**THE UNITED REPUBLIC OF TANZANIA**

**NATIONAL EXAMINATIONS COUNCIL OF TANZANIA**

**ADVANCED CERTIFICATE OF SECONDARY EDUCATION**

**EXAMINATION**

**131/3B** **PHYSICS 3B**

**(ACTUAL PRACTICAL B)**

(For Both School and Private candidates)

**Time: 3:20 Hours** **Year: 2021**

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**Instructions**

1. This paper consists of **three (3)** questions**.**
2. Answer **all** questions.
3. Question **one (1)** carries **20** marks, and the other **two(2)** carry **fifteen(15)** marks each.
4. Mathematical tables and non-programmable calculators may be used.
5. All writing must be in **blue** or **black** ink **except** drawing which must be in pencil
6. Cellular phones and any unauthorized materials are **not** allowed in the examination room.
7. Write your **Examination Number** on every page of your answer booklet (s).

The folowing information may be useful:

Pie, $\pi = 3.14$.

Acceleration due to gravity, $g = 981 cms^{-2}$

Specific heat capacity of Water $C_w = 4.2 J/gK$

Specific heat capacity of copper $C_{cu} = 0.4 J/gK$

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1. You are required to determine the acceleraion due to gravity , g by simple pendulum

**Proceed as follows:**

(a) Set up the apparatus as shown in Figure 1 (presented here as Figure 26).

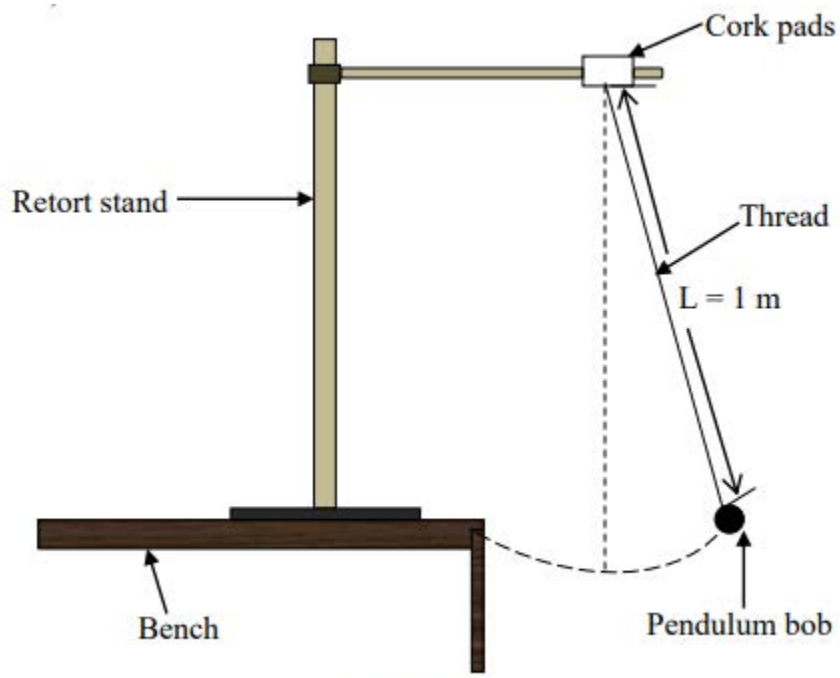



**Figure 26**

(b) Set the pendulum to oscillate through a small angle and record the time for 30 complete oscillations, hence determine its periodic time T.

(c) Repeat the procedure in 1 (b) for the values of L = 0.9 m, 0.8 m, 0.7 m, 0.6 m and 0.5 m.

Questions

(i) Tabulate your results including the value of $T^2$ .

(ii) Plot the graph of L against $T^2$ .

(iii) Deduce the slope of the graph.

(iv) Determine the acceleration due to gravity, g.

2. You are required to compare the rate of cooling for hot water in a calorimeter when it is about a half-full of water and when it is about two-thirds through a fixed range of temperature.

**Proceed as follows:**

(a) Half-fill the calorimeter with water of about $80^0$ C.

(b) Stir the hot water in a calorimeter and fanning constantly, start the stop watch when the water is exactly $70^0$ C and record the time $t_1$ in seconds after every $5^0$C drop until it has fallen to $50^0$C. Weigh the calorimeter with water, and then determine the mass, $m_1$ (in grams) of water used.

(c) Repeat the procedures in 2 (a) and in (b) with the calorimeter about two-thirds full of water. Record the time $t_2$ in seconds then determine the mass $m_2$ (in grams) of water used.

Questions

(i) Tabulate your results obtained in 2 (b) and (c).

(ii) Record the mass of water obtained in 2 (b) and (c).

(iii) Plot the graph of $t_2$ against $t_1$ and determine its slope.

(iv) Compare the value of the slope obtained in 2 (ii) and the ratio of $\frac{m_2}{m_1}$.

3. You are provided with a 2 Ω standard resistor, metre bridge, jokey, wire Y joined with a wire coiled in an insulator, a switch, crocodile clip, a dry cell, galvanometer and connecting wires.

**Proceed as follows:**

(a) Connect the coiled wire together with free hanging wire Y. Connect free hand of coiled wire to the left terminal of the right hand gap of the metre bridge. Then connect the wire Y with crocodile clip to the other terminal of the right hand gap as shown in Figure 2 (presented here as Figure 32).

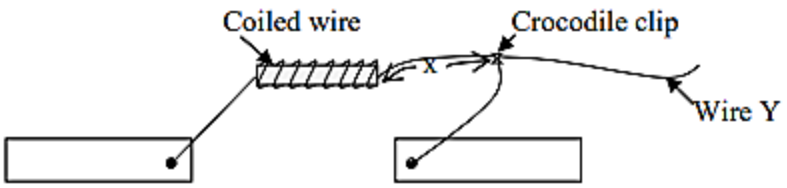



**Figure 32**

(b) Measure the length x of the wire Y equal to 10 cm and clip the crocodile clip at the end of this length. Using 2 Ω standard resistor, find the balancing length, l as measured from the left end and the equivalent resistance R in the right hand gap.

(c) Increase x by 10 cm each time and obtain four (4) more corresponding values of l and R.

**Questions**

(i) Tabulate your results.

(ii) Plot a graph of R against x.

(iii) Use the information in 3 (ii) to find the values of 'a' and 'b' from the equation $x = \frac{R}{A} - \frac{b}{a}$.

(iv) What is the physical meaning of the value of b obtained in 3 (iii)?

(v) Calculate the ratio $\frac{b}{a}$ and give its physical meaning.

(vi) Give a possible aim of performing this experiment.