

THE UNITED REPUBLIC OF TANZANIA
PRESIDENT'S OFFICE,
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT
NJOMBE REGION



FORM SIX PRE – NATIONAL EXAMINATION

CODE: 131/3B

PHYSICS 3B

(For Both School and Private Candidates)

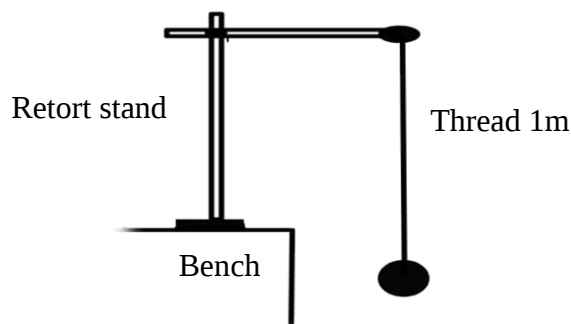
TIME: 03: 00 HOURS

MONDAY, 25TH March 2024 A.M

INSTRUCTIONS

1. This paper consists of **Three (3)** questions.
2. Answer **ALL** questions.
3. Question one carries **20 marks** and other two questions carries **15 marks** each.
4. Cellular phones and any other unauthorized materials are not allowed in examination room.
5. Write your **examination number** on every page of your answer sheets.
6. The following information may be useful:
 - a) $\pi = 3.14$

1. A form five student needs to learn about a gravitational pull of the earth, teacher assigned you as his friend to help him through experiment using the following setup provided and procedures



Suspend the pendulum bob as shown in figure, Measure the length $L = 100$ cm of the thread. Displace the bob through a small angle and allow it to perform oscillations in a vertical plane.

Read and record the time t_1 for 20 complete oscillations. Calculate the period, T_1 and T_1^2 , Shorten the length of the thread by a length $x = 10$ cm, Displace the bob and record the time t_2 , for 20 complete oscillations. Calculate the period T_2 and T_2^2 .

Repeat procedure above for $x = 20$ cm, 30 cm, 40 cm, and 50 cm.

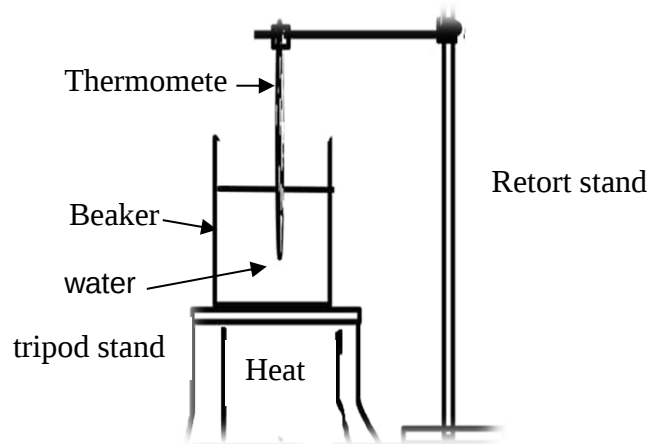
Questions

- Tabulate your results in a suitable table.
- Plot a graph of $T_1^2 - T_2^2$ against x .
- Determine the slope, (m) of your graph.
- How is $T_1^2 - T_2^2$ related to x ?
- Determine the acceleration due to gravity, g .
- Comment on the purpose of doing this experiment.
- State any two sources of errors and precautions taken.

(20marks)

2. Form five students were debating on the factors that affect the boiling point of a liquid such that, is it constant for given liquid? Conclude their debate by performing experiment using the following apparatuses; a Beaker, thermometer, cold water, stop watch, retort stand, and tripod stand

Proceed as follows:



Record the temperature t_0 of the surrounding air

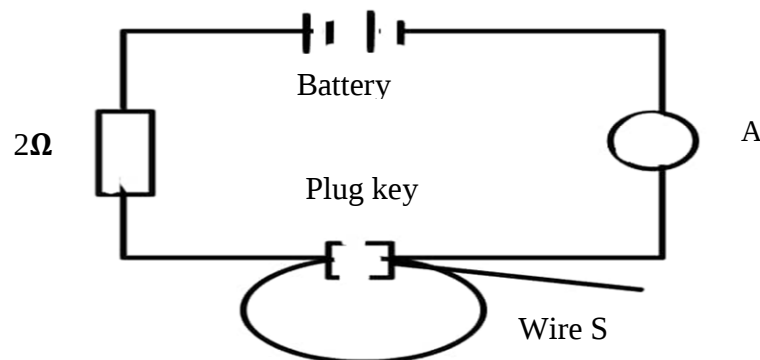
Place the thermometer in a beaker half full of water and record the temperature θ_w ,

Gradually heat up the water with a burner, as in figure above and record the temperature θ every two minutes until the temperature becomes steady at boiling point.

Questions

- Tabulate your results.
 - Comment on the magnitudes of t_0 and θ_w . Are they the same or different? Give reason for your answer.
 - Plot a graph of θ against time t and explain its nature.
 - is the maximum temperature expected to be 100°C ? Give reason for your answer.
 - Explain the aim of doing this experiment. (15marks)
3. Laboratory equipment dealer wants to know from you the specifications of the wire which was not indicated. You are required to perform an experiment to obtain the required specifications of the wire using; standard resistor of 2Ω , a battery(two dry cells each of 1.5V), 110 cm wire of unknown resistivity, ammeter, switch, micrometer screw gauge, metre rule and several pieces of connecting wires.

Proceed as follows



Connect the circuit as shown in Figure above, With the plug key open adjust the length of wire S to a value of $L_s=20\text{cm}$ Note the ammeter reading, the plug key should remain open throughout the experiment.

Repeat the procedures above for $L_s=40\text{cm}$, 60cm , 80cm and 100cm each time recording the ammeter reading.

Questions

- Tabulate your results.
- Plot a graph of $\frac{1}{I}$ against L_s
- Determine the slope and the $\frac{1}{I}$ intercept of the graph.
- Measure and record the diameter of a wire
- Using your graph, determine the resistivity ρ of the wire and internal resistance r of the battery.
- What is the aim of performing this experiment? **(15marks)**