



THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF DEFENCE AND NATIONAL SERVICE
MILITARY SCHOOLS ASSOCIATION

FORM FOUR PRE NATIONAL EXAMINATION

031/2A

PHYSICS 2A

(ACTUAL PRACTICAL)

TIME: 2:30 Hours

12th AUGUST 2026

INSTRUCTIONS

1. This Paper consists of two (02) questions, Answer all questions.
2. Each question carries twenty-five (25) marks.
3. All writings should be in blue ink, except for diagrams which must be in pencil.
4. Mathematical tables and non-programmable calculators may be used.
5. Cellular phone and any unauthorized material are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer sheet(s)

1. The aim of this experiment is to determine the mass of a given dry cell size “D”

-You are provided with a dry cell, a knife edge, two weights of 50g and 200g and a metre rule proceed as follows

- (a) Locate and note the center of gravity **K** of the rule by balancing it on a knife edge.
- (b) Suspend the 200g mass length “**a**” cm on the left side of a fulcrum and the 50g mass together with the dry cell at length “**b**” on the right side of a fulcrum.
- (c) Fix the 200g mass at length of 30 cm from the fulcrum and adjust the position of 50g mass together with the dry cell until the meter rule balances horizontally. Read and record these values as **a₀** and **b₀** respectively.
- (d) By fixing the length **a** = 5cm from fulcrum **K**, find its corresponding length **b**.
- (e) Repeat the procedures in part (d) above for values of **a** = 10cm, 15cm 20cm and 25cm. Read and record the corresponding values of length **b**.

Questions

- (i) Draw the diagram of this experiment set up
- (ii) Plot a graph of **a** (cm) against **b** (cm).
- (iii) Find the slope **G** of your graph
- (iv) Calculate the numerical values of **H** from the equation

$$200 = \frac{b_0}{a_0} (50 + H)$$

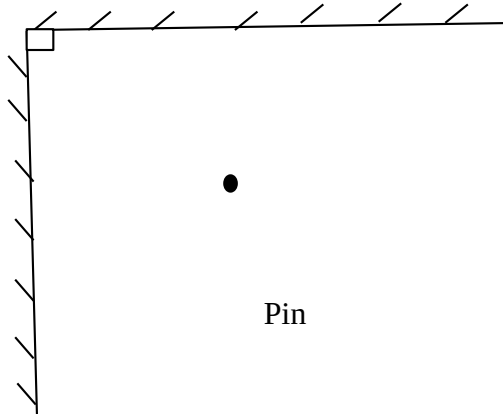
- (v) What is the physical meaning of “**H**” in this experiment?
- (vi) Comment on the value of $\frac{b_0}{a_0}$ and the answer obtained in part (e) (iii) above.
- (vii) State the principle governing this experiment.

2. You are provided with two plane mirrors optical pin, drawing pins, drawing board and protractor.

Proceed as follows.

- (i) Fix a white sheet of paper on drawing board.

- (ii) Make two perpendicular lines through the centre of paper.
- (iii) Place the two mirrors perpendicular to each other such that they make an angle (02) of 90° between them as shown below.



- (iv) Fix an optical pin (object) in front of the two mirrors, count the number of images formed by two mirrors.
- (v) Repeat the procedure above by moving one plane mirror so that the angle (θ) between mirrors is 72° , 60° , 45° and 30° .

(a) Tabulate your results as shown below

Number of image (n)	Angle between mirror (θ°)	$\frac{1}{\theta} (\theta - 1)$
	90°	
	72°	
	60°	
	45°	
	30°	

(b) Draw the graph of n(vertical) axis) against $\frac{1}{\theta}$ (horizontal axis).

- (c) (i) Calculate the slope of your graph.
(ii) What is the value of y-intercept P of the graph?
(iii) Given that this experiment is governed by the equation.

$$n = \frac{G}{\theta} + p.$$

Where G is the slope and P is the y- intercept, what will be the number of images where $\theta = G$?

- (d) (i) What will be the number of images when $\theta=0$?
(ii) Suggest the aim of the experiment.