

QUESTION 1

You are provided with the following:

- A thermometer
- A boiling tube
- A weighing balance (To be shared)
- A retort stand, boss and clamp
- A 50ml measuring cylinder
- A 500ml beaker labelled X
- 100ml of water in a beaker
- 50ml of Liquid L. (Paraffin)
- Source of boiling water
- A paper cover
- A stopwatch
- Tissue paper
- A metre rule
- A watch glass
- An optical pin mounted on a cork
- A plane mirror

PART A

Proceed as follows:

a) i). Using the weighing balance provided, measure and record the mass of the empty beaker X.

M₁..... (1 mark)

ii). Measure and pour 10ml of liquid L. into the beaker labelled X. Measure and record the mass of the beaker + Liquid L.

M₂..... (1 mark)

iii). Determine the density d of the liquid. (2 marks)

.....

.....

.....

b) Clamp the boiling tube on the retort stand. Measure and pour 45ml of the water into the boiling tube. Set up the apparatus as shown in figure 1.

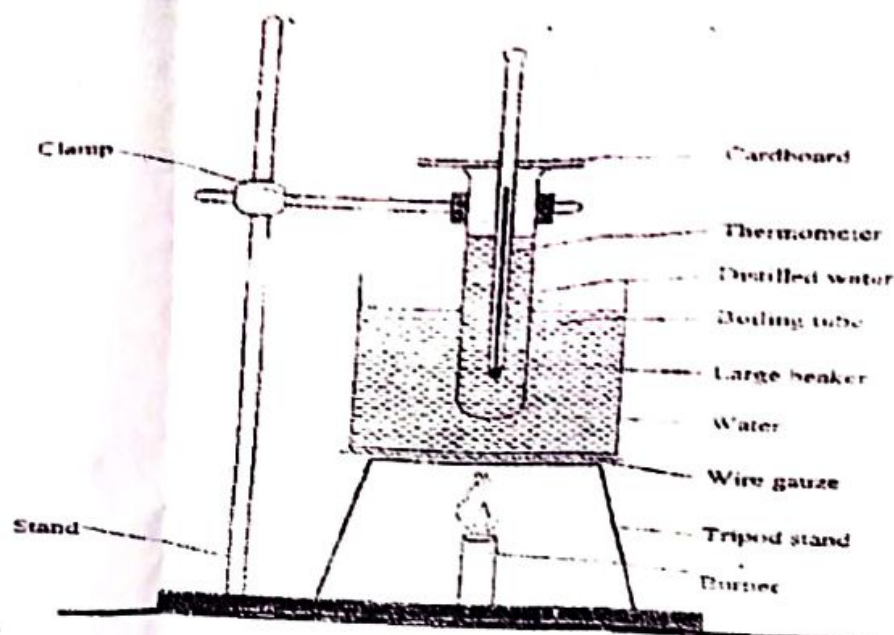


Fig 1

- c) Continue heating the water in the large beaker until the temperature of the water in the boiling tube reaches 85°C . Remove the boiling tube from the hot water by lifting up the retort stand and placing it away from the burner.
- d) Stir the water in the boiling tube using the thermometer. Record in the table I the time the temperature of water in the boiling tube drops from 80°C to 70°C and finally to 60°C . (Stir the water in the boiling tube before taking any reading)

Table I

Time, t_v (s)			
Temperature for water ($^{\circ}\text{C}$)	80	70	60
Time, t_L (s)			
Temperature for liquid L ($^{\circ}\text{C}$)	80	70	60

(4 marks)

- e) Repeat the procedure in (b), (c) and (d) using 45ml of liquid L instead of water. Record your results in the same table
- f) From the table determine;
- (i). The time taken for the water to cool from 70°C to 60°C

T_w (1 mark)

- (ii). The time taken for the liquid L to cool from 70°C to 60°C

T_L (1 mark)

- g) Determine the constant R given that $R = \frac{4.2T_L}{dT_w}$ where d is the density of liquid L. (2 marks)

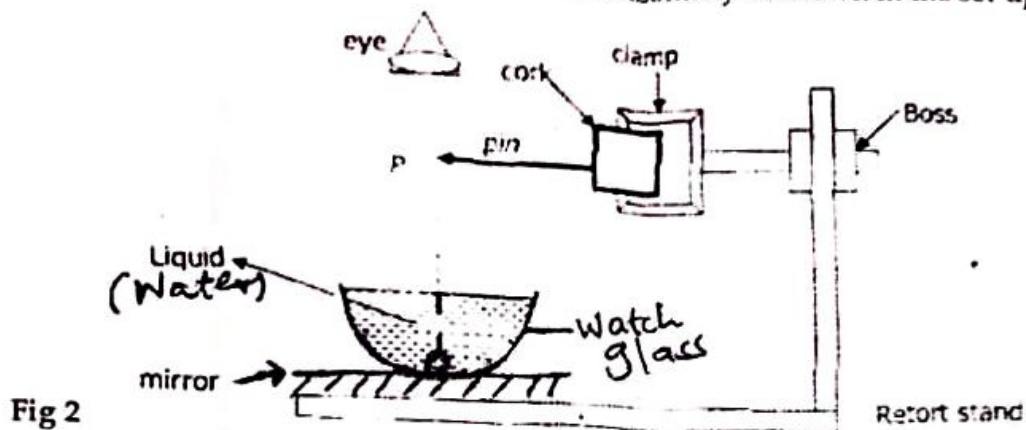
.....

.....

PART B

Proceed as follows:

- i). Clamp the cork so that the optical pin rests horizontally as shown in the set-up figure 2 below.



- ii). Place the mirror horizontally on a flat surface and put the watch glass on it so that the centre of the watch glass lies above the mirror.
- iii) Position the watch glass so that the tip of the pin is directly above the centre of the curved watch glass. Measure the distance OA.

OA = ... (1 mark)

- iv). By viewing directly from above the tip of the pin move the Boss and Clamp, up and down the stand until a clear, image of the pin is seen. Position the pin at this point (p) and clamp firmly.

Describe the image observed fully

..... (1 mark)

Use the rule to measure the distance OP: OP = ... (1 mark)

- v). Fill the watch glass to the brim using water and then adjust the position of the pin until a clear image of the pin is observed. Position the pin at this point R and measure the distance OR.

(1 mark)

- vi). Use the values obtained above to determine the value of AP/AR, hence state its significance.

.....

Significance

.....

v) State one precaution taken during the experiment (3 marks) (1mk)

vi). State one precaution taken during the experiment

(1 mark)

QUESTION 2

You are provided with the following:

- Ammeter (0 - 1 A)
- A half metre rule
- Vernier calipers (To be shared)
- A retort stand, boss and clamp
- A wooden block
- Two new size D dry cells in a cell holder
- Some plasticine
- 5 connecting wires, 2 with crocodile clips at both ends
- A variable resistor R
- Switch
- A magnetic compass
- A coil

Proceed as follows:

a) Measure the length, width and height of the wooden block using the Vernier calipers provided. (3 marks)

L.....cm.....m
W.....cm.....m
H.....cm.....m

b) Determine the volume of the wooden block.

V m³

(1 mark)

b) Arrange the apparatus as shown in figure 3.

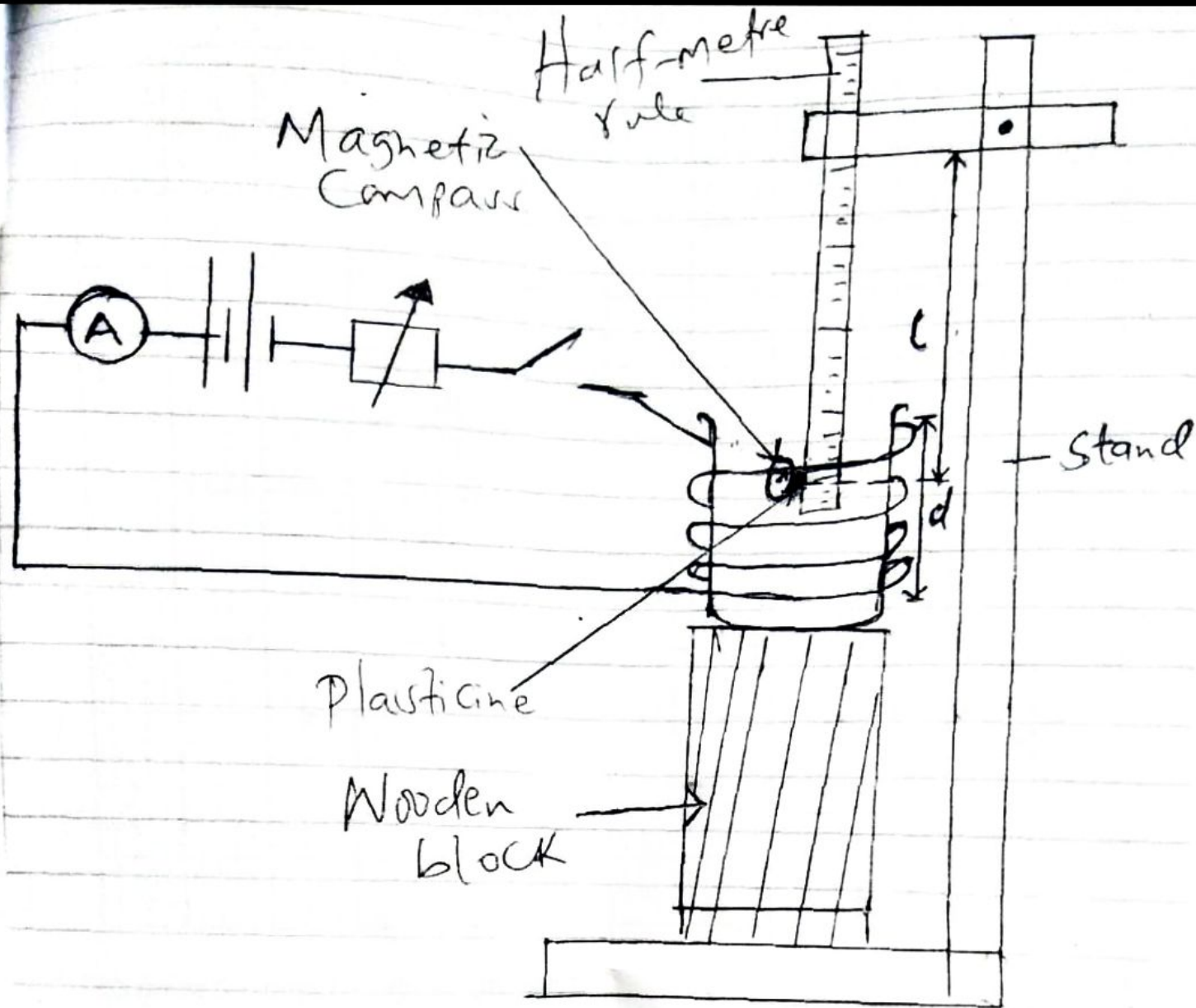


Fig 3

c) With the switch open measure and record the length d of the coil

$d = \dots\dots\dots \text{cm}$

(1 mark)

d) Close the switch. Adjust the half metre and the variable resistor so that a small current flow through the coil until the deflection on the magnetic compass is 10° . Record in table 2 below the values of the current and length.

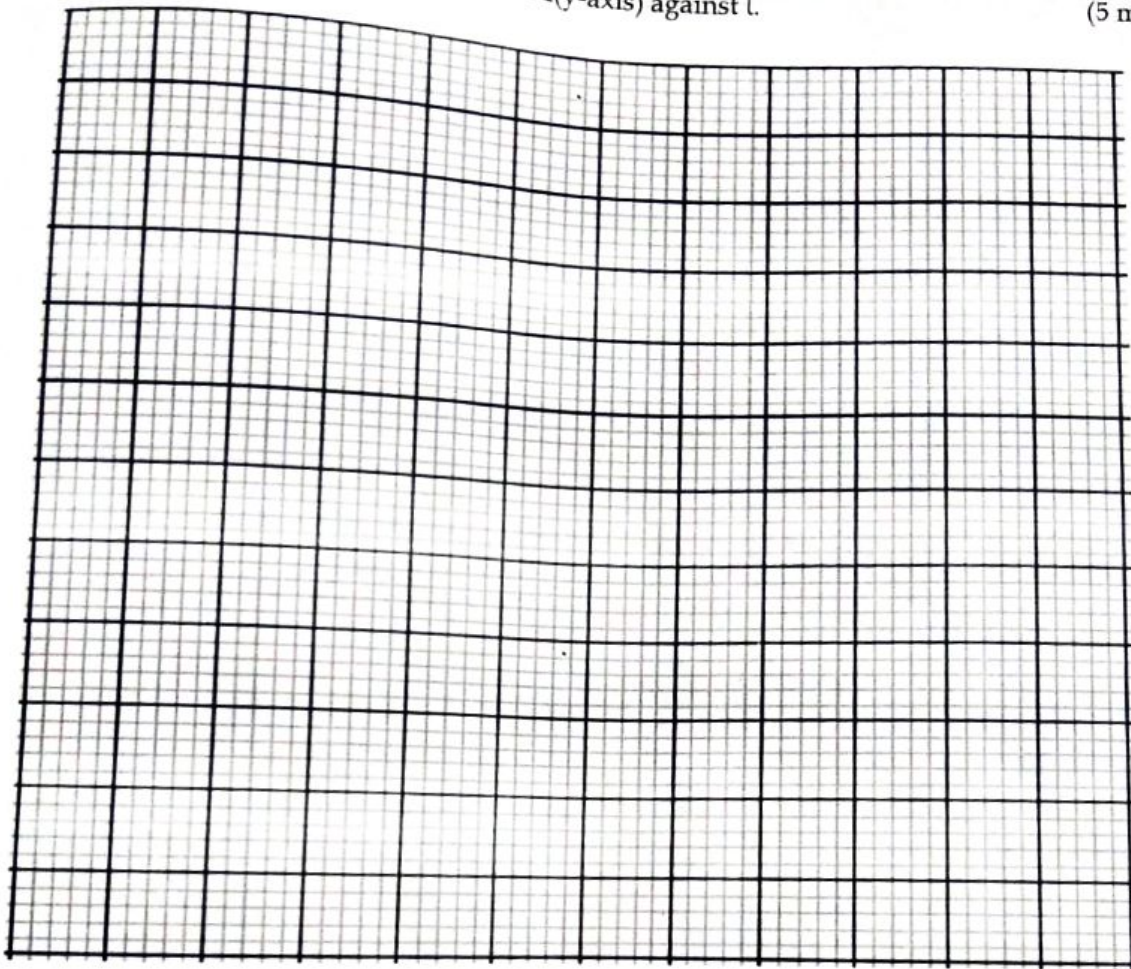
e) Repeat the procedure in (d) for the other values of angles shown in table 2 below.

Angle ($^\circ$)	10	20	30	40	50
Length, l (cm)					
I (A)					

(5 marks)

i) i). On the grid provided plot the graph of I (y-axis) against l .

(5 marks)



ii). Determine the slope S of the graph

(3 marks)

.....

.....

.....

.....

iii). Determine the constant k for the coil given that, $I = \frac{dl}{k}$. Where d is the length of coil.

(2 marks)

.....

.....

.....

.....

THIS IS THE LAST PRINTED PAGE