

**THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION**

031/2A

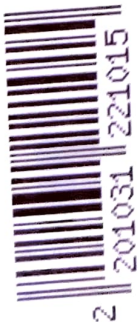
**PHYSICS 2A
(PRACTICAL A)
(For Both School and Private Candidates)**

Time: 2:30 Hours

Year: 2022

Instructions

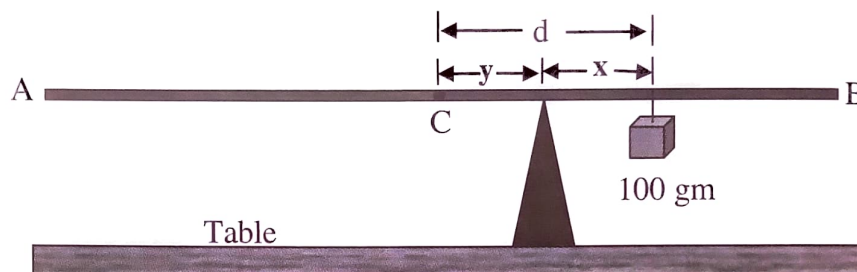
1. This paper consists of **two (2)** questions.
2. Answer **all** the questions.
3. Each question carries **twenty five (25)** marks.
4. Non-Programmable calculators may be used.
5. Cellular phones and any unauthorised materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).



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

Proceed as follows:

- (a) Locate the centre of gravity C of the metre rule AB by balancing freely at the knife edge.
- (b) Suspend 100 g mass on the ruler with distance $d = 10$ 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 centre of gravity to a knife edge and distance x from knife edge to the known mass of 100 g.
- (d) Repeat the procedures in 1 (b) and (c) by increasing the distance of 100 g to $d = 15$ cm, 20 cm, 25 cm and 30 cm.

Questions

- (i) Tabulate your results in a suitable table showing the values of d , x and y .
- (ii) Plot a graph of y (cm) against x (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 provided and hence determine the mass of a ruler.
- (v) Measure and record the length, width and the thickness of the metre rule provided.
- (vi) Determine the density of a metre rule.

(25 marks)

2. You are provided with a dry cell, resistance box, switch, an ammeter and a set of connecting wires.

Proceed as follows:

- (a) Connect the given electrical components in series, switch must be open. Draw and label clearly your circuit.

- (b) Set resistance $R = 1 \Omega$, then close the switch. Read and record the ammeter reading. Open the switch immediately after taking the readings.
- (c) Repeat the procedures in 2 (b), setting the value of $R = 2 \Omega, 3 \Omega, 4 \Omega$ and 5Ω .

Questions

- (i) Tabulate your results including the values of $\frac{1}{I}$.
- (ii) Plot a graph of R against $\frac{1}{I}$.
- (iii) From the graph, determine the slope and the vertical intercept.
- (iv) Use the results obtained in 2 (iii) to determine the internal resistance and e.m.f of a given dry cell.
- (v) What is the aim of doing this experiment?

(25 marks)