



TANZANIA HEADS OF ISLAMIC SCHOOLS COUNCIL
FORM SIX INTER ISLAMIC MOCK EXAMINATION

PHYSICS 3A

(ACTUAL PRACTICAL)

(For Both School and Private Candidates)

131/3A

TIME: 3:20 Hours

Thursday, 12th March 2026 a.m.

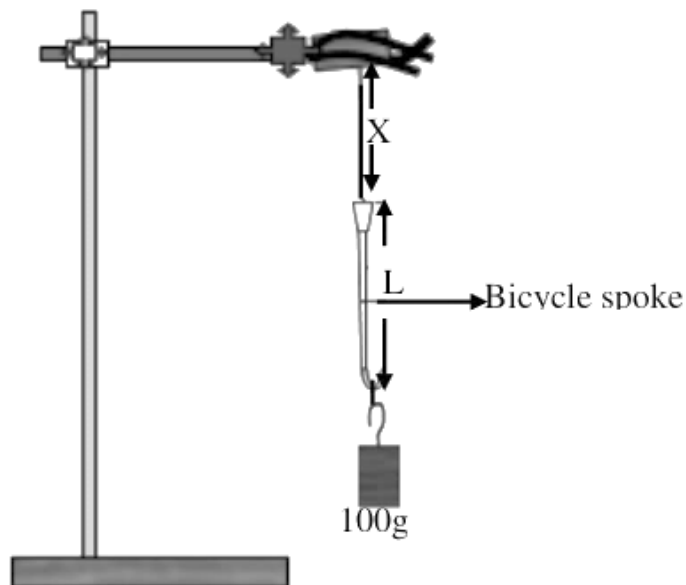
Instructions

1. This paper consists of **three (3)** questions.
2. Answer **all** questions.
3. Question one carries **twenty (20)** marks and the other two (2) carry **fifteen (15)** marks each.
4. All writing must be in a blue or black ink, except for drawing which must be in pencil.
5. Communication devices and any unauthorized materials are **not** allowed in the examination room.
6. Mathematical tables and non-programmable calculators may be used.
7. Write your **Examination Number** on every page of your answer booklet(s).
8. The following information may be useful:
 - Pie, $\pi = 3.14$
 - Specific heat capacity of water = $4.2 \times 10^3 \text{JKg}^{-1}\text{K}^{-1}$
 - Specific heat capacity of copper = $3.8 \times 10^2 \text{JKg}^{-1}\text{K}^{-1}$

1. At a metal fabrication workshop, a welder would like to cut a small metal rod into pieces of equal length of 31.0cm to be used as window girders. Unfortunately, he cannot find the tape measure yet his client is frequently demanding for finished products of the windows. Your school is just near the workshop and so the welder seeks for your help in regard to determining the length of each piece of the rod.

Proceed as follows:

- (a) Tie a thread to a given bicycle spoke with a standard mass of 100g in such a way that the value of $X = 20\text{cm}$ and the length of the spoke call it L as shown in the figure below.

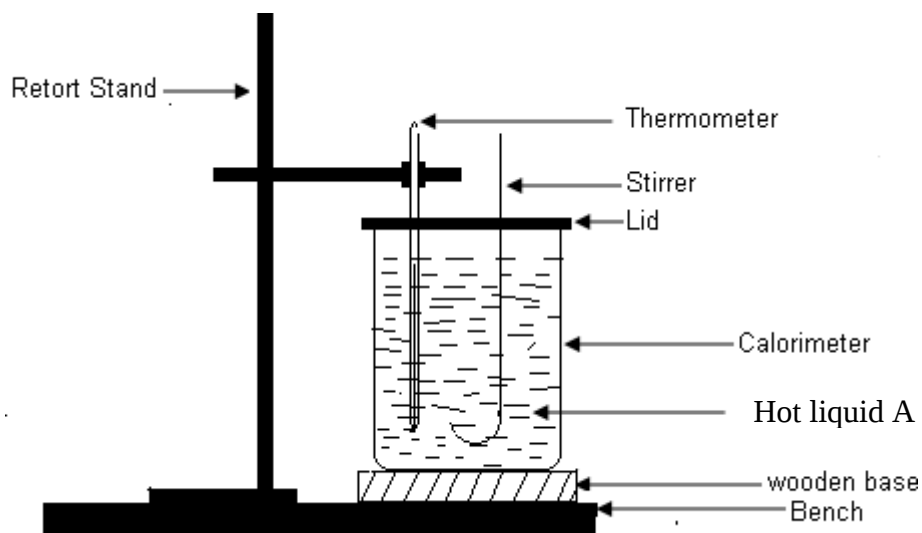


- (b) Displace the bicycle spoke with a standard mass aside and then release it so that it swings to and fro with small amplitude vibrations. Find the time t taken for 20 oscillations and hence determine the periodic time T .
- (c) Repeat the procedure in (a) and (b) above for the values of X equal to 30cm, 40cm, 50cm and 60 cm.

Questions:

- (i) Tabulate your results including the values of T^2 .
- (ii) Plot the graph of T^2 against (X) cm.
- (iii) Determine the slope of the graph and use it to determine the acceleration due to gravity.
- (iv) From the graph determine the length of the bicycle spoke by showing clearly all your working.

2. You are required to determine the specific heat capacity of liquid A provided. Proceed as follows:
- (a) (i) Weigh the empty calorimeter with lid and stirrer.
 - (ii) Fill the calorimeter to about 3/4 full of liquid A that has been heated to a Temperature of 90°C.
 - (iii) Set up the apparatus as shown in the figure below.

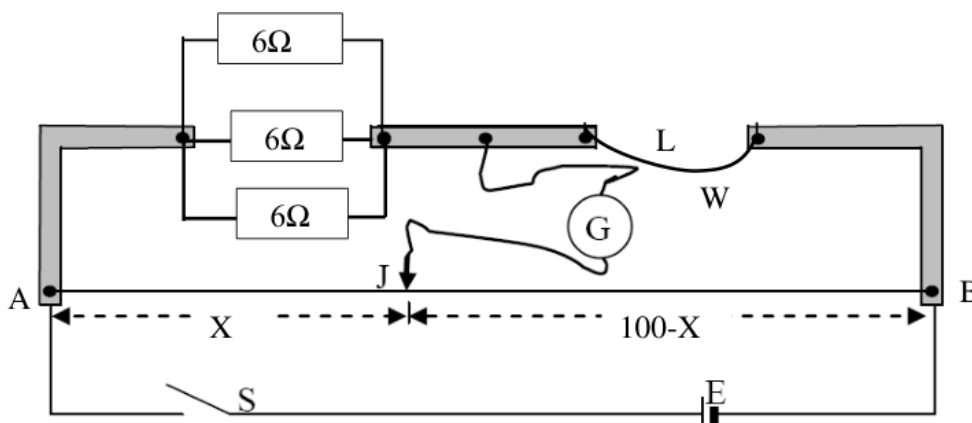


- (b) Read and record the temperature θ of the liquid as it cools at the interval of 2 minutes over the temperature range from 80°C to 56°C while gently stirring the calorimeter.
- (c) Tabulate the values of θ (°C) and the corresponding values of time t starting from at $t = 0$. Also measure and record the room temperature θ_R .
- (d) Remove the thermometer and weigh the calorimeter with its contents.
- (e) (i) Plot a cooling curve for the liquid A.
- (ii) Find the gradient at 65°C to obtain the rate of cooling of liquid A.
- (iii) Using the relation $(M_A C_A + M_C C_C) \frac{d\theta}{dt} = - 430 \text{ J/min}$, calculate the specific heat capacity of liquid A, and M_C is the mass of calorimeter with lid and stirrer.
- (f) State two factors upon which the rate of loss of heat of the body depends.

3. You are provided with the following apparatuses, dry cell E, three insulated wire of resistance 6Ω each connected in parallel and covered on heric paper, switch K, metre bridge, galvanometer G, jockey J, connecting wire, metre rule and constantan wire W of approximately 120cm.

Proceed as follows;

- (a) Set up the circuit as shown in the figure below.



- (b) Starting with the length of wire W, $L = 20$ cm, close the switch and record the balancing length X from the left to the balancing point.
- (c) Repeat the procedure in (b) for $L = 40$ cm, 60 cm, 80 cm and 100 cm, in each case record the value of X .

Questions:

- Tabulate the results including $100 - X$, $\frac{X}{100}$, $\frac{1}{L}$ and $\frac{x}{100-x}$
- Plot a graph of $\frac{x}{100-x}$ against $\frac{1}{L}$
- Determine the slope S of the graph.
- From the graph obtain the value of X for $L = 75$ cm.
- From your graph plotted in (ii) above find the value of resistivity ρ of the wire W.
- Suggest the suitable title for this experiment.

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