

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



**LAKE ZONE FORM FOUR MOCK EXAMINATION
(GEITA, KAGERA, MARA, SIMIYU, SHINYANGA AND MWANZA)**

031/2A

**PHYSICS 2A
(ACTUAL PRACTICAL, A)
(For Both School and Private Candidates)**

Time: 2:30 Hours

Year: 2025

INSTRUCTIONS

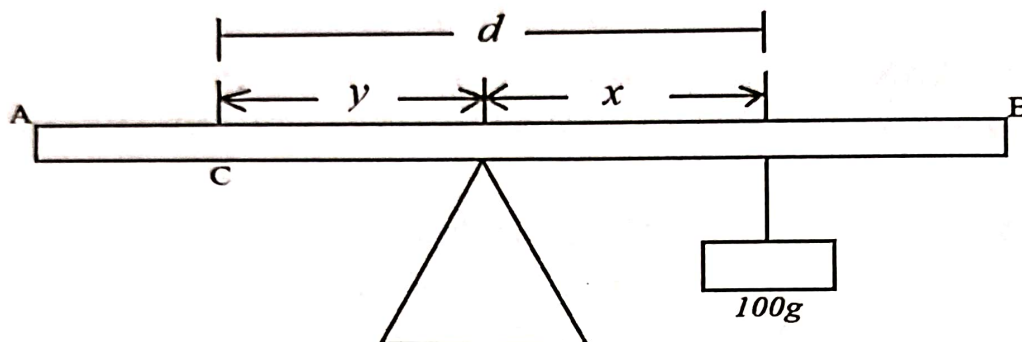
1. This paper consists of **two (2)** questions. Answer **all** questions
2. Marks for the questions are indicated at the end of each question
3. Non-programmable calculators may be used
4. Write your examination number on every page of your answer sheet(s).

This paper consists of 3 printed pages

1. The aim of this experiment is to determine the density of meter rule

Proceed as follows

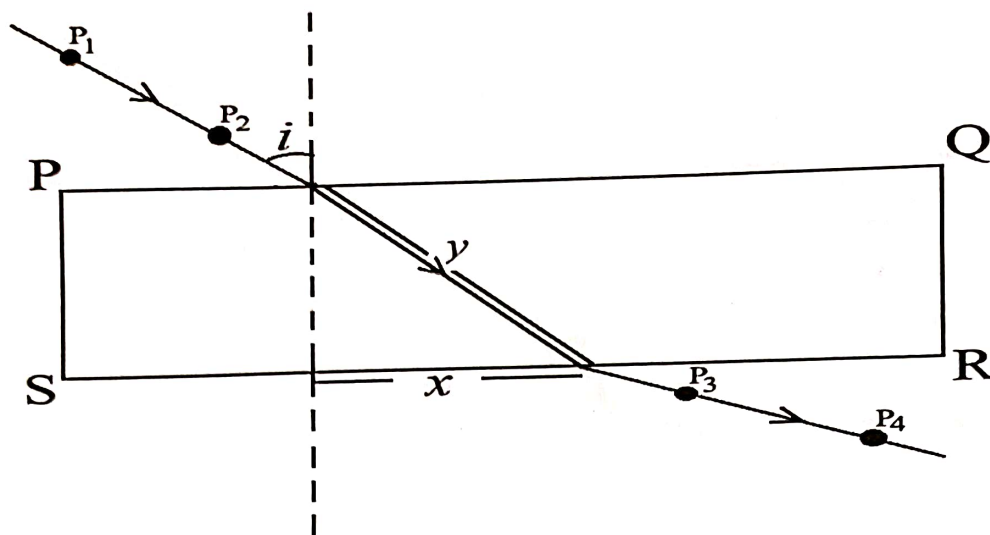
- (a) Locate the center of gravity C of the meter rule AB by balancing freely at the knife edge
- (b) Suspend 100g mass on the ruler with distance $d=10\text{cm}$ from C, adjust the position of the knife edge to get a balance, as shown in the following figure



- (c) Record the distance y from the center of gravity to a knife edge and distance X to the known mass of 100g
- (d) Repeat the producers in 1(b) and (c) by increasing the distance of 100g to $d=15\text{cm}$, 20cm , 25cm and 30cm

Questions

- (i) Tabulate your results in a suitable table showing the values of d , x and y
 - (ii) Plot the graph of $y(\text{cm})$ against $x(\text{cm})$
 - (iii) Determine the slope of the graph
 - (iv) Describe how the slope obtained from the graph is related to the mass of the metre rule
 - (v) Measure and record the length (L), width (w) and the thickness (t) of the metre rule. Provided by using a vernier caliper
 - (vi) Determine the density of the metre rule
2. You are provided with the soft board, four optical pins, one glass block, four thumb pins, white papers, transparent ruler and protractor
- Proceed as follows
- (a) Fix a white paper on soft board
 - (b) Place the glass block in the middle of the paper and use sharp pencil to mark the outline PQRS of the block
 - (c) Remove the glass block, draw the perpendicular line to PQ at B as shown in the figure bellows



- (d) Draw a line AB such that the angle of incidence is 20° and replace the glass block
- (e) Stick two pins, P_1 and P_2 along AB and looking through the glass block from the opposite face SR, stick two other pins P_3 and P_4 such that they are in line with P_1 and P_2
- (f) Remove the glass block and join C and D. Also join B and C
- (g) Measure and record distance x and y
- (h) Repeat the procedure (d) to (g) above for values of i equal to $30^\circ, 40^\circ, 50^\circ$ and 60°
- (i) Enter your results in a table including the value of $\sin i$ and x/y
- (j) Plot the graph of $\sin i$ against x/y
- (k) Determine the slope "M" of the graph
- (l) What is the physical meaning of the slope from the graph plotted
- (m) Give out any two sources of errors in this experiment and state how each can be counter balanced.