

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

131/3A

**PHYSICS 3A
(PRACTICAL A)
(For Both School and Private Candidates)**

Time 3:20 Hours

Year: 2020

Instructions

1. This paper consists of **three (3)** questions.
2. Answer **all** questions.
3. Question **Number 1** carries 20 marks and the other **two (2)** carry 15 marks each.
4. Mathematical tables and non-programmable calculators may be used.
5. Cellular phones and any unauthorized materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).
7. The following information may be useful:

Pi, $\pi = 3.14$



1. You are required to determine the acceleration due to gravity, g using a simple pendulum.

Proceed as follows:

- (a) Attach a piece of thread of 100 cm long to the pendulum bob and set up the apparatus as shown in Figure 1. Note that d is a distance from the bob to the reference line.

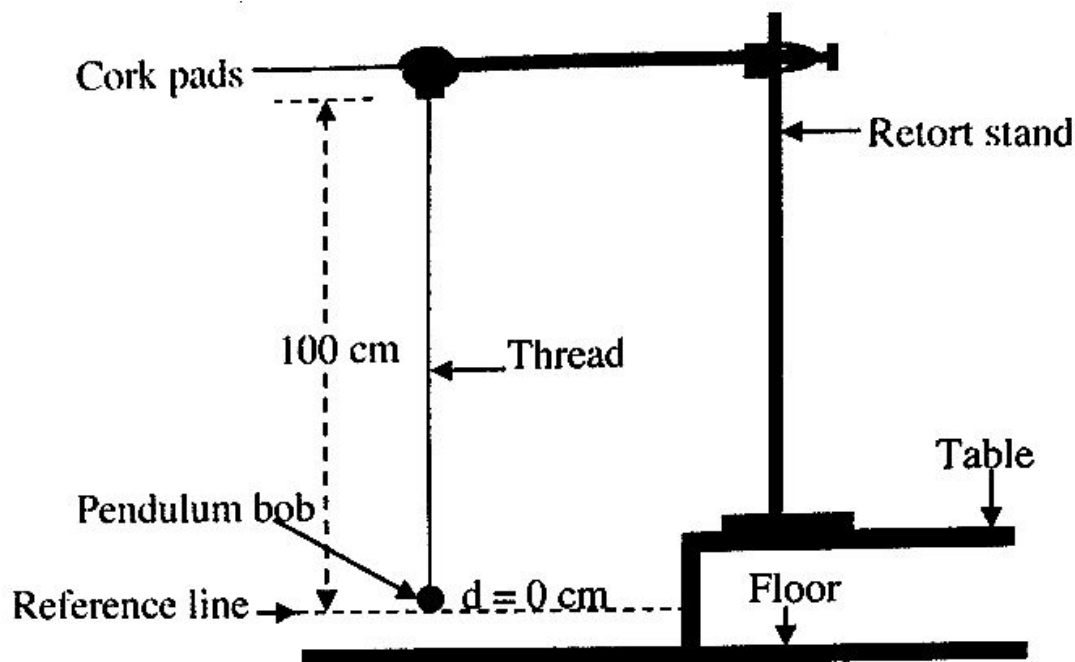


Figure 1

- (b) Set the pendulum bob to oscillate through a small angle and determine the time, t for 20 complete oscillations and its periodic time, T .
- (c) Repeat the procedure in 1 (b) while reducing the length of the thread by increasing the value of d by 10 cm, 20 cm, 30 cm, 40 cm, 50 cm, 60 cm, and 70 cm.

Questions

- (i) Tabulate your results including the values of the length of the thread and T^2 .
- (ii) Plot a graph of d against T^2 .
- (iii) Compute the acceleration due to gravity g , from the equation $S = \frac{-g}{(2\pi)^2}$ where S is the slope of the graph plotted in 1 (ii).
- (iv) What does the value of d -intercept represent?

2. You are provided with a beaker, liquid L, a thermometer, a stirrer and a wooden slab.

Proceeds as follows:

- (a) Weigh the empty beaker provided and record its value.
- (b) Set up the apparatus as shown in Figure 2.

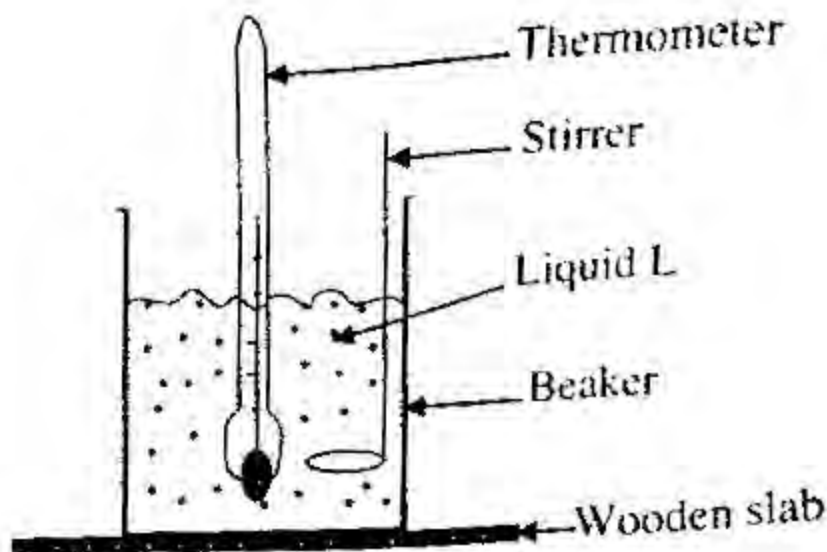


Figure 2

- (c) Pour 150 ml of liquid L which is heated to about 90°C in a beaker. While stirring gently, record the temperature of liquid L after every two minutes from 80°C until it falls to 50°C.
- (d) Weigh the beaker with its contents and determine the mass of liquid L.
- (e) Repeat the procedures in 2 (c) and (d) for 100 ml of liquid L.

Questions

- (i) Tabulate the results of your experiment.
- (ii) Plot cooling curves for both experiments on the same axes.
- (iii) Use the graph plotted in 2 (ii) to record the value of time taken for both volumes to fall from 80°C to 60°C as t_1 and t_2 respectively, hence compute the value of t_1/t_2 .
- (iv) Determine the ratio of mass of 150 ml to mass of 100 ml.
- (v) Compare the values obtained in 2 (iii) and (iv) and give the comments.
- (vi) What is the aim of performing this experiment?

3. You are provided with a dry cell E, ammeter A, resistance box B, switch K and several pieces of connecting wires.

Proceed as follows:

- (a) Connect a dry cell E, switch K, an ammeter A and the resistance box B in series.
- (b) Using the resistance box, set the resistance R equal to $1\ \Omega$, close the switch K and record the current I (A) passing through the circuit
- (c) Repeat the procedures in 3 (b) for the values of R equal to $2\ \Omega$, $4\ \Omega$, $5\ \Omega$ and $6\ \Omega$.

Questions

- (i) Record the results in a tabular form including the values of $1/I$ (A^{-1}).
- (ii) Draw a well labelled diagram of your circuit you connected.
- (iii) Plot a graph of R against $1/I$.
- (iv) Use the graph to compute the value of E.m.f. Of the cell.
- (v) What is the physical meaning of R-intercept?
- (vi) What is the aim of doing this experiment?