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

031/2A

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

Time: 2:30 Hours **Year: 2024**

Instructions

1. This paper consists of **two (2)** questions. Answer **all** the questions.
2. Each question carries **twenty five (25)** marks.
3. All writings should be in **blue** or **black** ink, except for diagrams which must be in pencil.
4. Mathematical tables and non-programmable calculators may be used.
5. Communication devices and any unauthorised materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).

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1. You are given two objects of different masses labelled **x** and **w**. The mass of **w** is 100 g, but the mass of **x** is unknown. You are required to perform an experiment to determine the unknown mass **x** using a metre rule, cotton threads and knife edge. Proceed as follows:

(a) Set up the experiment as shown in Figure 1.

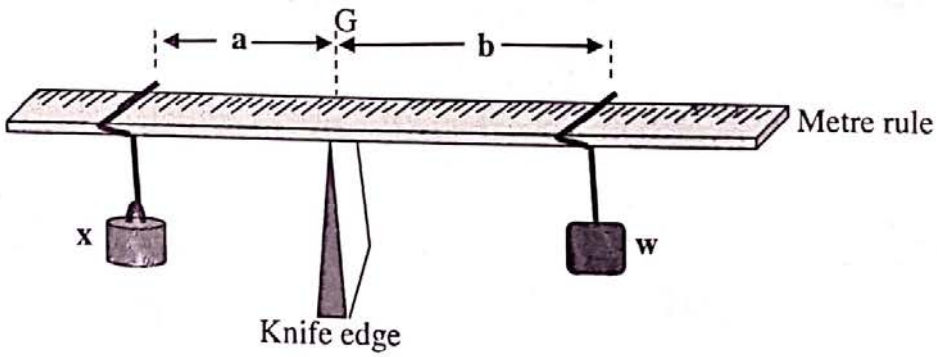


Figure 1

(b) Use a knife edge to find the centre of gravity of the ruler, and then label it as G.

(c) Suspend the unknown mass **x** on 10 cm mark from G and adjust the position of mass **w** on the other side of G so that the ruler balances in a horizontal position. Measure and record the distance **b** (cm).

(d) Repeat the procedure in 1 (c) by varying the value of **a** equal to 15 cm, 20 cm, 25 cm and 35 cm from G.

Questions

(i) Tabulate the results for the values of **a** (cm) and **b** (cm).

(ii) Plot a graph of **a** (cm) against **b** (cm).

(iii) What is the nature of the graph plotted in 1 (ii).

(iv) Determine the slope of the graph plotted in 1 (ii).

(v) Calculate the mass of object **x**.

(vi) Which principle is governing this experiment?

(vii) State the principle in 1 (vi).

(25 marks)

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2. You are required to determine the e.m.f of the cells and unknown resistance **Q**. Proceed as follows:

(a) Connect the circuit as shown in Figure 2, setting R = 1 Ω. Close the switch and quickly read the value of current, I in the ammeter.

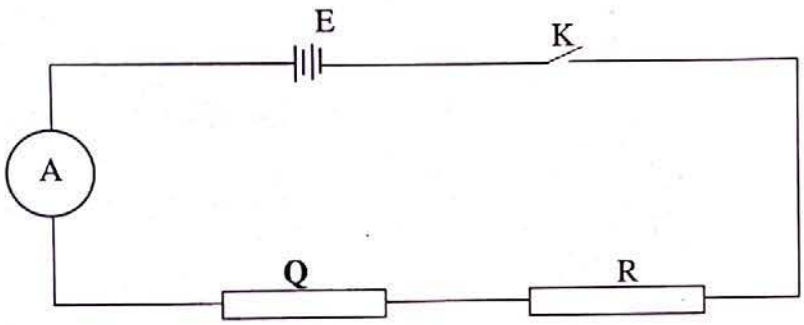


Figure 2

(b) Repeat the procedure in 2 (a) for the values of R = 2 Ω, 3 Ω, 4 Ω and 6 Ω.

Questions

(i) Tabulate your results including the values of $\frac{1}{I}$.

(ii) Plot a graph of R (Ω) against $\frac{1}{I}(A^{-1})$.

(iii) Determine the slope of the graph and the value of R-intercept in 2 (ii).

(iv) Compute the e.m.f of the cells and the value of **Q**, if the internal resistance r of a cell is 1 Ω.

(v) What will be the effect on the current, if the value of **Q** is increasing?

(25 marks)

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