EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Physics 5054/3

Paper 3 Practical Test

Candidates answer on the enclosed Answer Booklet

Additional Information:

As listed in Instructions to Supervisors

Electronic calculator (non-programmable) and /or Mathematical table

Graph Paper

Time 2 hours 15 minutes

Instructions to Candidates

Write your name, centre number and candidate number in the spaces provided on the Answer Booklet.

Answer all questions.

Write your answers in the spaces provided in the Answer Booklet.

For each of the questions in Section A, you will be allowed to work with the apparatus for a maximum of 20 minutes. For the question in Section B, you will be allowed to work with the apparatus for a maximum of 1 hour.

You should record all your observations as soon as these observations are made.

All of your answers should be written in the Answer Booklet, scrap paper should not be used.

An account of the method of carrying out the experiments is not required.

At the end of the examination, hand in only the Answer Booklet and the card.

Information for Candidates

Graph paper is provided.

The sheets of graph paper should be attached securely to the Answer Booklet.

Cell phones are not allowed in the examination room.

This question paper consists of 4 printed pages

Section A

Answer all questions.

1 In this experiment you will investigate the temperature of a thermometer placed near a low voltage lamp.

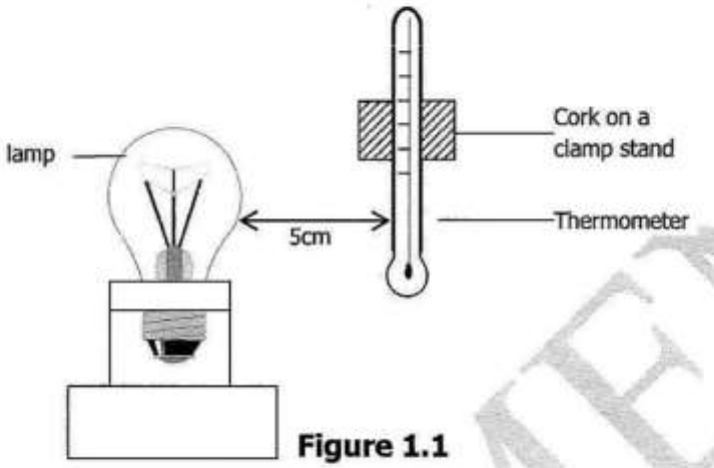

Figure 1.1

(a) **(i)** Make sure that the lamp is switched off. Move the thermometer so that it's bulb is level with the filament and 5cm from the surface of the lamp as shown in **Figure 1.1**.

(ii) Record the reading on the thermometer as T_1. [1]

(iii) Switch on the lamp and gently start timing. Record the reading on the thermometer after 1 minute, 2 minutes and 3 minutes. [3]

(b) **(i)** Move the thermometer so that it's bulb is now 2cm from the surface of the lamp.

(ii) Repeat steps **(a) (ii)** and **(iii)**. [3]

(c) What is your conclusion about the experiment? [1]

Total: 8 marks

2 In this experiment you will measure the voltage across different lengths of a resistance wire. **Figure 2.1** shows the circuit which has been set up for you.

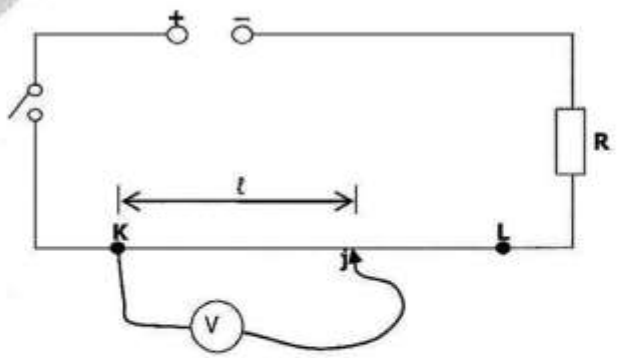

Figure 2.1

(a) **(i)** Place the jockey **j** on the resistance wire **KL** at a distance ℓ from **k** where ℓ = 0.200m. (See figure 2.1)

(ii) Close the switch and using the voltmeter, determine and record the potential difference **V** across **kj**. [2]

(iii) Take the jockey **j** away from the wire **KL** and open the switch.

(iv) Divide **V** by ℓ . [2]

(b) Repeat the steps set out in **(a)** with jockey **j** at distances of ℓ = 0.400m and ℓ = 0.800 from **K**. [2]

(c) What conclusion can you draw about the variation of potential difference with distance along the wire? Justify your answer. [2]

Total: 8 marks

3 In this experiment you will compare the densities of two small stones.

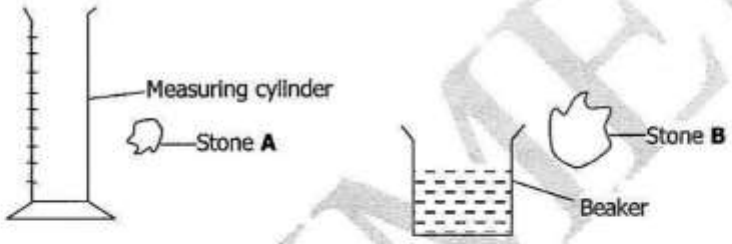

Figure 3.1

(a) **(i)** Pour some water from a beaker into the measuring cylinder until it is half full.

(ii) In your Answer Booklet, record the volume V_1 of water in the measuring cylinder. [2]

(iii) Tie the thread to the stone **A** and gently lower it into the water in the measuring cylinder.

(iv) Record the new reading V_2 of the water level in the measuring cylinder. [2]

(v) Using your values for V_1 and V_2, calculate the volume V_A of stone **A**. [1]

(b) The mass of stone **A** and the density of stone **B** are marked on the card. Copy the value of the mass M_A of stone A and the density d_B of stone **B** given on the card in the Answer Booklet.

(c) Calculate d_A, the density of stone **A**, using the equation;

$$d_A = \frac{M_A}{V_A}$$ [1]

(d) Does your calculation suggest that the two stones **A** and **B** are made from the same or from different types of material? Give a reason for your answer. [2]

Total: 8 marks

4 In this experiment you will use a simple pendulum to determine a value for the acceleration of free fall.

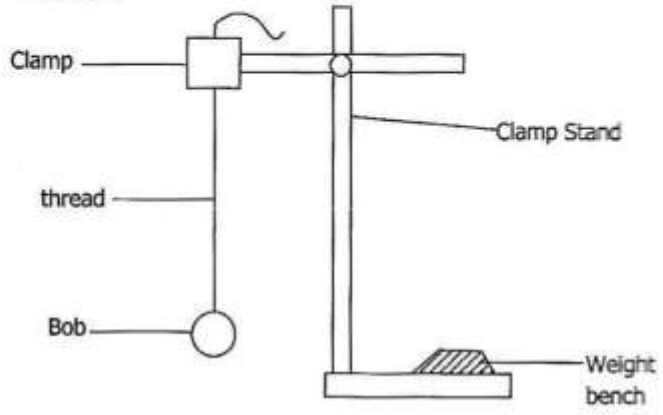

Figure 4.1

(a) **(i)** Holding the clamp firmly with one hand, use your other hand to pull the pendulum thread slowly through the clamp until the pendulum is about 0.30m above the floor.

(ii) Using the metre rule, measure and record as accurately as possible, **h**, the height of the bottom of the pendulum bob above the floor. Repeat the measurement, calculate and record the average of your two values [1]

(b) **(i)** Set the pendulum in motion, determine and record, *t*, the time taken for 20 complete oscillations.
Repeat the procedure in part **(b) (i)**, calculate and record the average of the two values. [1]

(ii) Using the average value, calculate and record **T**, the period of oscillation of the pendulum. [1]

(c) **(i)** Repeat the steps set out in **(a)** and **(b)** to obtain values of **T** for values of **h** of approximately 0.45m, 0.60m, 0.75m and 0.90m.

(ii) Tabulate your results, including those in **(a)** and **(b)**. Include in your table the corresponding values of **T** and $\mathbf{T^2}$. [5]

(d) Plot a graph of T^2/s^2 (y-axis) against h/m (x-axis). [2]

(e) G, the gradient of the graph, is given by the equation;

$G = \frac{-K}{g}$, where g is the acceleration of free fall and K = 39.5m/s^2.

(i) Determine the gradient **G** of your graph. [3]

(ii) Use your gradient to obtain a value of g. [3]

Total: 16 marks

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