and the cost price of one mattress are Tsh 20,000 and Tsh 18,000 respectively, find the constant of proportionality.
(ii) By using the answer obtained in part (b)(i), determine the equation that relates the cost price and the selling price.

7. (a) A damaged table that costs Tshs 20,000 was sold at a loss of 15% . find the loss made and the selling price.
- (b) Mariam, Selina and Moses contributed 800,000, 1,200,000 and 850,000 shillings respectively while starting their business
- (i) Find the ratio of their contributions in simplest form.
- (ii) If the business made a profit of 1,900,000 shillings; find how much each got if the profit was shared in the same ratio as their contributions.
8. (a) List down the terms of the sequences obtained from the following descriptions:
- (i) Counting numbers less than 50 but divisible by 9.
- (ii) Squares of the counting numbers from 1 to 10.
- (iii) Multiples of 3 between 0 and 20.
- (b) The value of a machine depreciated by 25% every year. If its value is 75000000 Tanzanian shillings when it is new, what is its value after 21 years?
9. (a) A river with parallel banks is 20m wide. If P and Q are two points on either side of the river, as shown in the figure below, find distance PQ.



- (b) From the top of a building 75m high, John sees a lorry and a minibus along the road, both being on one side of the building at the angles of depression of 30° and 60° respectively.
- (i) Sketch a diagram representing this information.
- (ii) Determine the distance between the cars, leaving the answer in surd form.
10. (a) Rachel is three years older than her brother John. Three years to come, the product of their ages will be 130 years. Formulate an equation representing this information. Hence by using the quadratic formula, find their present ages.
- (b) Express the equation $2t^{-10} - 3t^{-5} + 1 = 0$ in terms of x where $x = \frac{1}{t^5}$.

SECTION B (40 MARKS)

Answer **all** questions in this section

11. The following are the marks obtained by 40 students in one of the Basic Mathematics examinations;

48,47,57,56,71,62,46,45,50,76,58,66,48,32,89,60,42,47,54,67,64,49,37,64,67,44,45,45,42,34,47,44,73,44,58,43,54,35,54,52.

- (a) Prepare a frequency distribution using the information: number of classes = 8; size of each class = 8 and the lower limit of the first class interval = 32.
- (b) Use the frequency distribution obtained in part (a) to find the actual mean when the assumed mean is 83.5.
- (c) Calculate the difference between the actual mean and the median of this distribution. Hence, comment on the difference obtained.

12. (a) A function f is defined as follows:

$$f(x) = \begin{cases} 1 & \text{if } x \leq 0 \\ x^2 + 1 & \text{if } 0 < x < 2 \\ 5 & \text{if } x \geq 2 \end{cases}$$

- (i) Sketch the graph of $f(x)$.
 - (ii) Use the graph to determine the domain and range of $f(x)$.
 - (iii) Is $f(x)$ a one-to-one function? Give reasons.
- (b) Given the function $f(x) = \frac{1}{x-2}$, find;
- (i) the domain and range.
 - (ii) $f^{-1}\left(\frac{1}{3}\right)$.

13. (a) A translation takes the origin to $(-2, -5)$. Find where it takes $(2, -3)$.

- (b) What will be the image of $B(3, 4)$ after a reflection in the line $y = -x$ followed by another reflection in the line $y = 0$. Sketch the point B and the images formed.

14. Given that the relation $R = \left\{ (x, y) : y = \frac{1}{x-3} \right\}$, find

- (a) the domain of R .
- (b) the range of R .
- (c) Inverse of R .
- (d) the domain of R^{-1} .
- (e) the range of R^{-1} .