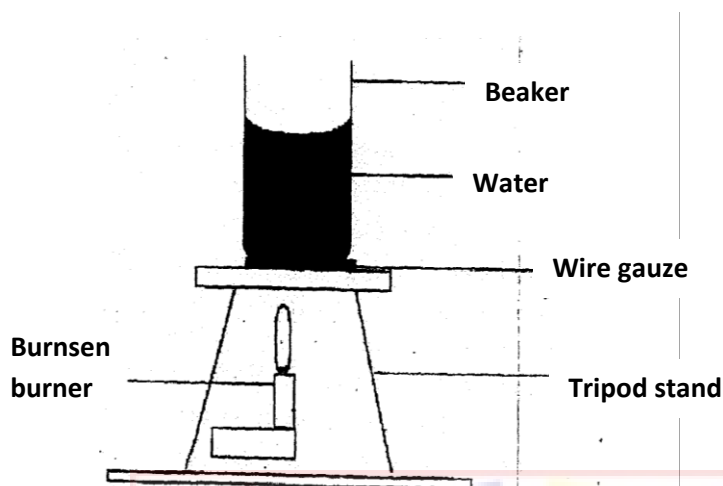


PHYSICS 232/3
MARKING SCHEME
QUESTION ONE

You are provided with the following;

- A 40ml glass beaker
- A Bunsen burner
- A thermometer
- A stop Watch
- A tripod stand and a measuring cylinder 100ml
- A wire gauze
- A source of heat

Set up the apparatus as shown in the diagram below.



Measure 100cm³ of water and pour it into the beaker. Take the initial temperature of the water.

$T_0 = 27^\circ\text{C}$ (1 mark)

Now heat the water to a temperature of 90°C. Switch off the gas tap and place a thermometer into the beaker and start the stop watch when the temperature is 65°C. Take the temperature $T^\circ\text{C}$ of water every two minutes.

Record your results in the table below.

Time (t) (min)	2	4	6	8	10	12	14
Temperature (T) °C	60	57	54	52	50	48	47
(T - T₀)⁰	33	30	27	25	23	21	20
Log (T - T₀)	1.5185	1.4771	1.4314	1.3979	1.3617	1.3222	1.3010

(i) Plot graph of Log (T — T₀) against Time (t)

(5 marks)

(ii) Find the value K of $\log(T - T_0)$ when $t = 0$

(2 marks) 

$K = 1.56$ shown the graph

Determine the antilog of K.

(2 marks)

Antilog $K = 36.31$

(iii) Calculate the temperature of the surrounding T_R using the expression

Antilog $K = 65 - T_R$

(3 marks)

$$36.31 = 65 - T_R$$

$$T_R = 65 - 36.31$$

$$T_R = 28.69^\circ\text{C}$$

QUESTION TWO

This question has two parts A and B. answer both parts

PART A

You are provided with the following:

- A meter rule
- Two identical 100g masses
- About 200ml of liquid L in 250ml beaker
- Three pieces of thread, each about half metre long
- Stand with clamps
- Tissue paper

Proceed as follows:

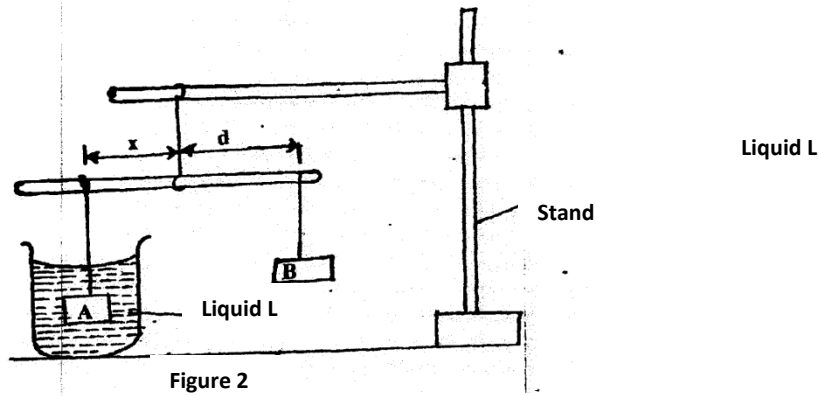
(a) Using a stand and one piece of thread, suspend the metre rule in air such that it balances horizontally.

Record the position of the centre of gravity.

$G = 500 \text{ mm}$

NOTE: The metre rule should remain suspended at this point through out the experiment.

(b) Set up the apparatus as in figure 2 below.



Suspend the mass A at a distance $x = 50\text{mm}$. Adjust the position of mass B until it balances mass A immersed in liquid L.

Record the distance d , of mass B from the pivot.

Repeat the same process for other values of x in table 2 below and complete the table.

x (mm)	50	100	150	200	250	300
	5	10	15	20	25	30
d (cm)	4.4	9.2	13.6	18.2	23.0	27.4

Graph



(d) Determine the slope, S of the graph

$$\text{Gradient} = \frac{DY}{DX} = \frac{14-0}{15-C}$$

$$= 0.9333 \quad (2 \text{ marks})$$

(e) Given $S = \frac{F}{W}$, where F is the apparent weight of objects A in the liquid L and W is W the actual weight of A , find: -

i) The value F (2 marks)

$$0.9333 = F/1$$

$$F = 0.9333N$$

(ii) The up thrust, U

$$U = 1 - 0.9333$$

$$U = W - F$$

$$U = 0.0667N$$

(3 marks)

PART B

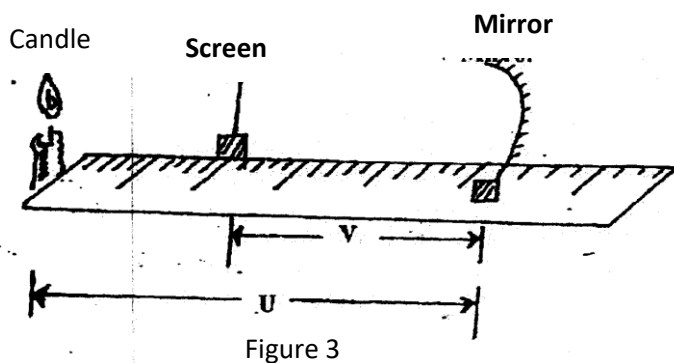
You are provided with the following:

- A concave mirror with holder
- A screen
- A meter rule
- A candle
- A match box (to be shared)



Proceed as follows:

(f) Set up the apparatus as in figure 3 below.



(g) Put the object at a distance $u = 30\text{cm}$ from the mirror. Adjust the position of the screen until a sharp image is formed on the screen. Record the distance V .

(h) Repeat procedure (g) above for the distance $u = 40\text{cm}$ and record the new distance V . Complete the table below

U(cm)	V(cm)	M=V/U	(m+1)
30	22.5	1.333	2.333
40	30.1	1.329	2.329



(i) Given, $f = \frac{V}{(m+1)}$ calculate the values off hence determine the average value f_{av} (3mks)

$$f_1 = \frac{22.5}{2.333} = 9.657\text{cm}$$

$$f_2 = \frac{30.1}{2.329} = 12.924\text{cm}$$

$$f_{av} = \frac{f_1 + f_2}{2} = \frac{9.657 + 12.924}{2}$$

$$= 11.2905\text{cm}$$

