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PHYSICS PAPER 3

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EXAMS**

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KANGA SCHOOL TRIAL SERIES
232/3
PHYSICS
PRACTICAL

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- g) This paper consists of 7 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing*

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Question	Maximum	Candidates Score
1	20	
2	20	
Total		

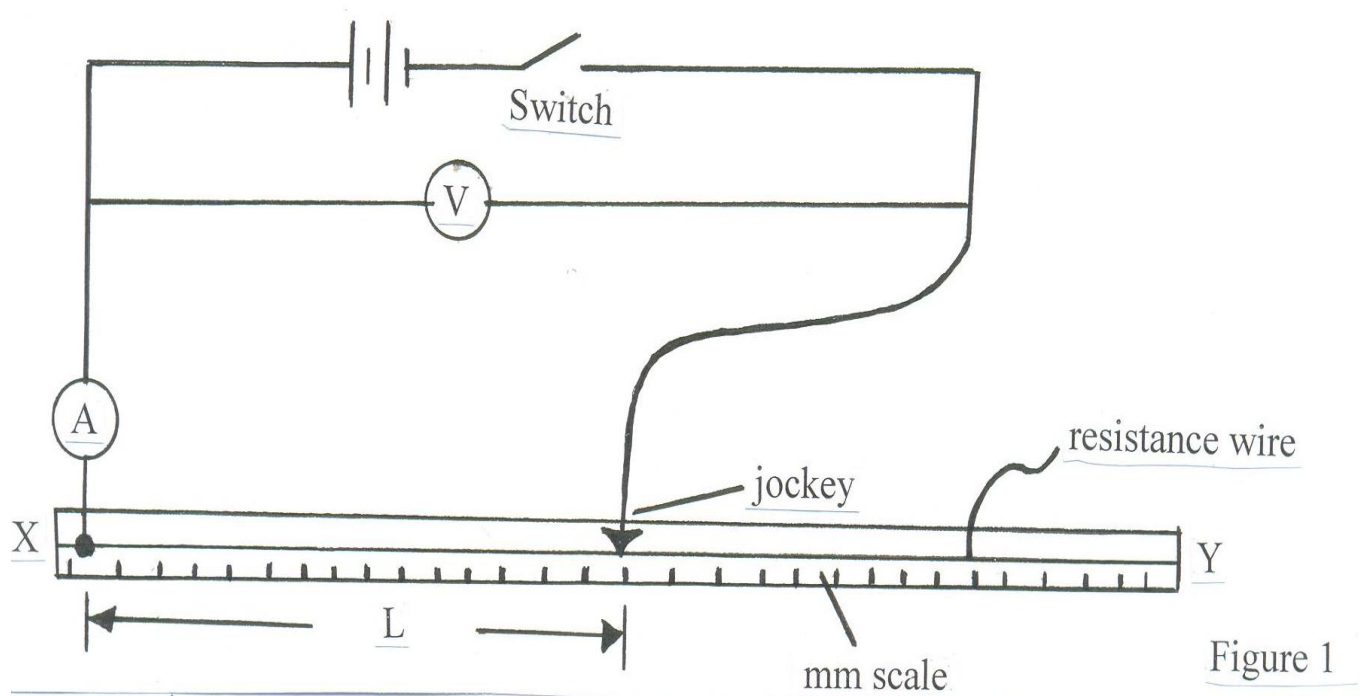
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Question one

You are provided with the following:

- Two new dry cells
- An ammeter 0 – 1A
- A voltmeter 0 – 5V
- A resistance wire labelled XY on mm scale
- Jockey or crocodile clip
- Cell holder
- Switch
- Six connecting wires at least three with crocodile clips at one end

(a) Set up the circuit as shown in figure 1



(b) Close the switch and place the jockey in contact with the resistance wire such that the length L , of the wire $XY = 0.20\text{m}$. Measure and record the current, I , through the wire XY and the p.d, V , across it and enter the results in table 1

(c) Repeat procedure (b) above for the other values of L given. Read and record the corresponding values of I and V .

L (cm)	0.2	0.4	0.5	0.6	0.7	0.8	1.0
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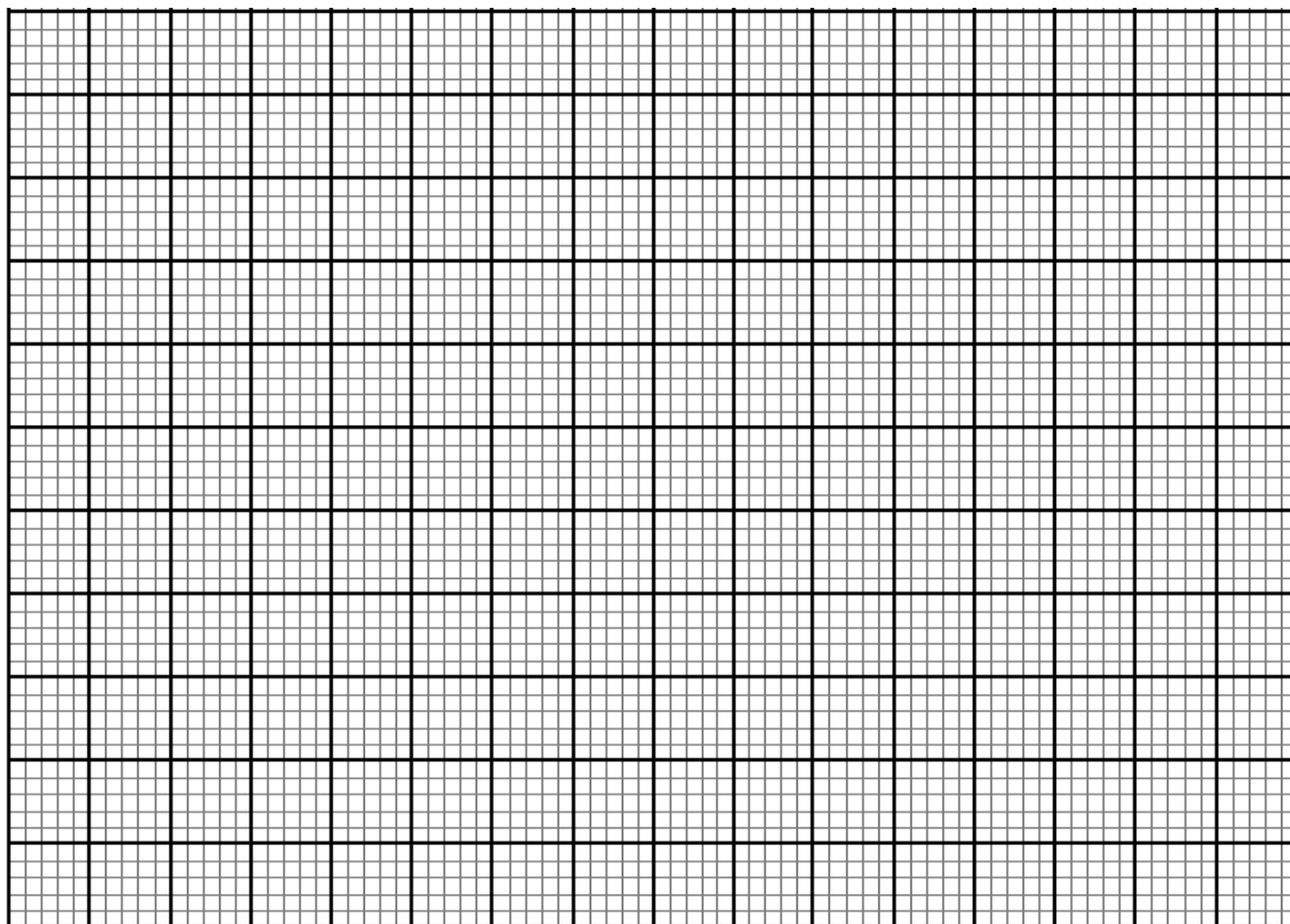
p.d (V)							
I (A)							
R (Ω)							
$1/I$ (A ⁻¹)							

Table 1

(7mks)

(d) Plot a graph of $1/I$ (y axis) against R

(5mks)



(e) Determine the slope, S, of your graph

(3mks)

(f) Given that I and R of the graph are related by the equation $\frac{1}{I} = \frac{R}{E} + \frac{r}{E}$, use your graph to

Determine the values of :

E =

(3mks)

r =

(2mks)

Question two

This question has three parts A, B and C. Answer all the parts

PART A

You are provided with the following:

- A metre rule
- Two identical 100g masses (labeled A and B)
- About 200ml of liquid L in 250ml beaker
- Three pieces of thread, each about half meter 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.

G = _____ cm (1mk)

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

(b) Set up the apparatus as in figure 2

x d B Liquid L stand Figure 2 A

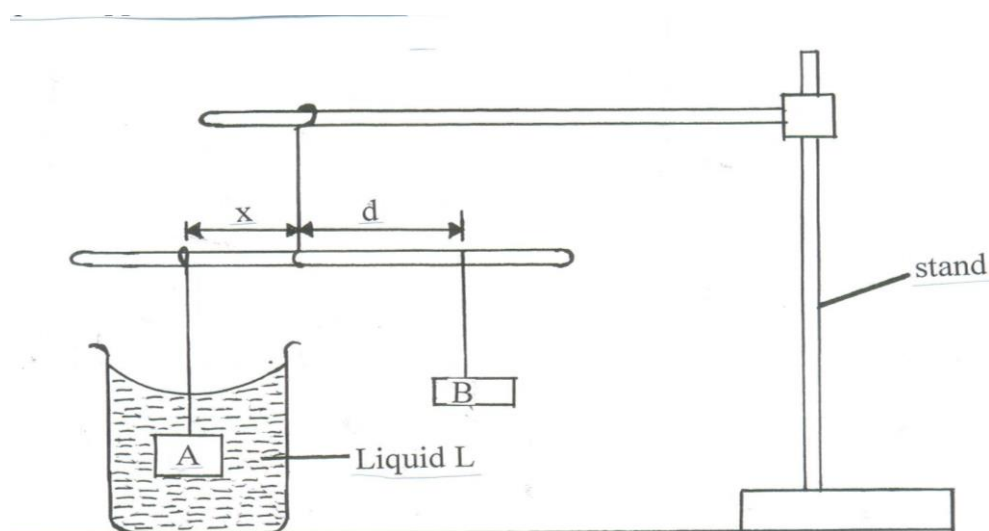


Figure 2

Suspend the mass A at a distance $x = 5\text{cm}$. 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.

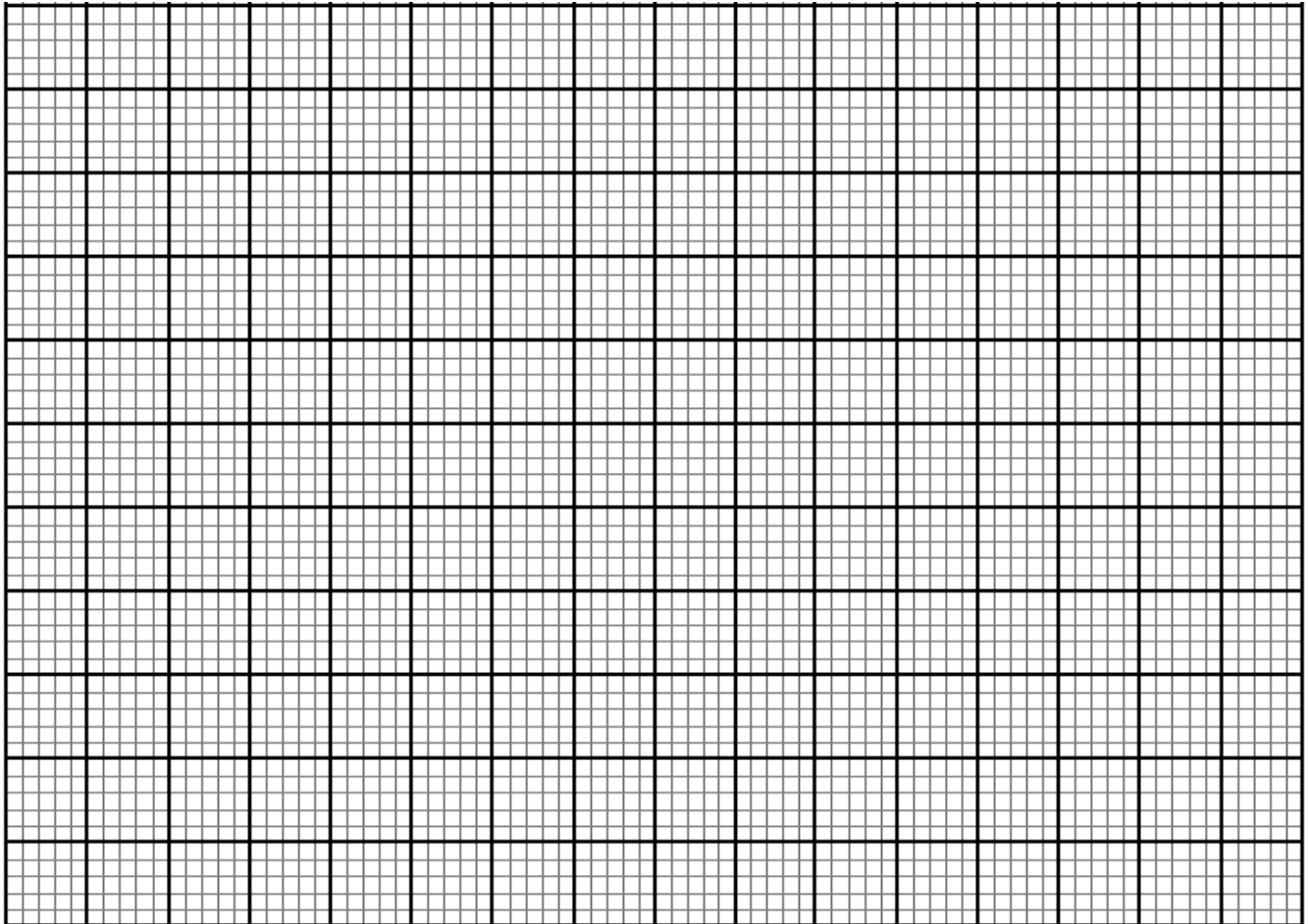
Repeat the same process for other values of x in table 2 and complete the table.

x (cm)	5	10	15	20	25	30
d (cm)						

(3mks)

(c) Plot a graph of d (y axis) against x

(5mks)



(d) Determine the slope, S of the graph.

(2mks)

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

weight of A, find:-

(i) The value of F.

(2mks)

(ii) The upthrust, U

(2mks)

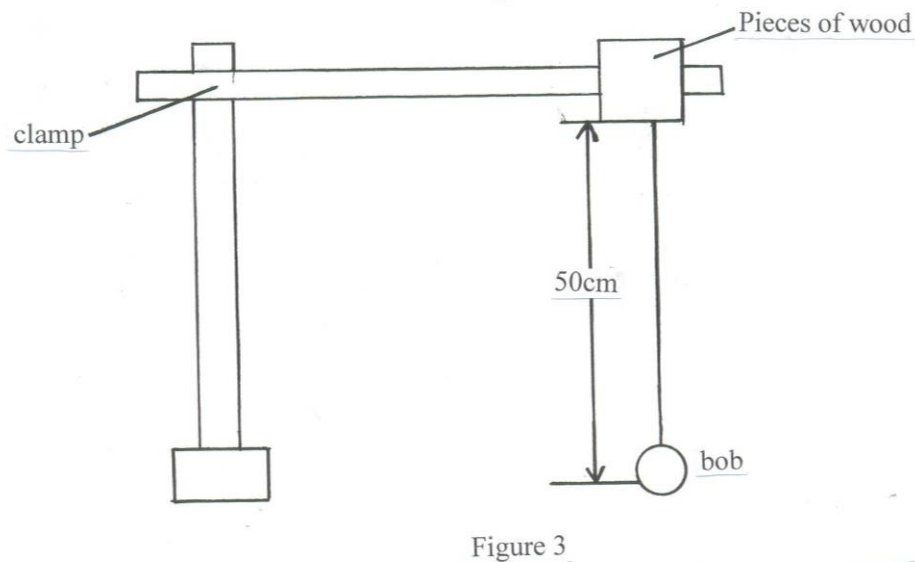
PART B

You are provided with the following:

- A 70cm long thread
- Stop watch
- Metre rule
- Clamp, boss and retort stand
- Pendulum bob

Proceed as follows:

(a) Using the provided thread, tie the bob to be used as a pendulum. Clamp the thread so that the length of the pendulum to the centre of the bob is 50cm as in figure 3.



Displace the bob slightly so as to oscillate along the vertical plane. Time and record the time, t, for 20 oscillations.

t = _____ s (1mk)

$T = \frac{t}{20} =$ _____ s (1 mk)

(b) If the oscillation of the bob is given by the formula $T^2 = \frac{4\pi^2 L}{g}$. Use the values in (a) above to determine the value of g. (1 mk)

PART C

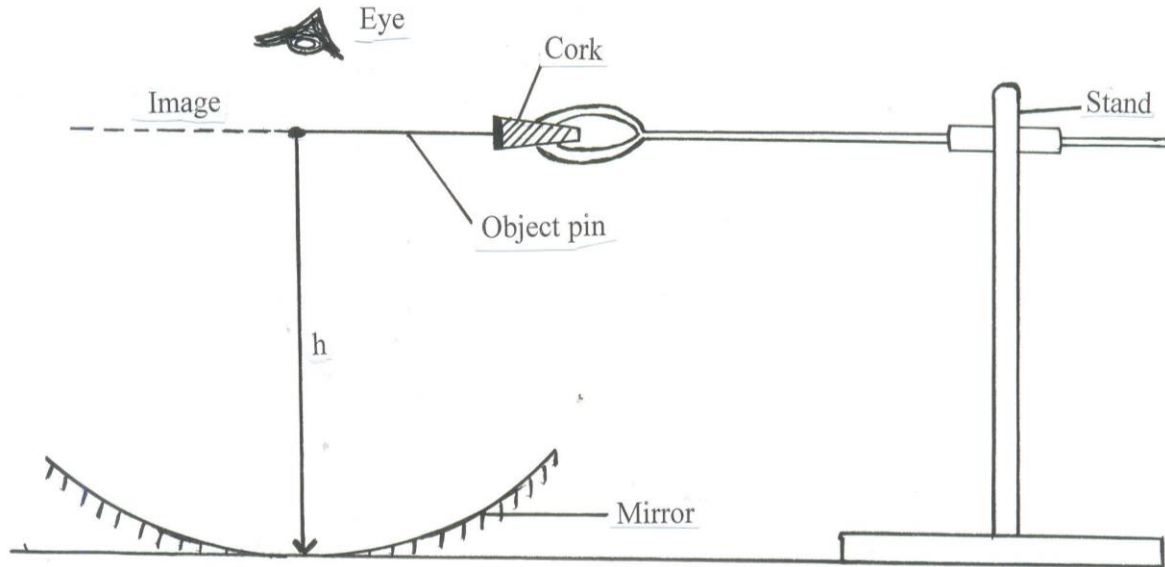
You are provided with the following

- A complete retort stand

- An optical pin
- A concave mirror and a holder or a lump of plasticine
- A cork
- A metre rule

Arrange the apparatus as follows in figure 4.

Figure 1



(a) By adjusting the clamp on the stand, move the object pin up and down until the inverted image and object pin appear to coincide (use – no – parallax method). Measure the distance

$h =$ _____ cm (1mk)

(b) Calculate the value f given that

$f = \frac{h}{2}$ _____ cm (1mk)

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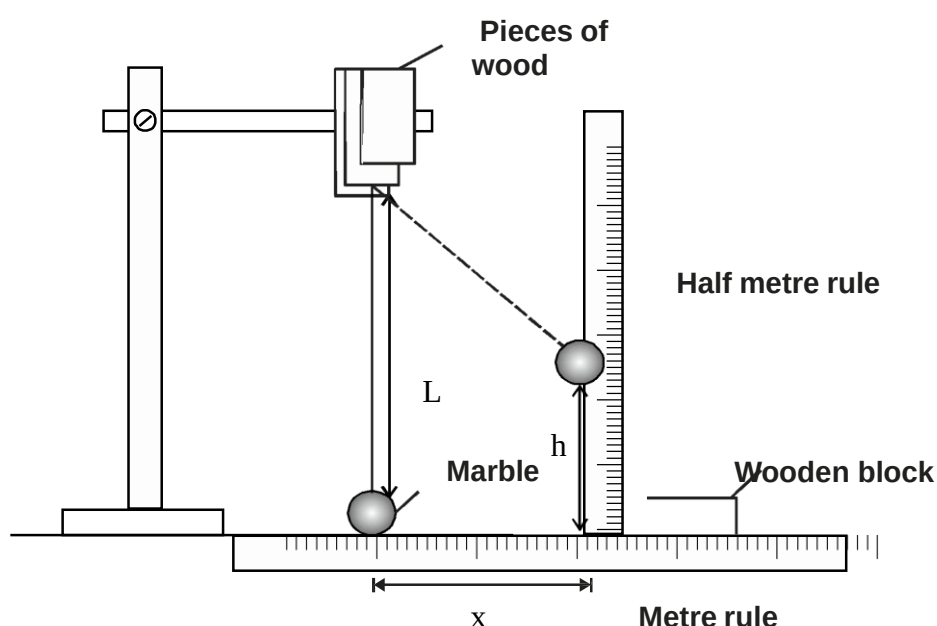
Instructions to Candidates

Answer all questions in the spaces provided.

1. You are provided with

- A marble with a piece of thread attached.
- Two wooden blocks
- A clamp, stand and boss
- A metre rule
- $\frac{1}{2}$ metre rule attached to a wooden block.
- 2 pieces of cello tape
- a stop watch.

- a) Fix the thread between the two wooden blocks and fasten in the clamp. Adjust the thread so that the length L shown in the figure is 50cm.
- b) Fix the metre rule horizontally to the bench using the cello tape provided.
- c) Adjust the clamp so that the marble is next to the end of the metre rule as shown.



- i) Displace the marble by a horizontal distance $x=20\text{cm}$ and measure the corresponding vertical displacement

$h = \dots\dots\dots \text{cm}.$

(1 mark)

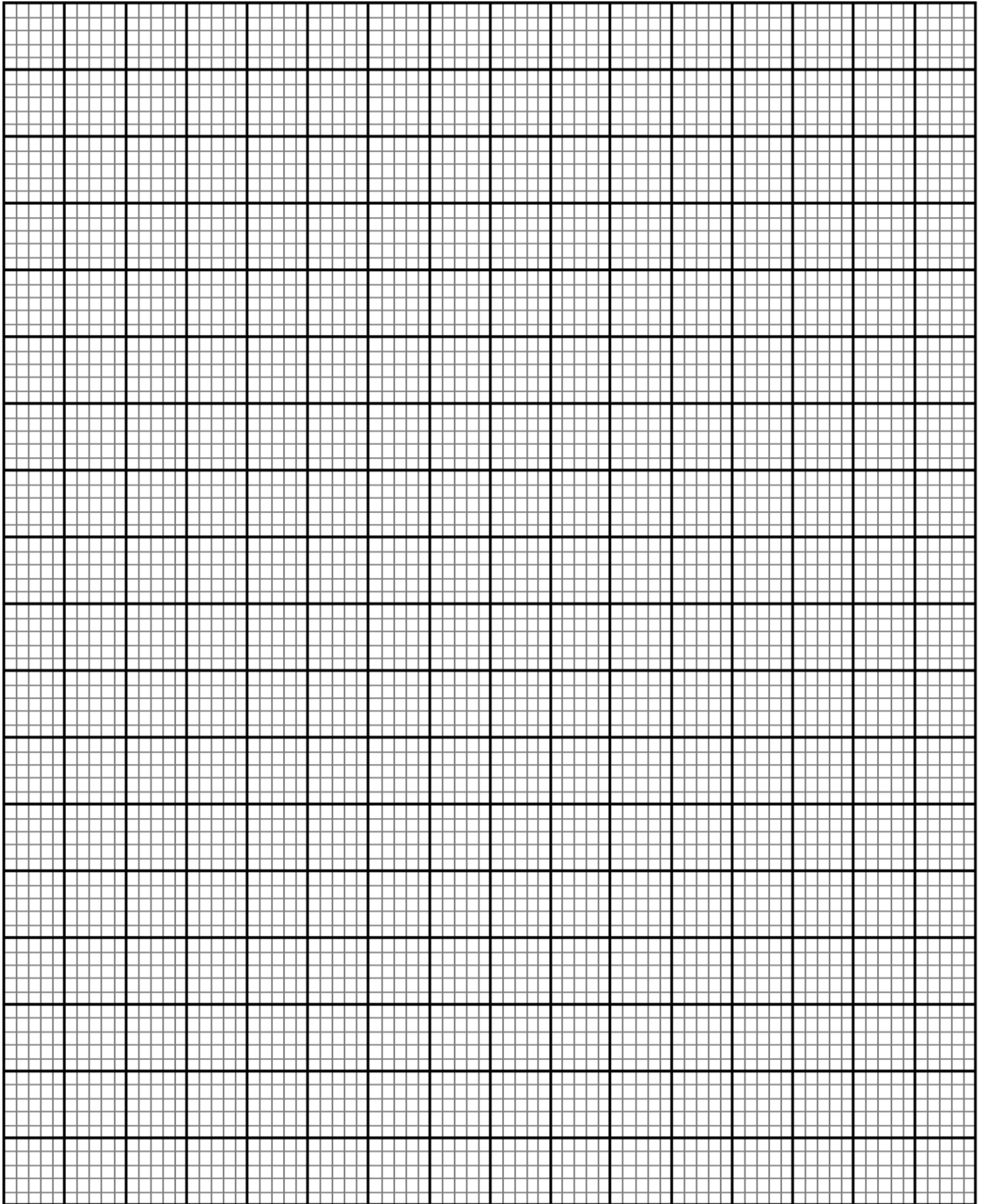
- ii) Repeat the experiment to find h for each of the following values of x and complete the table.

$x(\text{cm})$	$h(\text{cm})$	$x^2(\text{cm}^2)$	$x^2/h(\text{cm})$
20			
25			
30			
35			
40			
45			

(6 marks)

d) Plot graph of x^2/h (y –axis) against h . Draw the line of best fit through the points.

(5 marks)



f) From the graph find the value of x^2/h when $h = 0$

(1 mark)

g) Rinse the clamp slightly without changing the length L so that the marble is free to swing. Displace the marble through a horizontal distance of about 10cm and set it free to swing.

h) Determine the period for one complete oscillation by timing 20 oscillations.

Time for 20 oscillations = ... (1 mark)

Period T = ... (1 mark)

- i) Calculate the value of P from the following equation $T = 2\pi\sqrt{\frac{P}{g}}$ where $g=10\text{m/s}^2$ (3 marks)

2. PART A

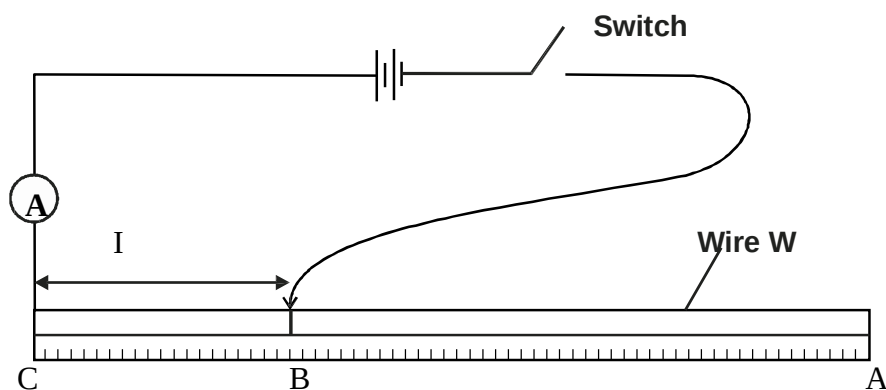
You are provided with the following apparatus.

- An ammeter.
 - A resistance wire about 1m long.
 - 3 dry cells.
 - 3 cell holders.
 - A micrometer screw gauge
 - 5 connecting wires
 - A switch
 - A voltmeter
- Proceed as follows.

- a) Measure the voltage E across the three cells connects in series without any other component.

E = ... V (1 mark)

- b) Connect the circuit as shown below



NB-Switch off the circuit whenever no readings are being taken

- i) Adjust the length BC of the wire to 0.7m using the crocodile clip. Switch on the current and record the ammeter reading. Calculate the reciprocal and enter in the table below.

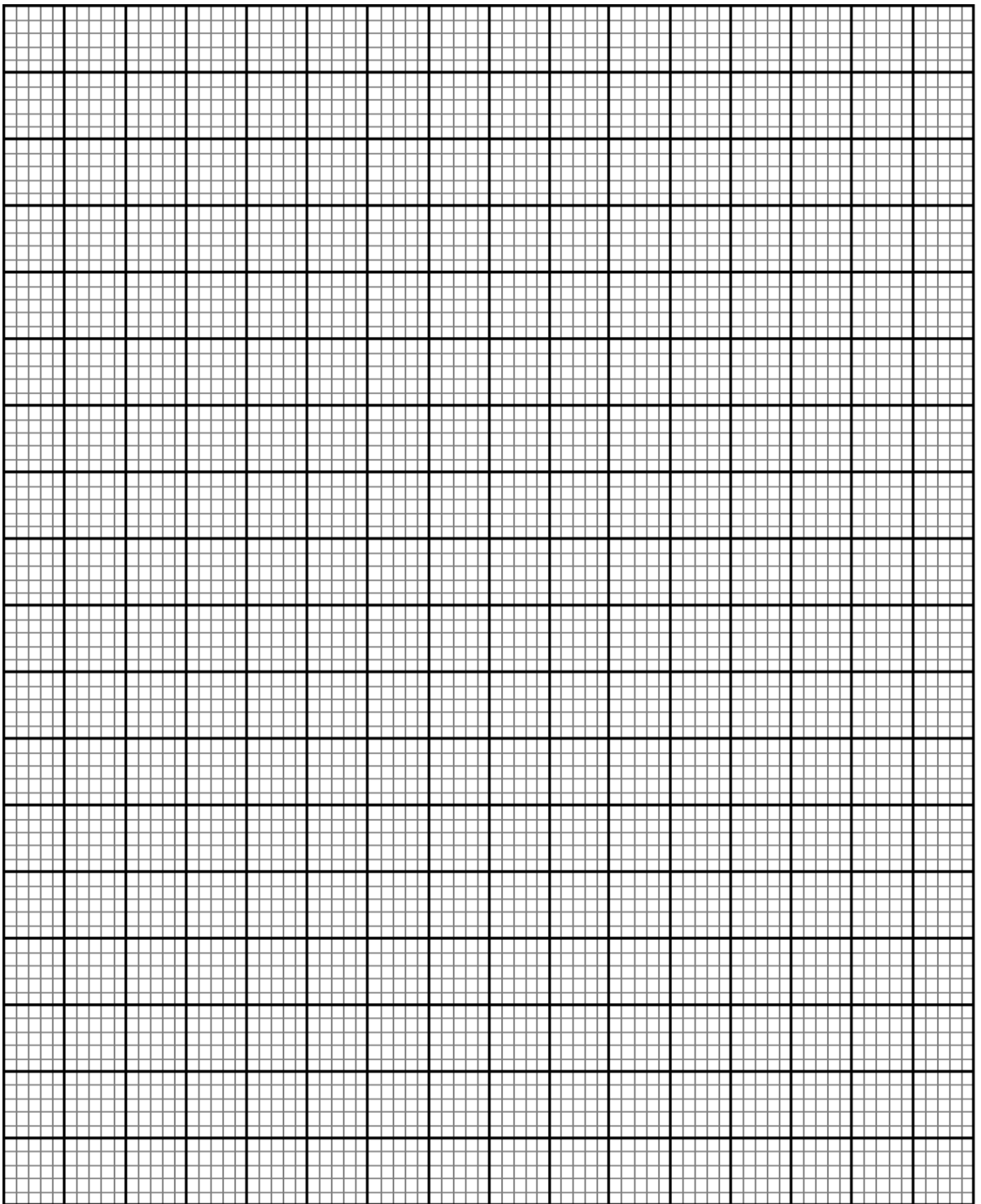
- ii) Repeat the experiment for other values of L and fill the table.

Length $BC(\text{m})$	0.7	0.6	0.5	0.4	0.3	0.2
Current I (A)						
$\frac{1}{I}$						

(3 marks)

- c) i) Plot a graph of $\frac{1}{I}$ against L .

(4 marks)



d) i) Measure the diameter of the resistance wire using a micrometer screw gauge. (1 mark)

d = ... mm

d = ...m

ii) Determine the cross-sectional area A of the wire

(1 mark)

A = ...

e) The equation relating I and E is given by

$$\frac{1}{I} = \frac{KL}{AE} + \frac{Q}{E}$$

Determine the value of K and Q.

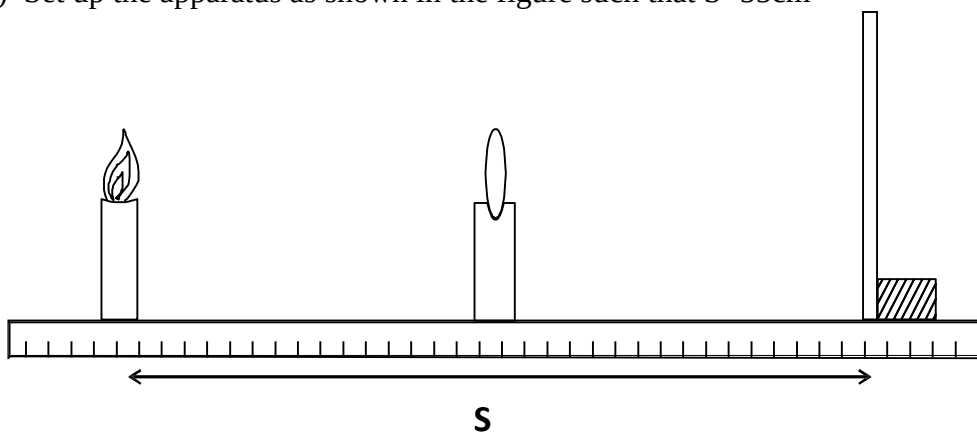
(2 marks)

PART B

- You are provided with the following.

- A lens in a lens holder.
- A candle stick
- A screen
- A metre rule.

a) Set up the apparatus as shown in the figure such that S=55cm



- Adjust the position of the lens to obtain a sharp enlarged image of the candle.
- Measure the distance U_1 between the candle and the lens.
- Without changing the position of the candle and the screen, move the lens to obtain a sharp diminished image of the candle.
- Measure the distance U_2 between the candle and the lens.
- Record the values of U_1 and U_2 in the table below.

b) Repeat the procedure in (a) above for S=45cm. Complete the table.

(3 marks)

S(cm)	U_1 (cm)	U_2 (cm)	$d = U_2 - U_1$ (cm)
55			
45			

c) Given that $f = \frac{S^2 - d^2}{4S}$

where f is the focal length of the lens determine the average value of the focal length f.

(3 marks)

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Question 1

	a	b	c	d	e
Maximum Score	2	6	5	3	4
Candidate's Score					

TOTAL

Question 2

	a	b	c	d	e	g	h	i	j
Maximum Score	2	3	2	3	2	1	3	2	2
Candidate's Score									

TOTAL

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TOTAL

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QUESTION 1 (20 marks)

You are provided with the following apparatus;

- One dry cell and a cell holder
- One milliammeter
- A resistor labelled K
- A chain of six resistors
- A switch
- Connecting wire

Proceed as follows:

(a) Set up the circuit as shown in **Figure 1**

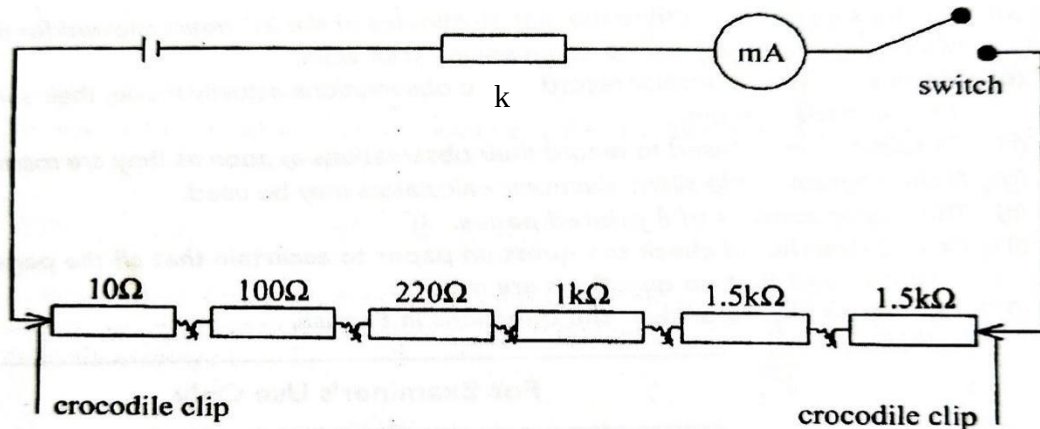


Figure 1

- i) Switch on the circuit to obtain a positive deflection in the milliammeter. Record the reading I_1 of the milliammeter. (1mk)

$I_1 = \dots\dots\dots \text{mA}$

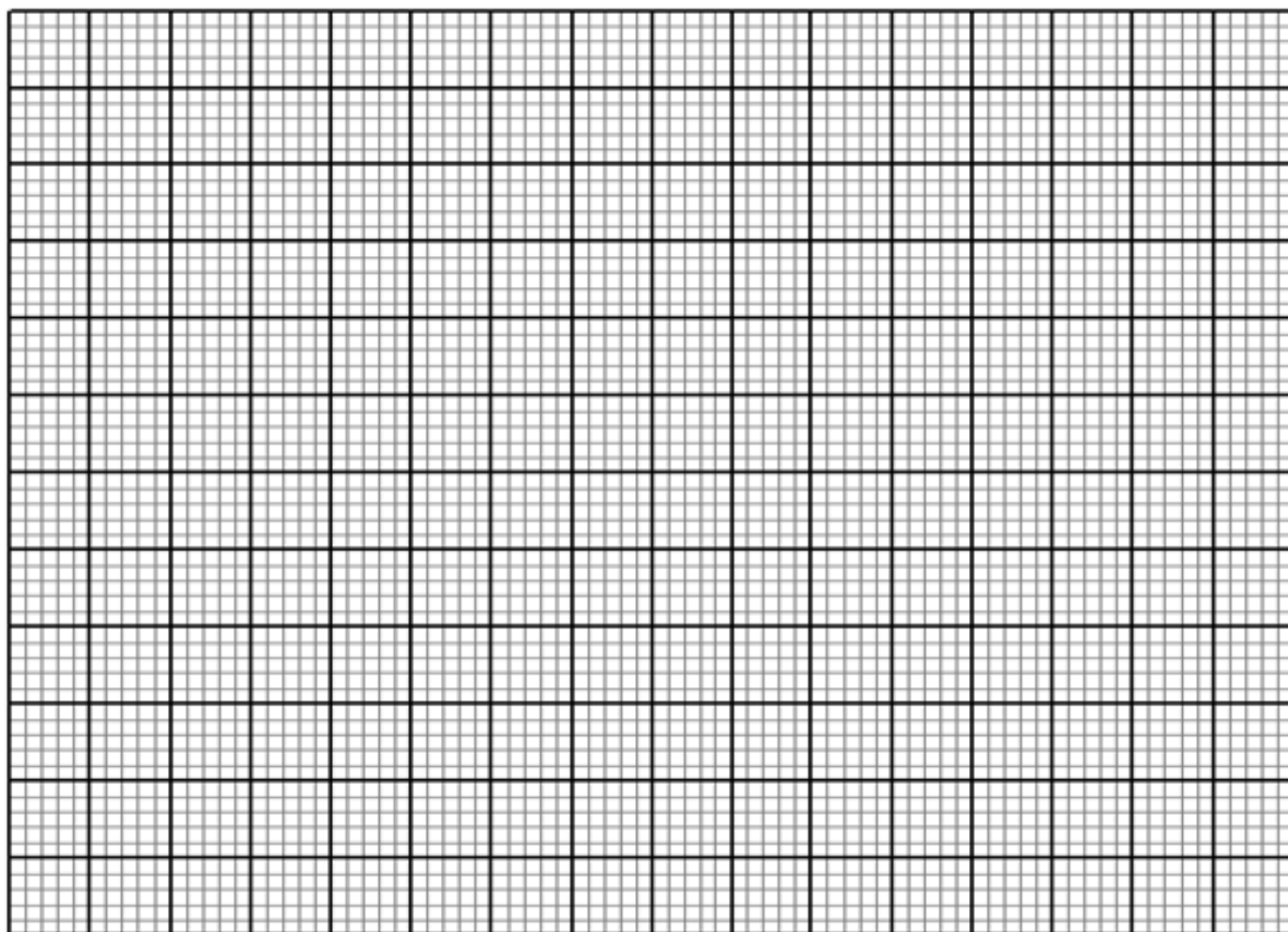
- ii) Remove the crocodile clips from the ends of the chains of resistors and connect them across two resistors in the resistance chain that adds up to $3.0 \text{ k}\Omega$. Record the reading of the milliammeter, I_2 . (1mk)

$I_2 = \dots\dots\dots \text{mA}$

- (b) Repeat the procedure in (a) ii) for other values of resistance R shown in **Table 1** and complete it. (6mks)
(The values of R may be obtained by combining two or more resistors in the chain)

$R \times 10^3 (\Omega)$	1.00	1.33	1.50	2.50	4.00	4.32
I (mA)						
I (A)						
$\frac{1}{I}$ (A ⁻¹)						

- (c) Plot graph of volume, $\frac{1}{I}$ (y-axis) against R (5mks)



- (d) Determine the slope, S of the graph (3mks)

(e) Given that the graph obeys the relationship provided in the equation

$$E = I(R + k)$$

I) Determine the value of **E**

(2mks)

II) Determine the value of **k**

(2mks)

QUESTION 2 (20 marks)

You are provided with the following apparatus:

- A Metre rule.
- A retort stand, boss and clamp.
- A stop watch
- An overflow can (about 180ml)
- Two 50 ml beakers labelled X and Y
- A 25ml measuring cylinder
- Two pieces of sewing thread; 30cm and 100cm
- Mass labelled M
- A 250ml beaker containing about 200ml of liquid L
- A 250ml beaker with water
- Electric beam balance
- Tissue paper

PART A

Proceed as follows:

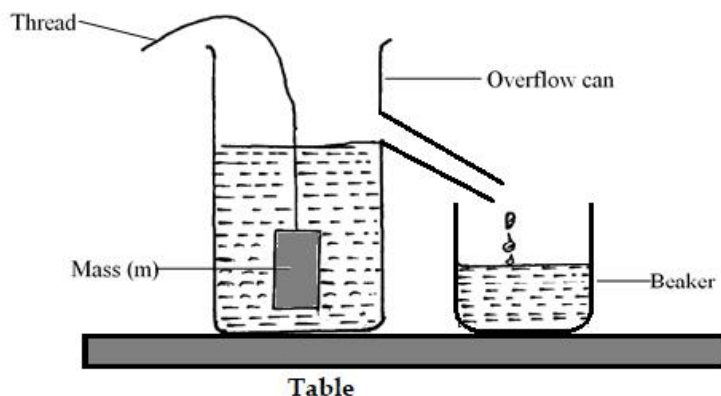
(a) Using the beam balance, measure the mass of **M** and the mass of beaker X

(2mks)

I) Mass, $M = \dots\dots\dots$

II) Mass of beaker X, $M_x = \dots\dots\dots$

- (b) Fill the overflow can with water and until overflow through the spout stops. Place the beaker **X** below the spout. Tie mass **M** with a 30 cm thread and gently immerse it into the overflow can. Wait for about one minute.



- i) Measure the mass of beaker with water and record it as **M₁**. (1mk)

M₁ = ...

- ii) Find the mass of the overflowed water in the beaker **X**, **M_w** (1mk)

M_w = ...

- iii) Pour the water in beaker **X** into the measuring cylinder and determine its volume. (1mk)

V = ...

- (c) Remove mass **M** from water and empty the overflow can. Wipe to the dryness, the mass **M**, beaker **X** and the overflow can using a tissue paper. Now, place beaker **Y** below the spout and fill the can with liquid **L** until it overflows. Wait until the flow stops. Replace beaker **Y** with the empty beaker **X**, and gently immerse mass **M** into the liquid.

- i) After one minute, measure the mass, **M₂** of the beaker with liquid **L**. (1mk)

M₂ = ...

- ii) Determine the overflowed mass **M_L**, of the liquid **L**. (1mk)

M_L = ...

- (d) Determine quantity **R** given by (2mks)

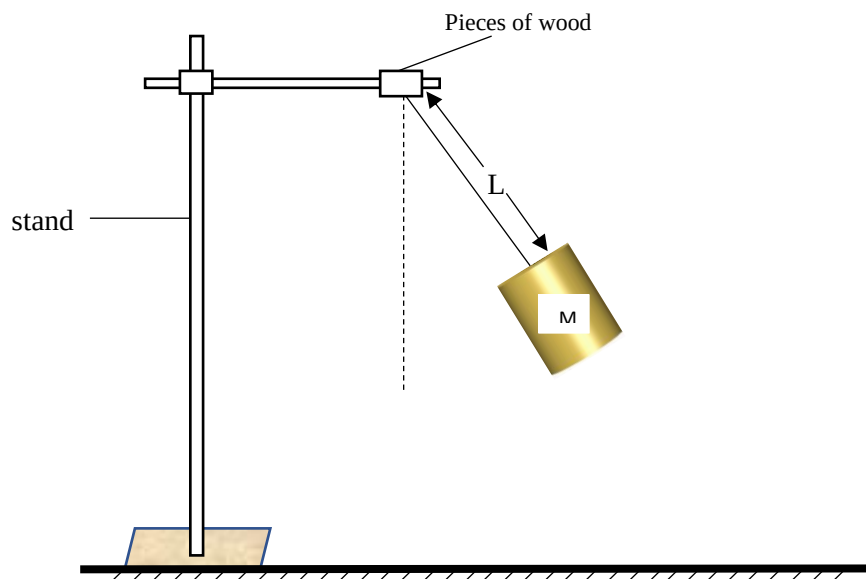
$$R = \frac{ML}{M_w}$$

Hence, find the density of **Liquid L** (density of water = 1000 kgm^3) (1mk)

(e) Determine the density of the **mass, M** (2mks)

PART B

(f) Set up the apparatus as shown in the figure below



Adjust the length L , of the thread so that $L = 70\text{cm}$. Displace mass M slightly so that length L makes small angle of about 10° from the vertical axis and then release it.

(g) Measure and record time t , for twenty (20) oscillations. (1mk)

$t = \dots\dots\dots$

(h) Repeat (g) above for 15 oscillations and 10 oscillations respectively. Record the time in the table below (3mks)

Number of oscillations (n)	20	15	10
Time, t (s)			
Periodic time, $T = \frac{t}{n}$ (s)			

(i) Find the average periodic time, T_{av} (2mks)

(j) Find the value of β given the equation below (2mks)

$$\frac{1}{(f_{av})^2} = \frac{4\pi^2 L}{\beta}$$

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Question 1

You are provided with the following:

- a voltmeter
- two new dry cells and a cell holder
- a switch
- a resistor labeled R (4Ω)
- a wire mounted on a mm scale and labeled G.
- a micrometer screw gauge (to be shared)
- six connecting wires with six crocodile clips

Proceed as follows

- a. i) Record the length L_0 of the wire labeled G

$L_0 = \dots\dots\dots$ (1 mk)

- ii) Use the micrometer screw gauge provided to measure the diameter of the wire labeled G at two different points and determine the average diameter, d.

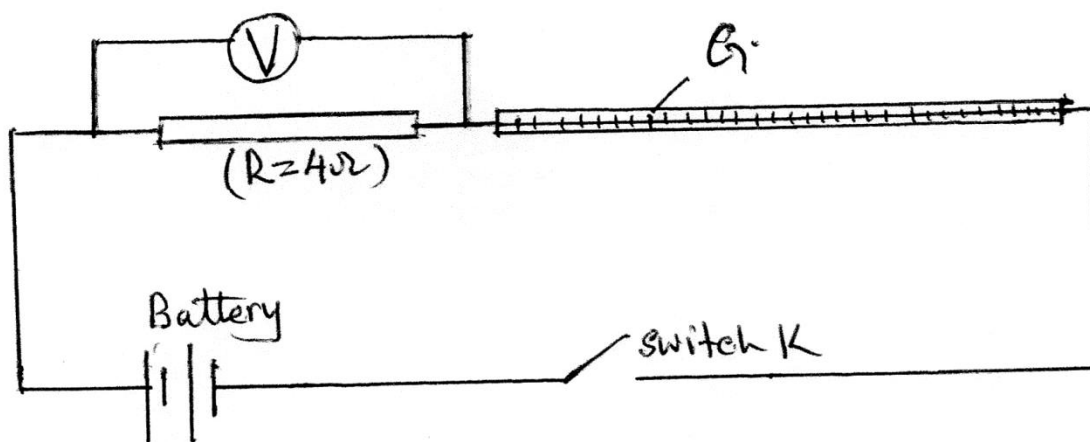
The diameter $d_1 = \dots\dots\dots\text{mm}$, $d_2 = \dots\dots\dots\text{mm}$ (1mk)

Average diameter $d = \dots\dots\dots\text{mm}$ (1mk)

- iii) Determine the radius r of the wire in metres.

Radius $r = \dots\dots\dots\text{m}$ (1mk)

- b. Set up the apparatus as shown in the circuit diagram in the figure below.



- i. Use the voltmeter provided to measure the p.d V_R across R and the p.d, V_G across G when the switch is closed.

$V_R = \dots\dots\dots$ Volts (1/2 mk)

$V_G = \dots\dots\dots$ Volts (1/2 mk)

Open the switch

- ii. Use the value of R provided and the value of V_R in b (i) above to determine the current I flowing through R when the switch was closed.

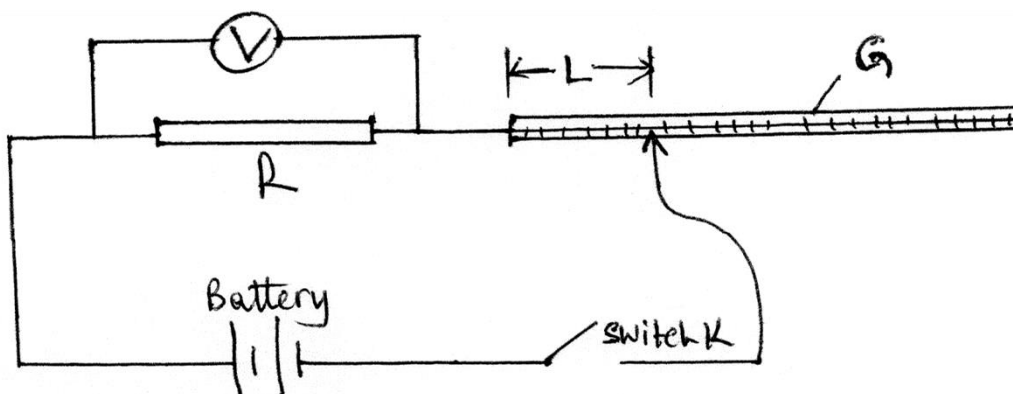
$I = \dots\dots\dots$ Amperes (1mk)

- iii. Determine the constant H given that

$$H = \frac{100V_G}{I \times L_0}$$

$H = \dots\dots\dots \Omega m^{-1}$ (1mk)

- c. Connect the voltmeter across R as shown in the figure below.



Adjust the position of one crocodile clip on the wire G to a point such that the length L of the wire in the circuit is 5cm (see the figure above). Close the switch.

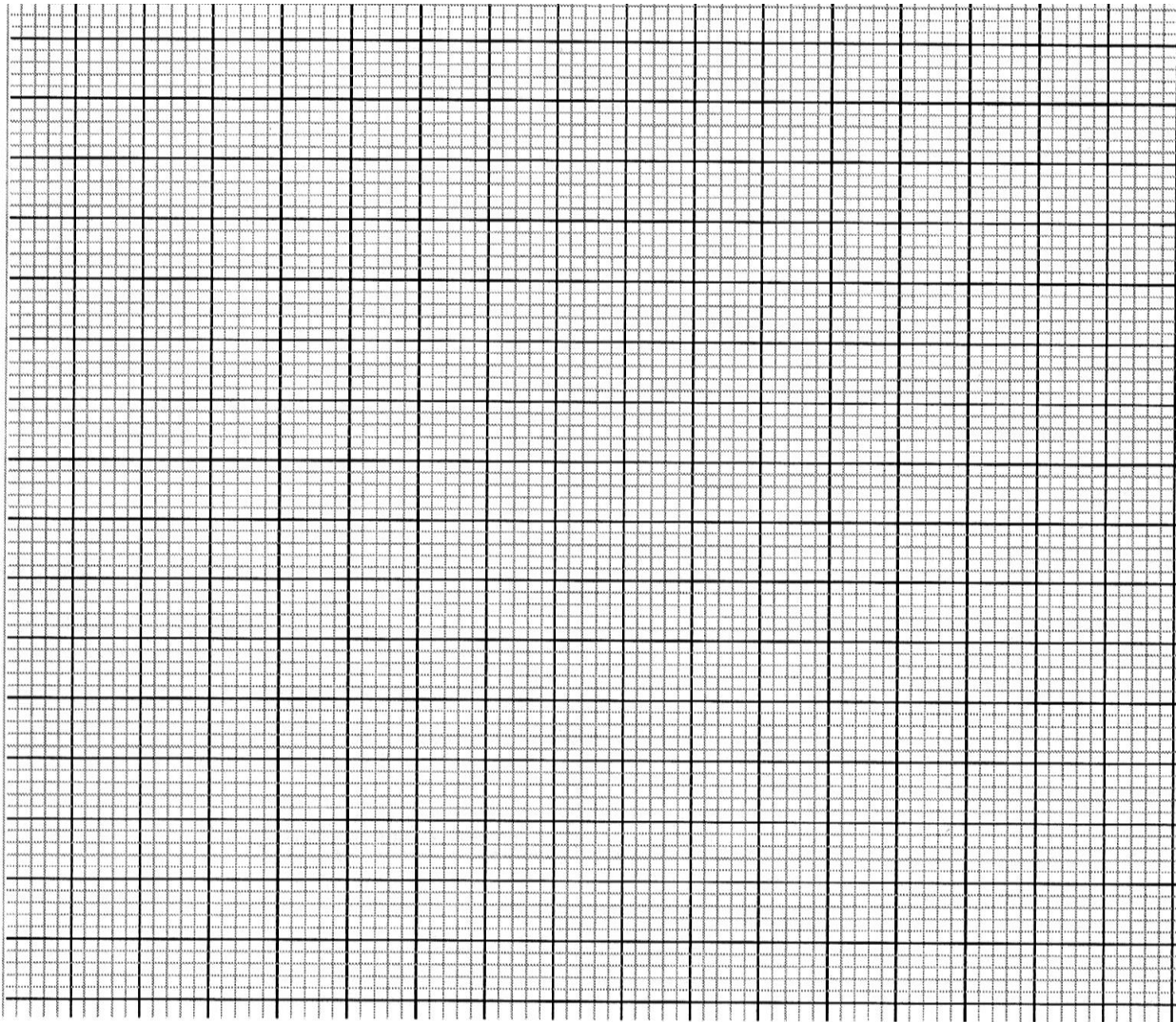
Read and record in the table 2 the value for the p.d across R. Open the switch.

d. Repeat the procedure in (c) above for the other values of L shown in table 2. (3mks)

Table 2

Distance L (cm)	0	5	10	20	30	40	60	70
p.d V across R (V)								

e i. On the grid provided plot the graph of V (y-axis) against L (5mks)



(ii) From the graph determine L_1 , the value of L when $V = \frac{V_0}{2}$ where V_0 is the p.d

when $L = 0$ (1mk)

f. Determine the constant D for the wire given that (2mks)

$$D = \frac{R}{L_1} \times \frac{300}{V_0}$$

g. Determine the constant p given that

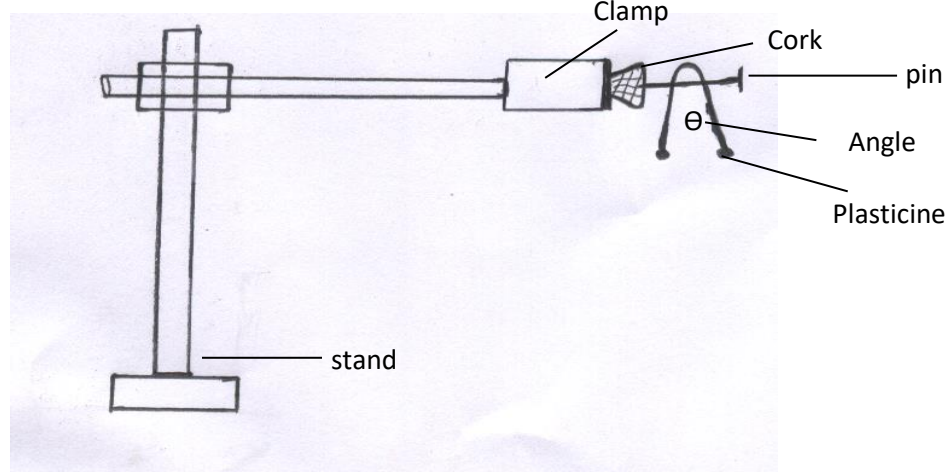
$$p = \frac{\pi r^2}{2} (D + H) \text{ where } r \text{ is the radius of the wire in metres.} \quad (2 \text{ mks})$$

QUESTION 2

You are provided with the following apparatus:

- clamp
- boss
- stand
- optical pin
- copper wire (15 cm long)
- protractor
- two pieces of plasticine of about 0.5cm diameter
- cork

(a) Set up the apparatus as shown in the diagram below



(b) Bend the wire in the middle so as to make an angle of 50° . Attach the two small pieces of plasticine at both ends of the bent wire as shown in the diagram.

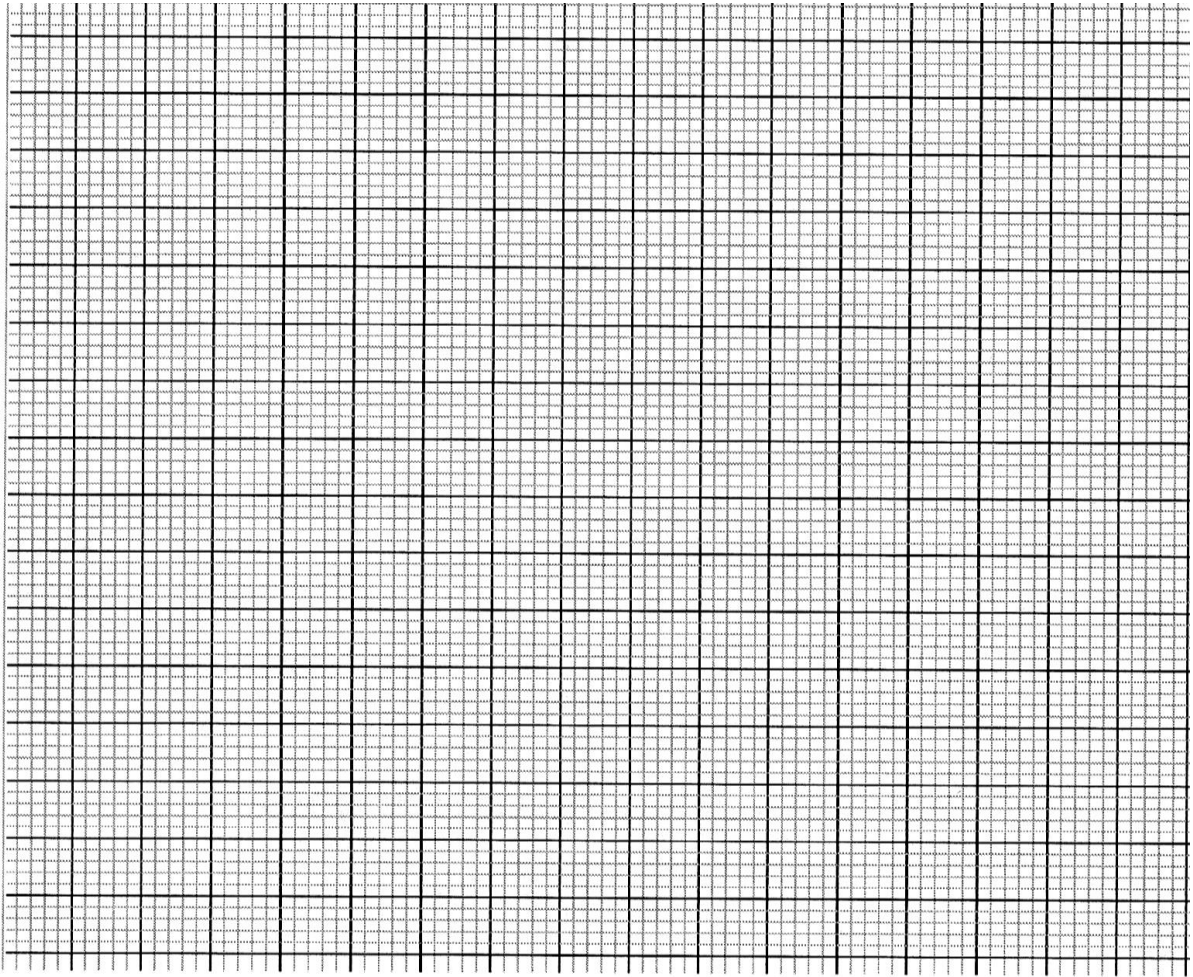
(c) Place the bent wire on the optical pin and give a small horizontal displacement. Take the time for 10 complete oscillations and record in the table below.

(d) Repeat the procedure above for other values of θ and complete the table below.

(9mks)

Angle θ°	Time 't' for 10 oscillations (s)	Period T (s)	Frequency f (Hz)	$f^2 \text{ (Hz)}^2$	$\cos \left(\frac{\theta}{2} \right)$
50					
60					
70					
80					
90					
100					

(i) On the graph paper provided, plot a graph of f^2 (y-axis) against $\cos \frac{\theta}{2}$ (5mks)



Determine the gradient 'S' of the graph

(3 mks)

(ii) The equation for the oscillation of the wire is given by the formula:

$$f^2 = \frac{150}{4\pi^2 L} Z \cos\left(\frac{\theta}{2}\right)$$

Given that $L = 0.15\text{m}$, use the gradient of the graph to determine the value of Z . (3mks)

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KENYA HIGH SCHOOL TRIAL SERIES

232/3 PHYSICS PRACTICAL

INSTRUCTIONS TO CANDIDATES

- a) Write **your name** and **index number** in the spaces provided
- b) Answer **ALL** the questions in the spaces provided in the question paper.
- c) You are supposed to spend the first 15 minutes of the 2 1/2 hours allowed for this paper reading the whole paper carefully before commencing your work.
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- e) Candidates are advised to record their observations as soon as they are made.
- f) **Non-programmable** silent electronic calculators and KNEC mathematical table may be used.
- g) This paper consists of 7 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

FOR EXAMINER'S USE ONLY:

QUESTION	TOTAL MARKS	CANDIDATE'S SCORE
1	20	
2	20	
GRAND TOTAL	40	

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QUESTION ONE

You are provided with the following apparatus: clips

- Two new size 'D' dry-cells
- switch
- milli-ammeter
- voltmeter (0-3V)
- two enameled copper rods
- rheostat (0 – 100 Ω)
- eight connecting wires with atleast 4 fitted with crocodile
- Micrometer screw-gauge (to be shared)
- 50 ml beaker (labelled, A)
- 75 ml of distilled water (labelled, B)
- solid X
- Measuring cylinder
- Thermometer
- Glass-rod for stirrer
- Sand-paper

Proceed as follows:

- a) Measure the temperature of the distilled water in beaker, B

Temperature, θ = ... (1 mark)

- b) Place the provided solid X into the beaker labelled, A. measure 50 ml of the distilled water and gently pour it into beaker A and stir gently until all the solid X is dissolved to form solution, C.

- c) Measure the diameter, d of one of the copper rods.

i. diameter, d = ... m (1 mark)

ii. determine the cross-section area, A of the copper rod (2 marks)
 A =

- d) Using the sand paper, remove the insulating coating at the both ends of each of the copper rods. Now set-up the apparatus as shown in figure 1 below.

- e) With the help of the rheostat, set the current value to 30 mA and measure its corresponding voltage, V .

V = ... (1 mark)

- f) Repeat the above procedure for the values of current indicated in the table, 1 below and note their

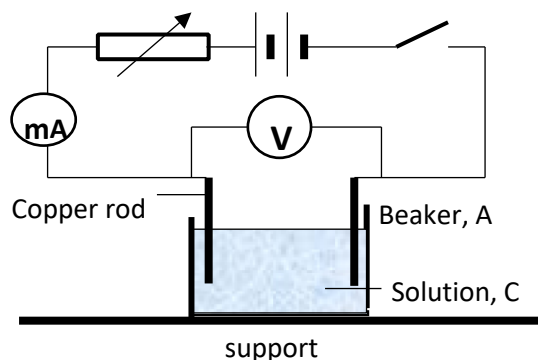


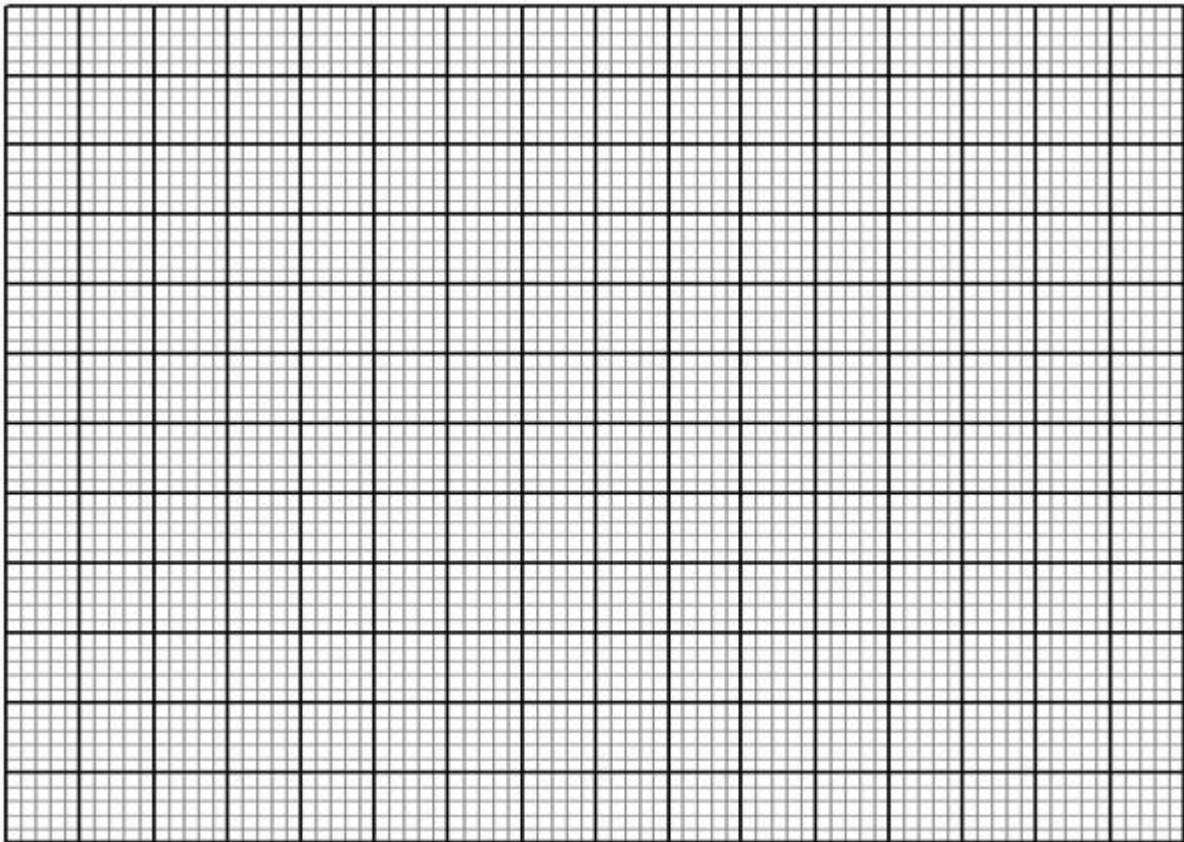
Figure 1

corresponding voltages. Complete the table. (5 marks)

Table 1

Current, I (mA)	30	40	50	60	70
Current, (A)					
Voltage, V					

g) In the grid provided, plot a graph of voltage (y-axis) against current (A) (X-axis) (5 marks)



- h) Determine the slope, S of the graph (3 marks)
- i) The voltage and current are related by the equation: $V - \frac{bI}{A} = 0$
Determine the value of b . (2 marks)

$b =$

QUESTION TWO

You are provided with the following apparatus:

- Complete retort-stand (clamp, boss and stand)
- Four 100g masses (or its equivalent)
- Half metre-rule
- Some celotape
- Metre-rule
- Vernier calipers (to be shared)
- G-clamp
- String/thread (about 30 cm long)
- Office pin
- One 50g mass
- Knife-edge

PART A

Proceed as follows:

- a) Arrange the apparatus as shown in figure 2, below. Ensure the 10 cm mark of the half metre-rule is at the edge of the table and firmly held by the G-clamp while the pin (pointer) is at the 90 cm mark on the scale of the metre-rule. (The clamp should not be removed for the entire duration of carrying-out this experiment)

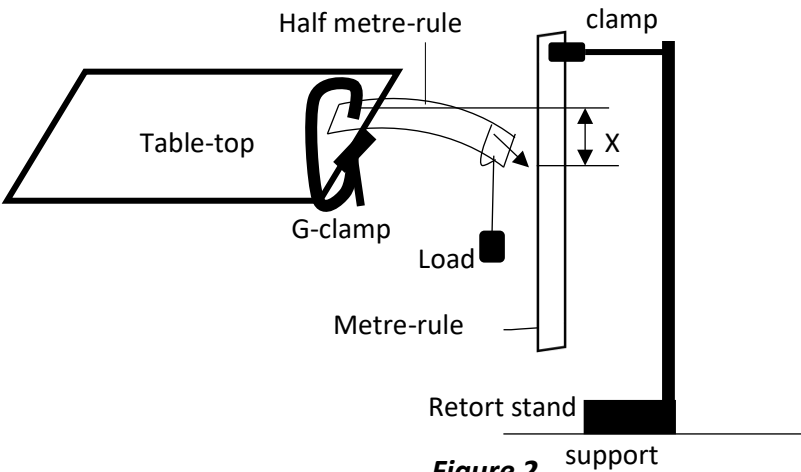


Figure 2

- b) Suspend one 100 g mass at the 49.5 cm mark and record the new pointer reading, P_1

$P_1 = \dots\dots\dots$ (1 mark)

- c) Continue adding the load in 100 g steps, each time recording the pointer position. Ensure that the half metre-rule is not overloaded.
- d) Determine the amount of sagging, X and complete the table, 2 below. (6 marks)

Table 2

Mass (g)	Load (N)	Pointer position (cm)	Amount of sagging, X (m)
100			

200			
300			
400			

PART B

Procedure

- e) Use the Vernier calipers to determine the width, a and breadth, b of the half metre-rule

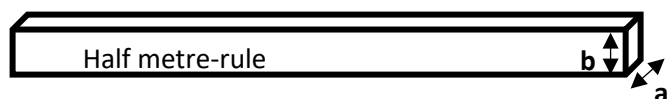


Figure 3

Width, $a = \dots\dots\dots$ cm (1 mark)

breadth, $b = \dots\dots\dots$ cm (1 mark)

- f) Using a loop of thread suspend the 50g mass at the 49.5cm mark on the half-metre rule.
g) With the 50g mass fixed at that position adjust the position of the half-metre rule on the knife edge until it balances horizontally as shown in figure 4.

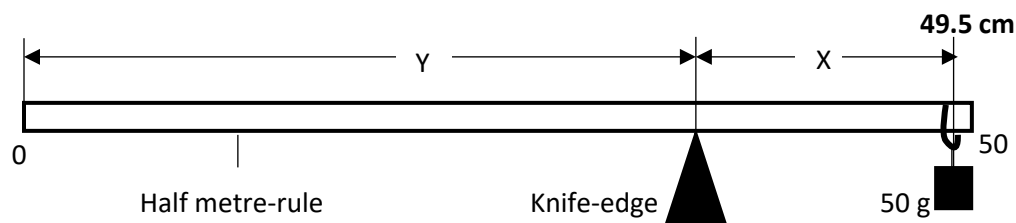


Figure 4

- h) At the balance position, read off the length x and y and record in table 3.
i) Using the values of x and y obtained in 'h' above, determine the weight, W of the half metre-rule (3 marks)

W = ...

- j) Move the suspended mass 2cm towards the centre of the rule and repeat parts (g) and (h) to obtain other values of x and y so as to complete table 3. (4 marks)

Table 3

Position of the mass of 50g	X (cm)	Y (cm)
49.5 cm mark		
47.5 cm mark		
45.5 cm mark		
43.5 cm mark		
41.5 cm mark		

- k) Given that quantity, P is given by: $p = \frac{W}{g (5ab \times 10^{-5})}$; determine the value of P (3 marks)

- l) State the significance of the quantity, P (1 mark)

THIS IS THE LAST PRINTED PAGE

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KISII SCHOOL TRIAL SERIES

PHYSICS

Paper 3 (Practical)

Time: 2.5 Hours

INSTRUCTIONS TO CANDIDATES:

- Write your **name** and **admission number** in the spaces provided above.
- You are supposed to spend the first 15 minutes of the 2 ½ hours allowed for this paper reading the whole paper carefully before commencing your work.
- Marks are given for a clear record of the observation actually made, their suitability, accuracy and the use made of them.
- Candidates are advised to record their observations as soon as they are made
- Non-programmable silent electronic calculators **may be** used.
- Candidates should check the question paper to ascertain that all the pages are printed and that no questions are missing.

For Examiner's Use Only.

Question	Maximum score	Candidate's score
1	20	
2	20	
Total	40	

QUESTION 1

You are provided with the following: -

- 2 dry cells
- A cell holder
- A switch
- An ammeter
- Five connecting wires
- Wire mounted on the metre rule labelled X
- A micrometer screw gauge [to be shared
- A Voltmeter

Proceed as follows

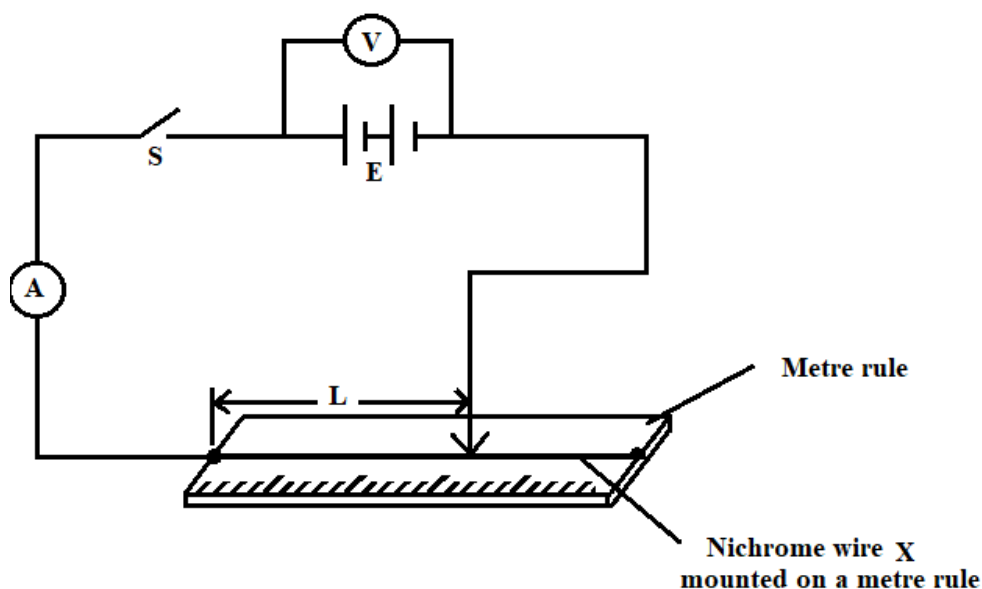
(a) Measure the diameter D of the wire labelled X on the metre rule.

D m

(1 marks)

(b) Determine the cross-section area of the wire, A m^2 (2 marks)

(b) Connect the circuit as shown in the figure below.



(c) **Measure** the voltage E from the Voltmeter, before closing the switch.

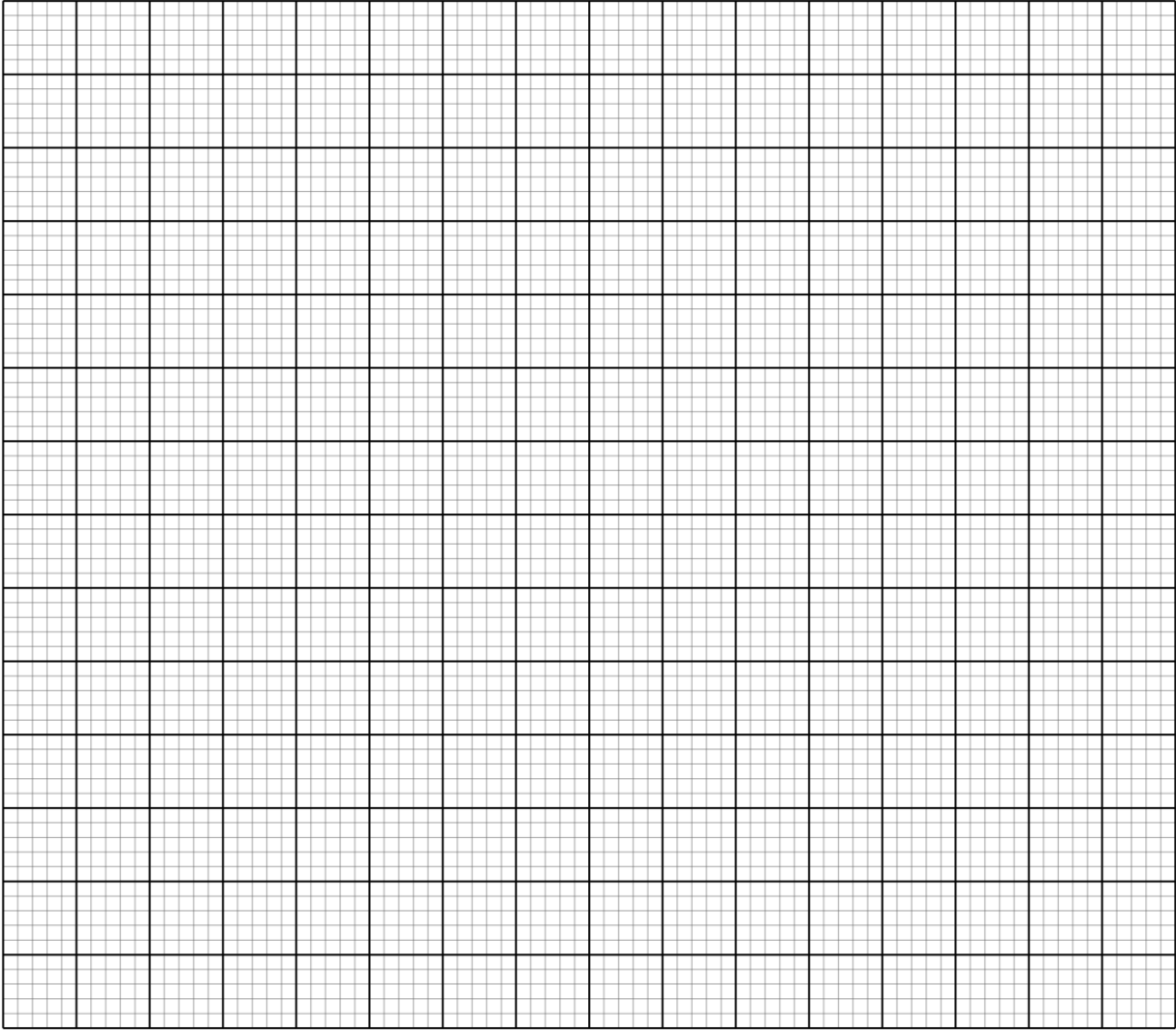
E = ...

(1 mark)

(d) Adjust the length, ℓ of the wire to 0.2m, close the switch, S and read the value of current and record in the table below.

Length, ℓ (m)	0.2	0.3	0.4	0.5	0.6	0.7
Current, I (A)						
$\frac{1}{I}$ (A^{-1})						

- (e) Repeat the procedure in (c) above for the values of lengths given. (5 marks)
- (f) **Calculate** the value of $\frac{1}{I}$ and record in the table above. (1 mark)
- (g) On the grid provided **plot** a graph of $\frac{1}{I}$ (y- axis) against l (5 marks)



(h) **Determine** the gradient of the graph. (2 marks)

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(i) Given that, $\frac{1}{l} = \frac{\delta}{EA} l + \frac{r}{E}$, determine the value of δ and r . (3 marks)

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QUESTION 2

You are provided with the following:

- a metre rule
- knife edge raised 20 cm above bench
- one 50 g mass and one 100 g mass
- a beaker or any container
- some thread
- some water in a beaker
- Liquid L in a beaker
- tissue paper
- A triangular glass prism
- A piece of soft board
- Four optical pins
- Four office pins
- A sheet of plain paper

PART A

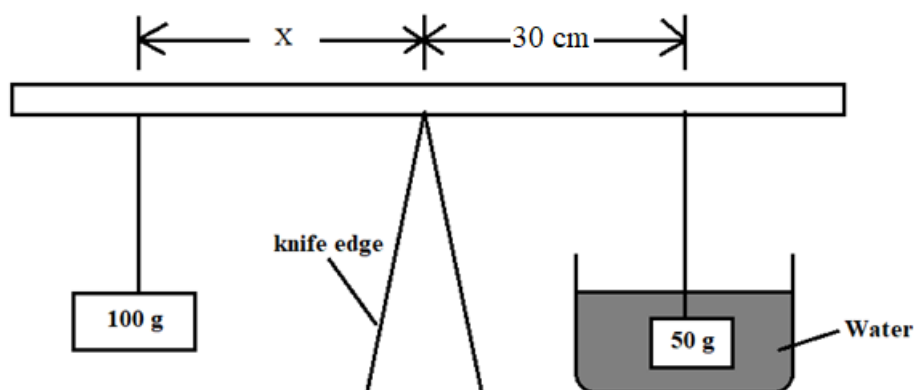
Proceed as follows:

(a) Balance the metre rule on knife edge provided and record the reading of the point of balance.

Balance point = ... cm (1 mark)

For the rest of this experiment the knife edge must be placed at this position

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



(c) Use the thread provided to hang the masses such that the positions of support can be adjusted. The balance is attained by adjusting the position of the 100g mass.

Note that the distances X is measured form the knife edge and the 50g mass is fully submerged in the water.

(d) Record the value of X .

$X = \dots\dots\dots$ cm (1 mark)

(e) Apply the principle of moments to determine the apparent weight W_w of the 50 g mass in water and hence determine the upthrust U_w in water

$W_w \dots\dots\dots$ N (2 marks)

$U_w \dots\dots\dots$ N (1 mark)

(f) Remove the 50 g mass from the water and dry it using tissue paper.

(g) Maintaining the distance of 30cm in step (d), now balance the metre rule when the 50 g mass is fully submerged in the liquid L Record the value of the distance X.

$X = \dots\dots\dots$ cm (1 mark)

(h) Apply the principle of moments to determine the weight W_L of the 50 g mass in the liquid L and hence determine the upthrust U_L in the liquid

(i) $W_L = \dots\dots\dots$ (2 mark)

(ii) $U_L = \dots\dots\dots$ (1 mark)

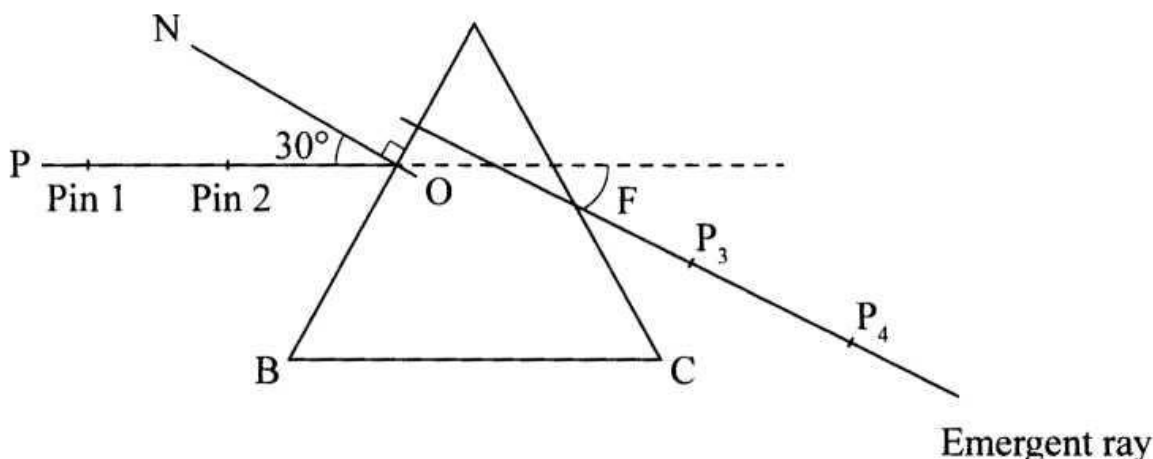
(iii) Hence determine the relative density RD of liquid L

(2 marks)

PART B

Proceed as follows:

- Place the plain sheet of paper on the soft board and pin it using the office pins at the comers. Trace the triangular prism outline of the prism on the sheet of paper (use the upper part to leave space for two other outlines on the same page). Label the vertices of the outline at A, B and C. Remove the prism from the paper.
- On the outline at a point O near the centre of side AB draw a normal ON.
- Draw a line PO at an angle of 30° to the normal ON as shown in **the figure below**.
- Replace the prism accurately on the outline. Fix two optical pins vertically on the line PO at different points (**see the figure below**).
- View the images of the two pins through side AC of the outline. Fix a third and fourth pin vertically such that they are in line with the images of the first and second pin. Remove the prism and the pins. Draw a line joining the marks made by the third and fourth pins and extend it to join line PO (also extended) as shown below.



Measure F, the angle of deviation of the emergent ray.

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(f) Repeat part (e) for other angles of incidence shown in the table below. (Draw a fresh outline of the prism for each angle of incidence)

Complete table 1 (3 marks)

Angle of incidence	30°	50°	70°
Angle of deviation			

(g) Determine:

(i) E the angle of emergence (between the emergent ray and the normal at the point of emergence) at the least angle of deviation. (2 marks)

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(ii) K given that $K = 2 \sin \left(30 + \frac{F_0}{2} \right)$ (where F_0 is the least angle of deviation) (2 marks)

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(Attach the plain sheet of paper to your question paper and hand them in).

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MANGU SCHOOL TRIAL SERIES

232/3

PHYSICS PRACTICAL

INSTRUCTIONS TO CANDIDATES

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QUESTION ONE

This question consists of two parts A and B; attempt both parts.

PART A

You are provided with the following:

- Two metre-rules.
- A stopwatch.
- A half metre rule.
- Two retort stands, two bosses and two clamps.
- Some sewing thread.
- A pendulum ball.

Proceed as follows:

(a) Clamp one metre rule horizontally on the two stands so that it is on a vertical plane. Suspend the second metre rule so that it balances on one point as shown in figure 1 below. Note the balance point as the centre of gravity of the metre rule. Let this be point A.

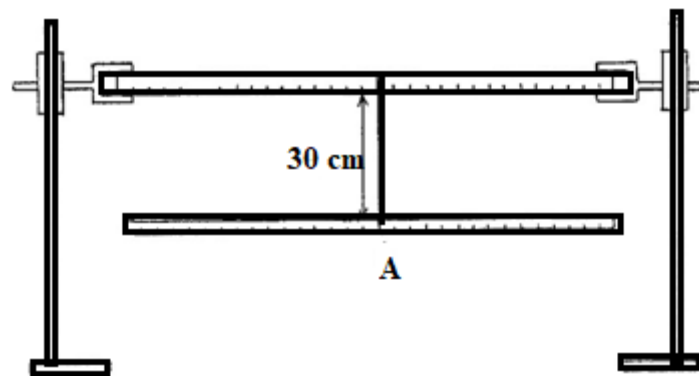


Fig.1

(b) Set the length of the string on which the metre rule is suspended to be 30cm. Tie a second support to the metre rule a distance D from the string. Let the point of support be point B

(c) Suspend the pendulum ball with a string a distance L from B and set the length of the string to 20cm. See figure 2 below.

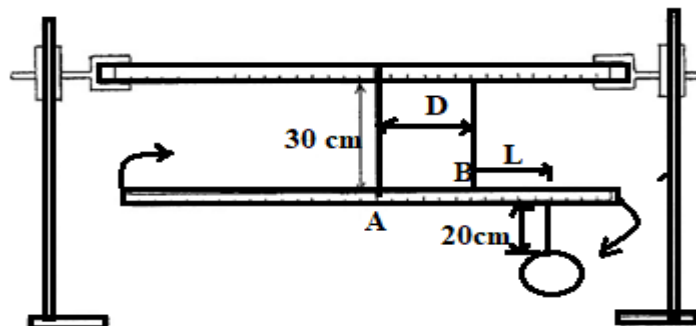


Fig.2

Starting with a distance $D = 15\text{cm}$, and distance $L = 25\text{ cm}$. displace the hanging metre rule on a horizontal plane and record the time taken for it to make 20 complete oscillations on table 1.

(d) Repeat part (c) above for other values of D and complete the **table 1** below.

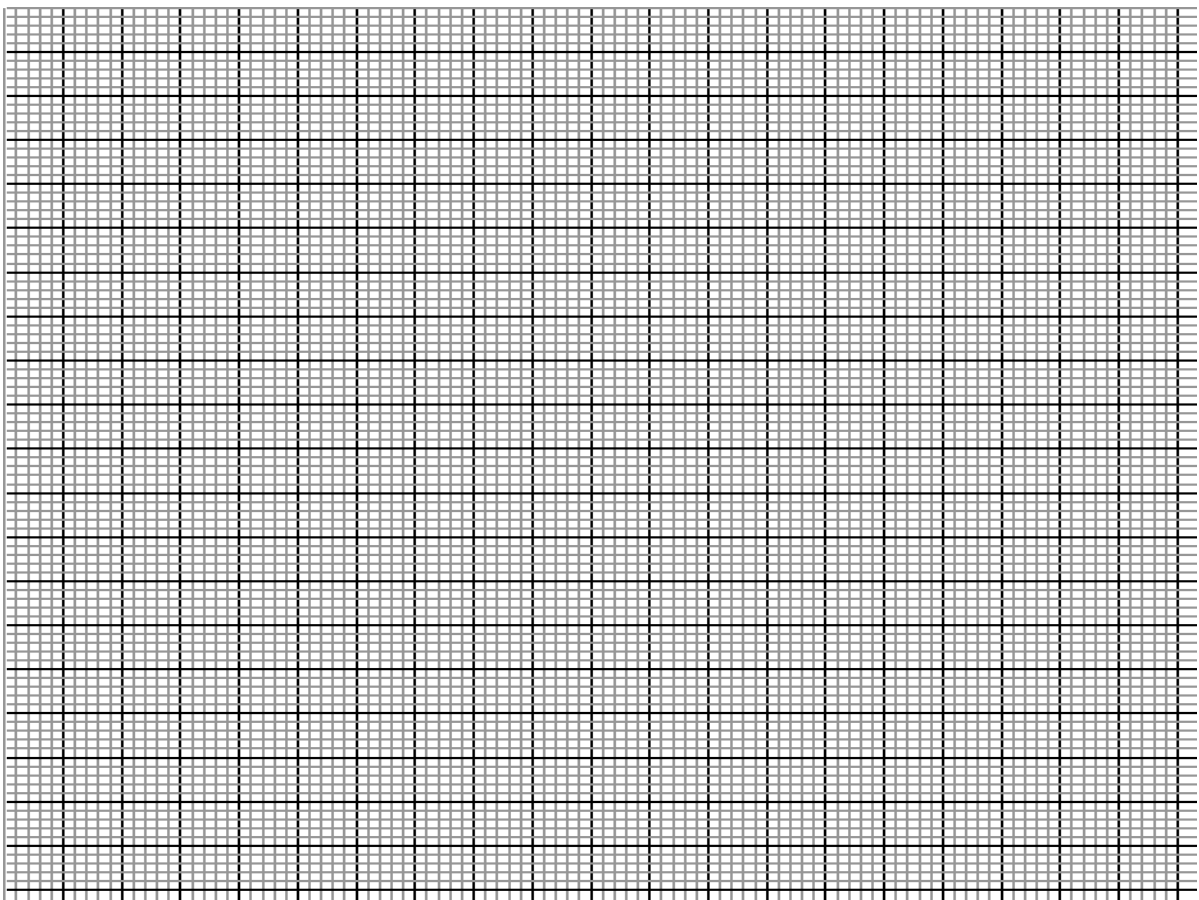
(5mks)

Table 1

D (cm)	Time for 20 oscillations (s)	Periodic time (T) (s)	T ² (s ²)
15			
20			
25			
30			
35			
40			

e) On the grid provided, plot a graph of D (cm) against T² (S²).

(5mks)



(f) Determine the slope of the graph at D= 25cm.

(3mks)

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(g) Use your graph to determine the periodic time when the length of distance D is 33cm. (2mks)

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PART B

You are provided with the following:

- A metre rule (use one used in part A).
- A piece of knitting thread.
- A rectangular stiff paper labelled M.
- One 100g mass.
- A funnel.
- A pendulum ball (use one used in Part A).
- A stopwatch (use one used in Part A).

Proceed as follows:

(h) Tie the pendulum ball tightly with the knitting thread and after passing the other end of the thread through the funnel and the marker (marked M) as shown in figure 3 below, tie it to a 100g mass. Push the marker to be about 1cm from the funnel after adjusting the length of the thread from the funnel to the pendulum ball to be 30cm.

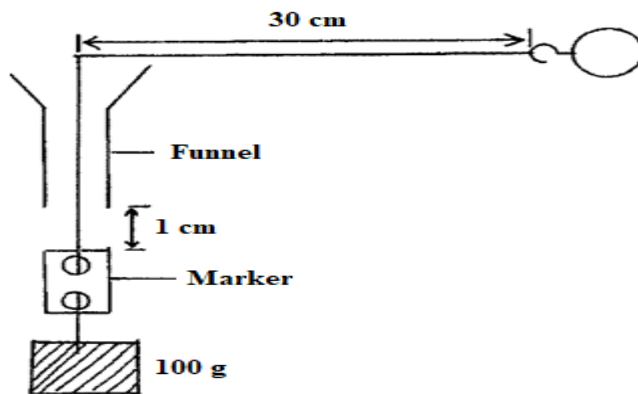


Fig. 3

i) Hold the funnel vertically. Swing the pendulum ball around so that it moves in a constant horizontal circle with a uniform circular motion. The marker should be just below the funnel but not touching it. Measure the time taken by the Pendulum ball to make 10 complete revolutions and repeat this 3 times and complete the table below. (3mks)

Table 2

Trial	Time for 10 revolutions (S)	Periodic time T (S)
1.		
2.		
3.		

j) Find average T.

T= _____ (1mk)

k) Given that $W = 2\pi/T$ where W is the angular velocity of the pendulum ball, determine W . (1mk)

.....

2. PART A

You are provided with the following apparatus

- A metre rule
- A log of plasticine
- Bi convex lens
- A candle
- A lens holder
- Across wire mounted on a cardboard
- A white screen

(a) Determine the average focal length, f of the lens using a distance object.

$f = \dots$ (1mk)

b) Set up the apparatus as shown.

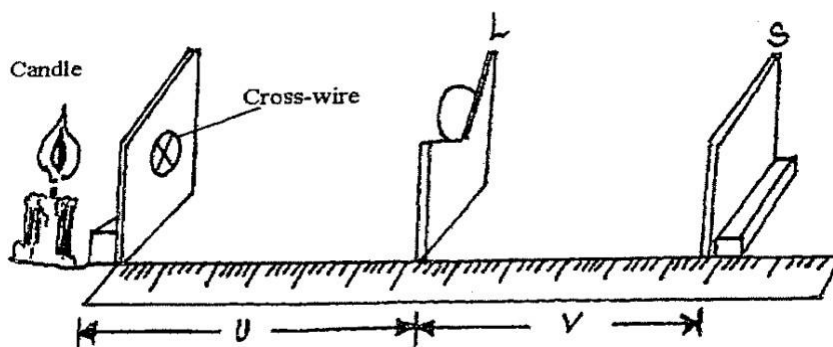


Fig. 4

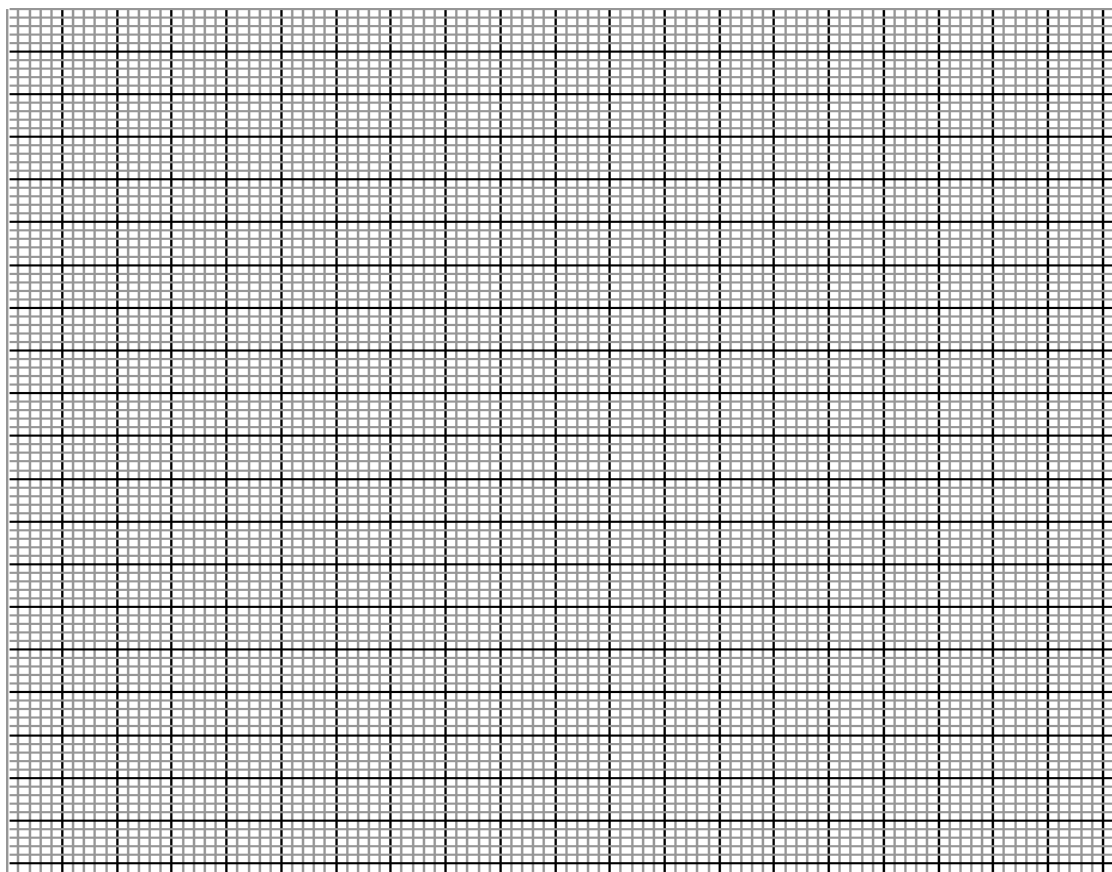
(c) Starting with $u=30\text{cm}$, vary the position of the screen S until a sharp image of the cross wire is observed on the screen. Measure and record the value of the image distance v .

(d) Repeat the experiment above for other values of u 35cm, 40cm, 50cm, and 55cm and fill the table below (4mks)

U (cm)	30	35	40	45	50	55
V(cm)						
$m = v/u$						

e) Plot a graph of M against v .

(4mks)



f) Determine the slope of the graph.

(3mks)

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g) The equation of the graph is given by $m = \frac{v}{f} - 1$. Use the graph to obtain the value of f.

(3mk)

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PART B

You are provided with the following apparatus.

- 2 new dry cells size D
- A cell holder.
- One 100cm resistance wire mounted on millimeter scale.
- 1 switch
- 1 Voltmeter 0 - 3V.
- 1 Ammeter 0— 1A,
- 8 connecting wires (4 with at least 1 crocodile clip).
- Resistor wire mounted on cardboard.

(h) Connect the circuit as shown below in **figure 5**

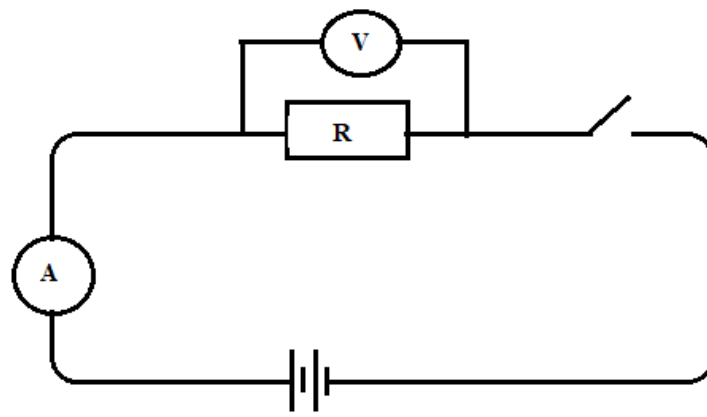


Fig 5

Record the reading of

(i) Ammeter, $I = \dots\dots\dots$ A (1mk)

(ii) Voltmeter, $V = \dots\dots\dots$ V (1mk)

(iii) Given that $K = V/I$, find K (3mks)

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MARANDA SCHOOL TRIAL SERIES

232/3

PHYSICS PRACTICAL

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- g) This paper consists of 7 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

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Question 1	a	b	c	d	e	h	i	Total
Maximum score	6	5	1	1	2	1	3	20
Candidates score								

Question 2	b	d	f(i)	f(ii)	f(iii)	f(iv)	total
Maximum score	2	6	5	3	2	2	20
Candidates score							

Grand total

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Question 1

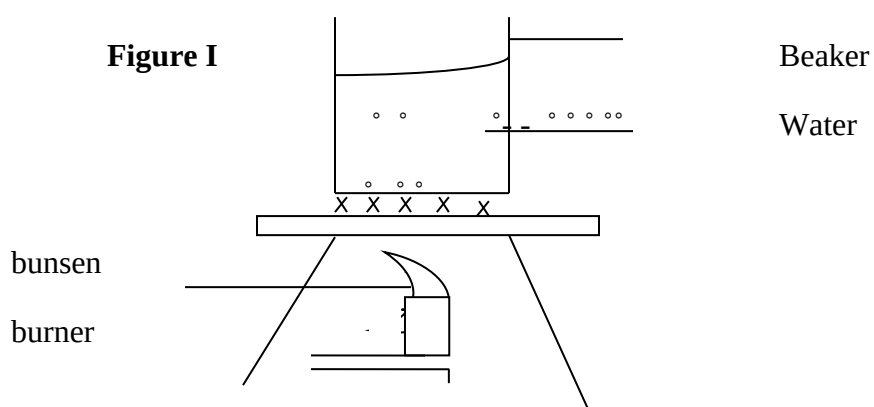
- The question has two parts A and B. Answer both parts

Part A

You are provided with the following

- A tripod stand and wire gauze
- A measuring cylinder 100ml
- A stop watch
- A thermometer
- A Bunsen burner
- A 250ml glass beaker

Set the apparatus as shown in figure I below



- (a) Measure 100cm³ of water and pour into a beaker. Take the initial temperature of water.

T_0 (1mk)

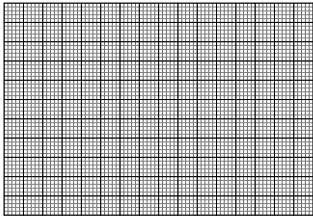
Now heat the water to a temperature of 80°C. Switch off the gas tap and place a thermometer into the beaker and start the stop watch; when the temperature is 65°C. Take the temperature $T^\circ\text{C}$ of water every two minutes. Record your results in the table below.

Time t (min)	2	4	6	8	10	12	14
Temperature (T) ^{°C}							
$T - T_0$							
Log (T – T_0)							

(5mks)

- (b) Plot a graph of log (T- T_0) against time (t)

(5mks)



(c) Find the value of P of $\log (T- T_0)$ when $t =0$ (1mk)

(d) Determine N, where N is the anti-log of P (1mk)

(e) Calculate the temperature of the surrounding T_R using the expression $N = 65 - T_R$ (2mks)

Part B

You are provided with the following

- A metre rule
- Knife edge 20cm above bench
- A 50g mass
- A 100g mass
- A beaker
- Some thread

- Some water in a beaker
- Liquid L in a beaker
- Tissue paper

Proceed as follows;

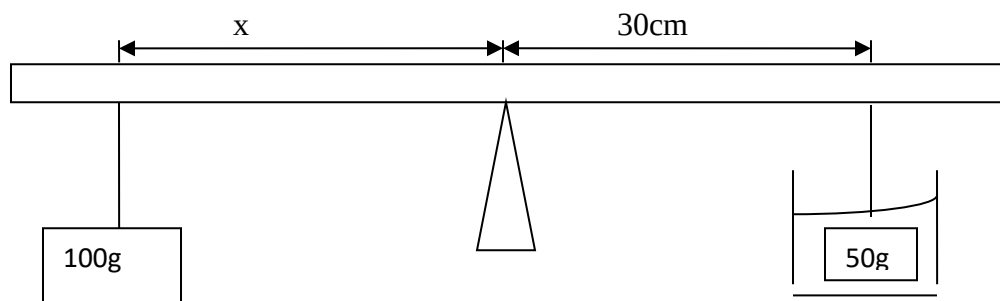
- (f) Balance the metre rule edge and record the reading at this point.

Balance point cm

(For the rest of this experiment the knife edge must be placed at this point)

- (g) Set up the apparatus as shown in figure 2 below

Figure 2.



- (h) Use the thread provided to hang the masses such that the position of the support can be adjusted. The balance is attained by adjusting the position of the 100g mass.

Note that the distance x is measured from the knife edge and the 50g mass is fully submerged in the water.

Record the value of x

$X =$ cm (1mk)

- (i) Apply the principle of moments to determine the weight W_L , of the 50g mass in water and hence determine the upthrust U_L in water

(i) $W_L =$ (1mk)

(ii) $U_L =$ (1mk)

(iii) Relative density of liquid L (2mks)

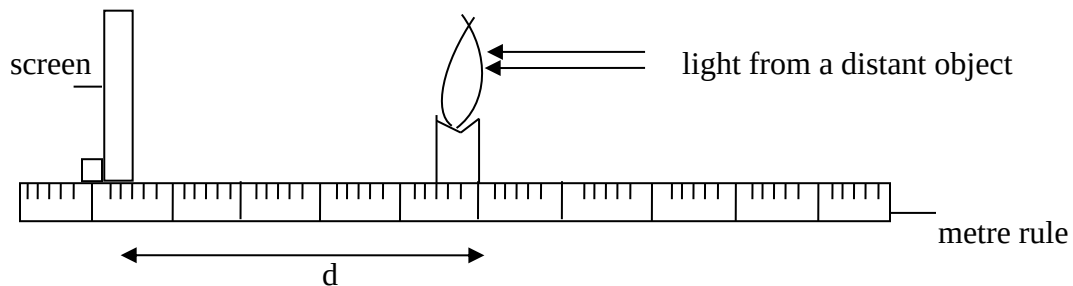
Question 2

You are provided with the following:

- A candle
- A white screen
- A metre rule
- A lens and lens holder
- A piece of plasticine

Proceed as follows

(a) Arrange the apparatus as shown below

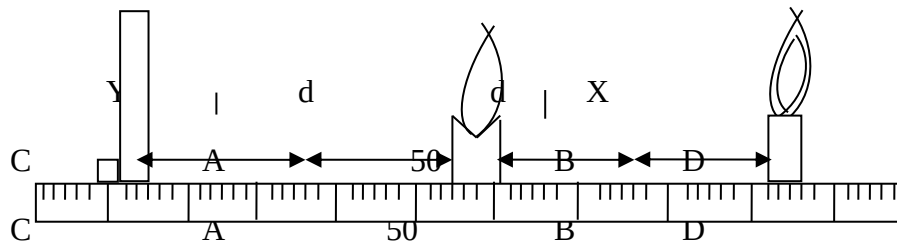


(b) Adjust the distance of the lens until a well focused image of a very distant object is seen on the screen. Record the distance between the screen and the lens as d

d cm (1mk)

d m (1mk)

(c) Now place the lens at the mid point of the metre rule. (it will remain at this point throughout the entire experiment). Arrange the screen and lit candle as shown below.



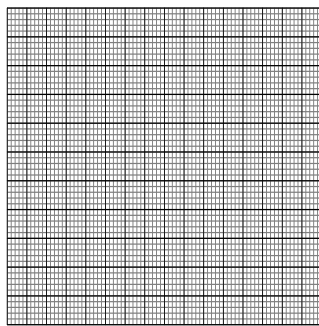
Mark point A and B each of distance ' d ' from the lens

- (d) Place the lit candle at point d, 30cm from B. adjust the positions of the screen until a sharp image appears on it. The screen is at C. measure BD and AC. Record them as X and Y respectively in the table below

BD = Xcm	AC = ycm	$\frac{1}{y} \text{ cm}^{-1}$
30		
25		
20		
15		
10		

- (e) Repeat the procedure in (d) above for other values of X in the table and complete it (6mks)

- (f) (i) draw a graph of $1/y$ (y-axis) against x (5mks)



(ii) Determine the slope S of the graph

(3mks)

(iii) Determine the value of M given that

(2mks)

$$M = \sqrt{\frac{1}{S}}$$

(iv) Comment on values of M and d

(2mks)

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KCSE TOP NATIONAL SCHOOLS TRIAL AND JOINT EXAMS

NAME ADMISSION NUMBER

CANDIDATE'S SIGNATURE.....DATE.....

MASENO SCHOOL TRIAL SERIES

232/3

PHYSICS PRACTICAL

INSTRUCTIONS TO CANDIDATES

- a) Write **your name and index number** in the spaces provided*
- b) Answer **ALL** the questions in the spaces provided in the question paper.*
- c) You are supposed to spend the first 15 minutes of the 2 1/2 hours allowed for this paper reading the whole paper carefully before commencing your work.*
- d) Marks are given for clear record of observations made, their suitability, accuracy and the use made of them.*
- e) Candidates are advised to record their observations as soon as they are made.*
- f) **Non-programmable** silent electronic calculators and KNEC mathematical table may be used.*
- g) This paper consists of 7 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing*

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Question	Maximum	Candidates Score
1	20	
2	20	
Total		

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Question 1

A) You are provided with the following apparatus:

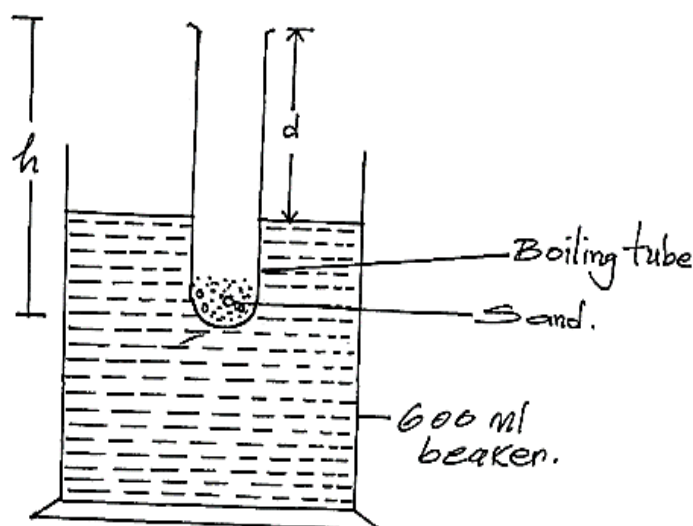
- A boiling tube,
- Some dry sand
- A liquid in a beaker labeled L
- Half meter rule
- Vernier caliper (To be shared)
- A weighing balance (To be shared)
- Tissue paper

Proceed as follows:

i) Measure the length of the boiling tube using the vernier calipers.

$h = \dots\dots\dots$ cm (1mrk)

ii) Put a little amount of sand in the boiling tube and place it in the beaker which is almost filled with liquid L. Add sand little by little until the tube floats upright as shown in the figure bellow.



iii) Measure the length d , part of the boiling tube which is above the liquid.

$d = \dots\dots\dots$ cm (1mrk)

iv) Determine the length t , of the boiling tube which is immersed in the liquid.

$t = \dots\dots\dots$ cm (1mrk)

v) Remove the boiling tube from the beaker, wipe it dry on the outside and measure its mass, including the sand inside.

$m = \dots\dots\dots$ g (1mrk)

vi) Measure the external diameter, D , of the boiling tube.

$D = \dots\dots\dots$ cm (1mrk)

vii) Determine the external reading, R (1mrk)

R = ... + ...cm

viii) Using the formula $m = 12\rho\pi R^2$, determine ρ of the liquid (3mks)

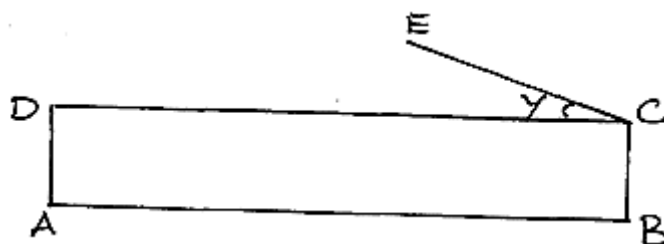
$\rho =$

B) You are provided with the following apparatus:

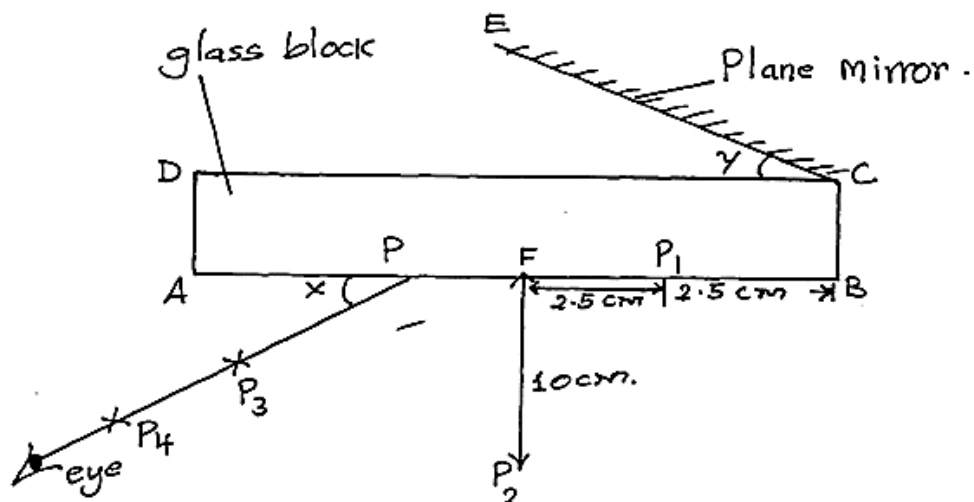
- One plane mirror.
- One rectangular glass block.
- One white plane paper.
- Soft board.
- A protector (student geometrical set).
- A piece of plasticine.
- Four optical pins.

Proceed as follows

- a) Place the glass block vertically on the white paper with its largest surface facing you. Draw the outline of the block and label it ABCD. Remove the block.
- b) From point c measure angle $y=30^\circ$ and draw line CE as shown in the diagram.



- c) From point B, fix a pin P1 at 2.5cm from B along BA and another pin P2 2.5cm from P1 and 10cm from point F on line AB. As shown in the diagram.
- d) Replace the glass block and put the plane mirror vertically on line CE behind the glass block (fix it with plastacine). Arrange pins P3 and P4 to be in a straight with the image of P1 and P2 as seen through the glass block after reflection from the plane mirror. Draw a line P3P4 to meet the block at P as in the figure below.



e) Measure angle X and state its units (1mk)

X = ...

f) Given the equation $Y = Y_0 - 0.515X$ determine the value of y_0 . (2mks)

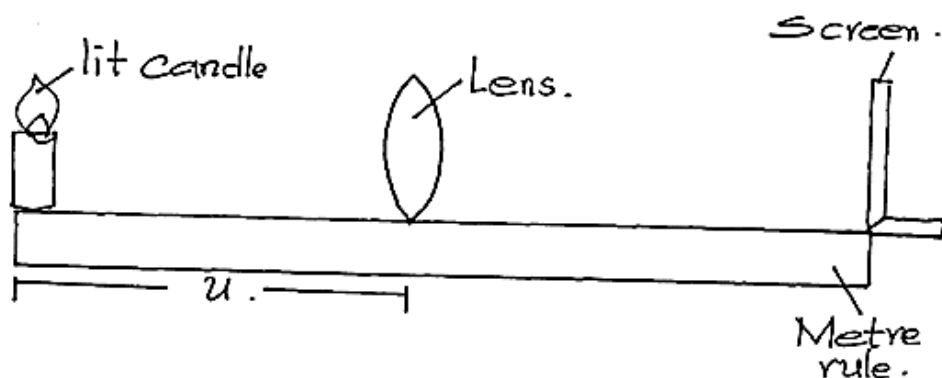
g) Find n from the formula $n = \frac{1}{\sin(90 - Y_0)}$ (2mks)

C) You are provided with;

- A candle,
- A biconvex lens,
- A lens holder,
- A meter rule,
- A white screen.

Proceed as follows;

a) Arrange the lit candle and the white screen on the bench at a distance of 100cm from each other. Mount the meter rule on the bench as shown so that it's zero mark coincides with point of the lit candle and 100cm mark coincide with the position of the screen.



- b) Place the lens between the screen at a point near the candle. Move the lens systems together with its holder towards the screen until you observe a sharp magnified inverted image of the flame on the screen.

Record the distance U_1 between the lens and the lit candle.

U_1 cm (1mrk)

- c) Move the lens system further towards the screen until you obtain another position where a sharp diminished inverted image of the flame is formed on the screen.

Record the new distance U_2 between the lens and the candle.

U_2 =.....cm (1mrk)

- d) Determine the displacement d of the lens (1mrk)

$$d = U_2 - U_1$$

- d) Determine Constant ϕ given that $\phi = \frac{1+m}{mU_1}$ when $m = \frac{100 - U_1}{U_1}$ (3mks)

Question 2

You are provided with the following apparatus;

- Ammeter (0-1 A)
- Voltmeter (0-5V)
- Two dry cells
- One resistance wire fixed on a meter rule/mm scale.
- A switch
- Six connecting wires with crocodile clip.

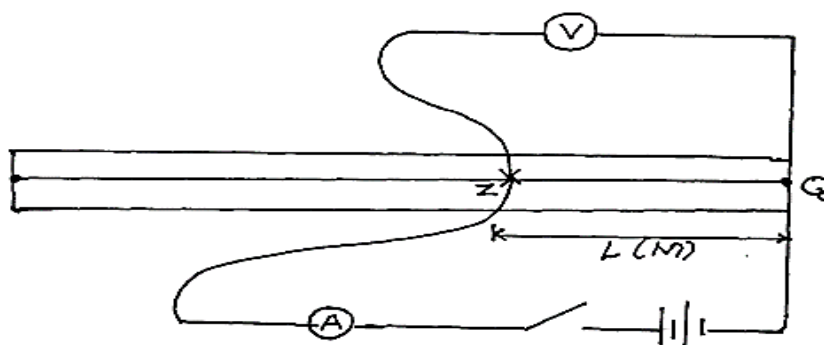
A cell holder

Proceed ad follows

- i) Set up a circuit and measure the potential difference M across the cells before connecting the circuit.

M =..... (1mk)

- ii) Arrange the circuit as shown below.



- iii) Keeping both crocodile clips attached on the resistance wire QZ for a length $L=0.1\text{m}$ from Q, record corresponding values of current I (A) and voltage (V) in the table below.

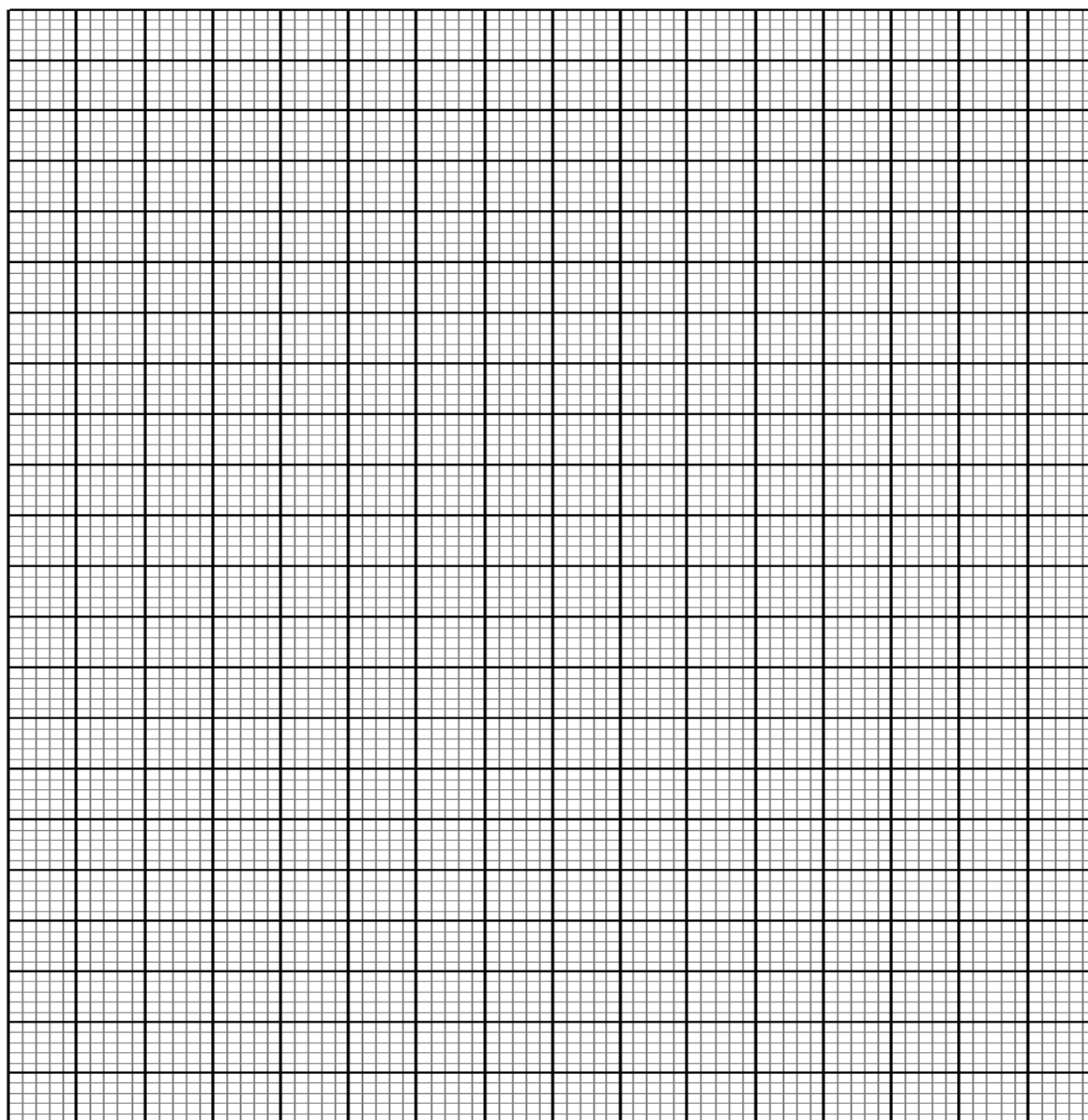
Repeat the procedure from the other length L of L 0.2m, 0.3m, 0.4m, 0.5m, 0.6m, 0.7m and 0.8m.

Length $L(\text{m})$	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
Current $I(\text{A})$								
Voltage V (V)								
$P = \frac{V}{I} (\Omega)$								
$\frac{1}{I} (\text{A}^{-1})$								

NB (give your answer in 3 significance figures.)

- iv) Draw a graph of $\frac{1}{I}$ against P

(5mks)



v) Given that the Quantities are connected by the equation $\frac{1}{I} = \frac{P}{m} + \frac{x}{m}$

Determine the value of

a) m (4mks)

b) x (2mks)

THIS IS THE LAST PRINTED PAGE!

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KCSE TOP NATIONAL SCHOOLS TRIAL AND JOINT EXAMS

NAME ADMISSION NUMBER

CANDIDATE'S SIGNATURE.....DATE.....

MERU SCHOOL TRIAL SERIES

232/3

PHYSICS PRACTICAL

INSTRUCTIONS TO CANDIDATES

- a) Write **your name** and **index number** in the spaces provided
- b) Answer **ALL** the questions in the spaces provided in the question paper.
- c) You are supposed to spend the first 15 minutes of the 2 1/2 hours allowed for this paper reading the whole paper carefully before commencing your work.
- d) Marks are given for clear record of observations made, their suitability, accuracy and the use made of them.
- e) Candidates are advised to record their observations as soon as they are made.
- f) **Non-programmable** silent electronic calculators and KNEC mathematical table may be used.
- g) This paper consists of 7 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

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Question 1										TOTAL
	b	c	e	f	g	h	i			
Maximum score										20
Candidate's score										
Question 2										TOTAL
	a	b	c	d	e	f	g	h		
Maximum score										20
Candidate's score										

GRAND TOTAL

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QUESTION 1

You are provided with the following apparatus.

- An ammeter (range 0 – 1A)✓
- A resistance wire labeled R✓
- Two new dry cell (size D) ✓
- Six connecting wires (at least three with crocodile clip) ✓
- A switch✓
- A jockey✓
- A micrometer screw gauge (to be shared) ✓
- A voltmeter (0-3V) ✓

Proceed as follows:

(a) Assemble your apparatus as shown in **Figure 1**

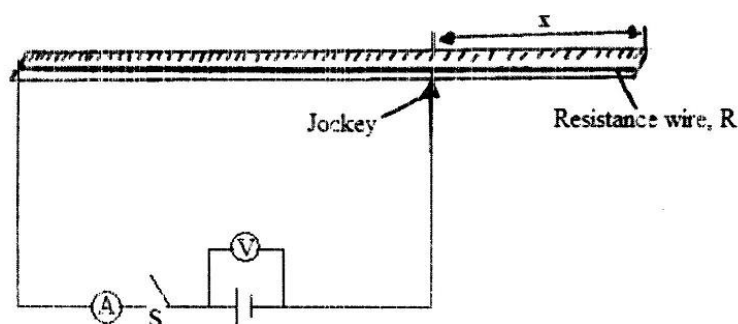


Figure 1

(b). With the switch S open, record the voltmeter reading.

V = ... Volts (1 mark)

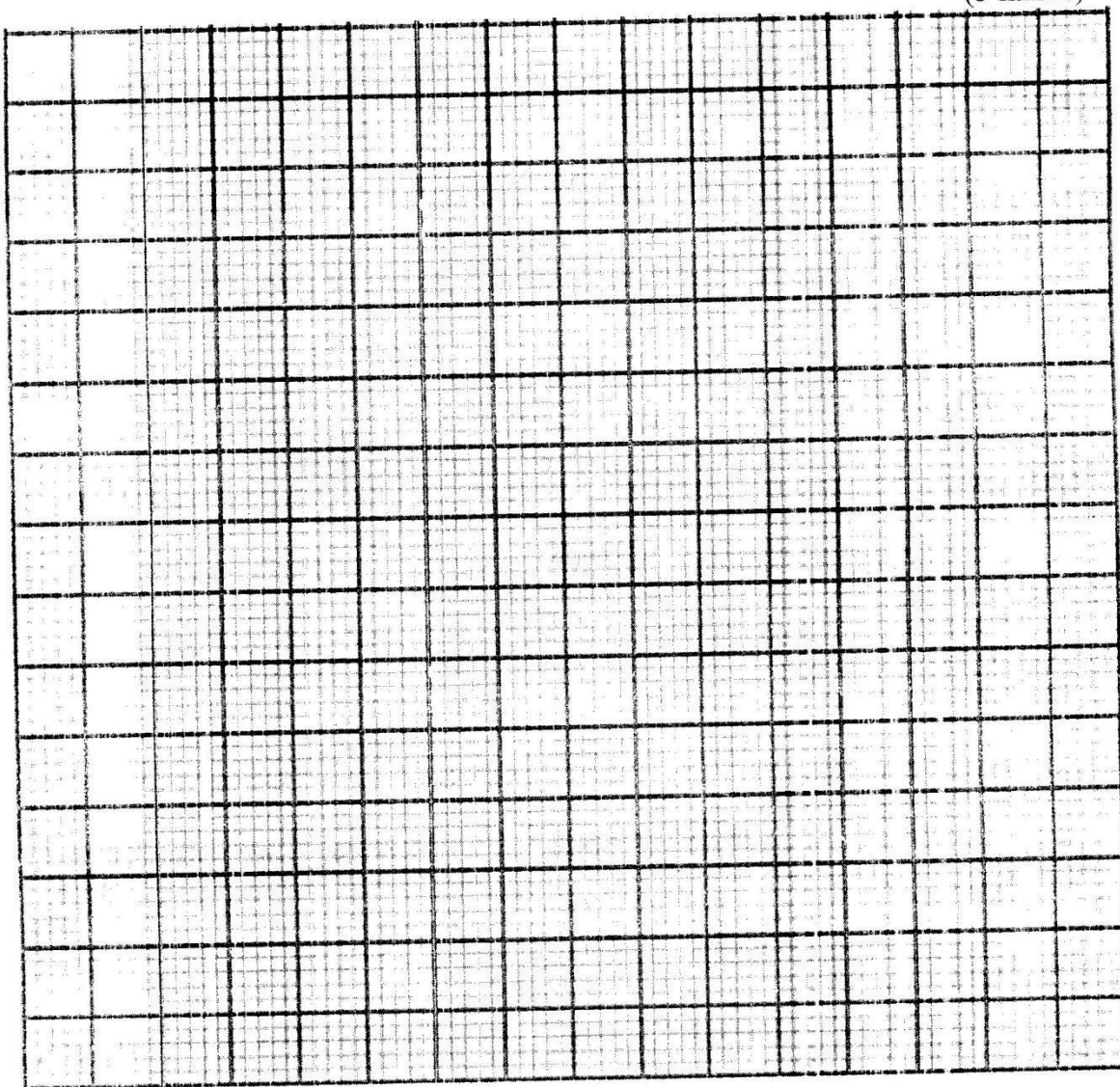
(c). Adjust the length x of the wire to 25cm. Close the switch, read and record the value of current I in Table 1

Table

Length x (cm)	25	35	45	55	65	75
Length (100 – x) cm						
Current I (A)						
$\frac{1}{I}$ (A ⁻¹)						

(d). Repeat (c) for other values of x given in Table 1. Complete the table. (5 marks)

(e) On the grid provided plot a graph of length (100-x) m against $\frac{1}{I}$ (A⁻¹) (5 marks)



(f). calculate the slope S of the graph

(3 marks)

.....

.....

.....

.....

(g). what does the y-intercept represent?

(1 mark)

.....

(h). Using the micrometer screw gauge provided measure the diameter t, of the resistance wire R

t = ...mm

(2 marks)

t = ...m

(i). Given $P = \frac{SVt^2}{4}$

Determine the value of P

(3 marks)

QUESTION 2

This question has two parts A and B. Answer all the parts

Part A

You are provided with the following:

- A metre rule✓
- Two identical 100g masses (labelled A and B) ✓
- Liquid L in 250ml beaker $\frac{3}{4}$ full ✓
- Three pieces of thread, each 30cm long. ✓
- Stand with clamps✓
- Tissue paper✓
- Vernier calipers✓

Proceed as follows:

(a).Take one 100g mass and measure the diameter d and height h using the Vernier calipers

$d = \dots\dots\dots$ M (1 mark)

$h = \dots\dots\dots$ M (1 mark)

b. Determine the volume V given that $V = \pi \left(\frac{d}{2}\right)^2 h$

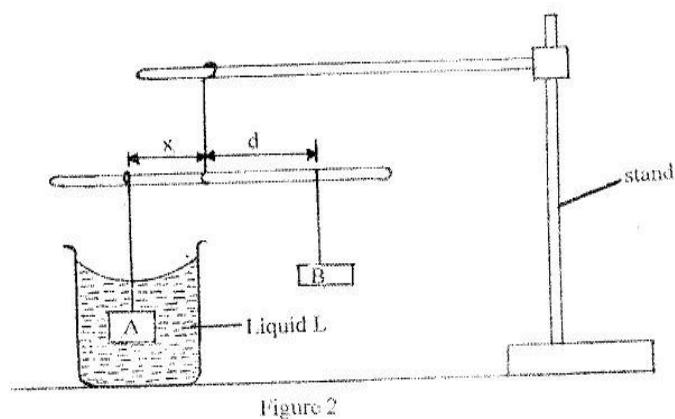
$V \dots\dots\dots$ m³ (1 mark)

c. 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 .

$G = \dots\dots\dots$ cm (1mark)

NOTE: the metre rule should remain suspended at this point throughout the experiment.

d. Set up the apparatus as shown in Figure 1 below;



- Suspend the mass A at a distance $x = 30$ cm and completely immerse it in liquid L without touching the sides of the beaker.
- Hang mass B and adjust its position such that the rule is balanced and measure the distance d cm. Tabulate your results in table 1 below;

(i) Table

(3 marks)

x (cm)	30	35	40
d (cm)			
$\frac{d}{x}$			

(i).(e). Determine the weight F of one of the masses A or B in air. Given that

$$g = 10\text{N/K g and } A = B$$

Weight F in air = ...

(1 mark)

(ii). Using the principle of moments, determine the apparent weight P of A when completely immersed in Liquid L

Apparent weight P = ...

..... (2 marks)

(iii). Find the up thrust U on A when completely immersed.

(1 mark)

(iv).Upthrust; U = ...

.....

(h). Determine the density of liquid L, given that;

(1 ½ marks)

$$P = \frac{Un}{v} \text{ where } n = 0.1 \text{ Kg/N}$$

(1 ½ marks)

PARTTWO

You are provided with the following apparatus

- A glass beaker✓
- A metal solid✓
- Some water✓
- Source of heat✓
- A piece of cotton thread✓
- A plastic beaker wrapped with tissue✓
- Thermometer✓
- Liquid L✓

Proceed with the experiment as follows:

(f). Fill the glass beaker with the water provided and place it on the fire source. Use the piece of thread to carefully lower the metal solid to the bottom of the beaker.

Heat the water to its boiling point. Use the thermometer to measure its boiling point.

Boiling point of water Kelvin

(1 mark)

(g). (i). Find the following measurements using appropriate instruments

Mass of the solid M_s = ...g

(½ mark)

Mass of the wrapped empty plastic beaker M_1 g

(½ mark)

Use the plastic beaker to measure 240ml of liquid L, hence find the joint mass of the plastic beaker and its content liquid L, M_2 = ...(g)

(½ mark)

: Initial temperature of liquid L, $T_1 = \dots\dots\dots$ Kelvin (1 mark)

((ii). At boiling point of water; quickly transfer the metal solid into liquid L, stir well and measure the temperature of the mixture immediately.

Temperature of the mixture $T_2 \dots\dots\dots$ Kelvin (1 mark)

(h). By using the measurements taken in pars (f) g(i) and g(ii) as well as the equation provided below, determine the specific heat capacity of liquid L. (Take S.H.C of metal solid = 480J/kg/k and S.H.C of plastic = 359J/kg/k).

(Heat lost by metal) = (heat gained by liquid L) + (heat gained by plastic beaker). (3 marks)

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KCSE TOP NATIONAL SCHOOLS TRIAL AND JOINT EXAMS

NAME ADMISSION NUMBER

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MOI GIRLS EDLORET HIGH SCHOOL TRIAL SERIES

232/3

PHYSICS PRACTICAL

INSTRUCTIONS TO CANDIDATES

- Write **your name** and **index number** in the spaces provided
- Answer **ALL** the questions in the spaces provided in the question paper.
- You are supposed to spend the first 15 minutes of the 2 1/2 hours allowed for this paper reading the whole paper carefully before commencing your work.
- Marks are given for clear record of observations made, their suitability, accuracy and the use made of them.
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FOR EXAMINER'S USE ONLY

Q1

QUESTION	e	h	i	j	k	TOTAL
MAXIMUM SCORE	1	8	5	3	3	
CANDIDATES SCORE						

Q.2

QUESTION	a(ii)	a(iii)	a(iv)	a(v)	a(vi)	b(i)	b(ii)	b(iii)	b(iv)	TOTAL
MAXIMUM SCORE	4	1	5	3	1	1	2	1	2	
CANDIDATES SCORE										

GRAND DTOTAL

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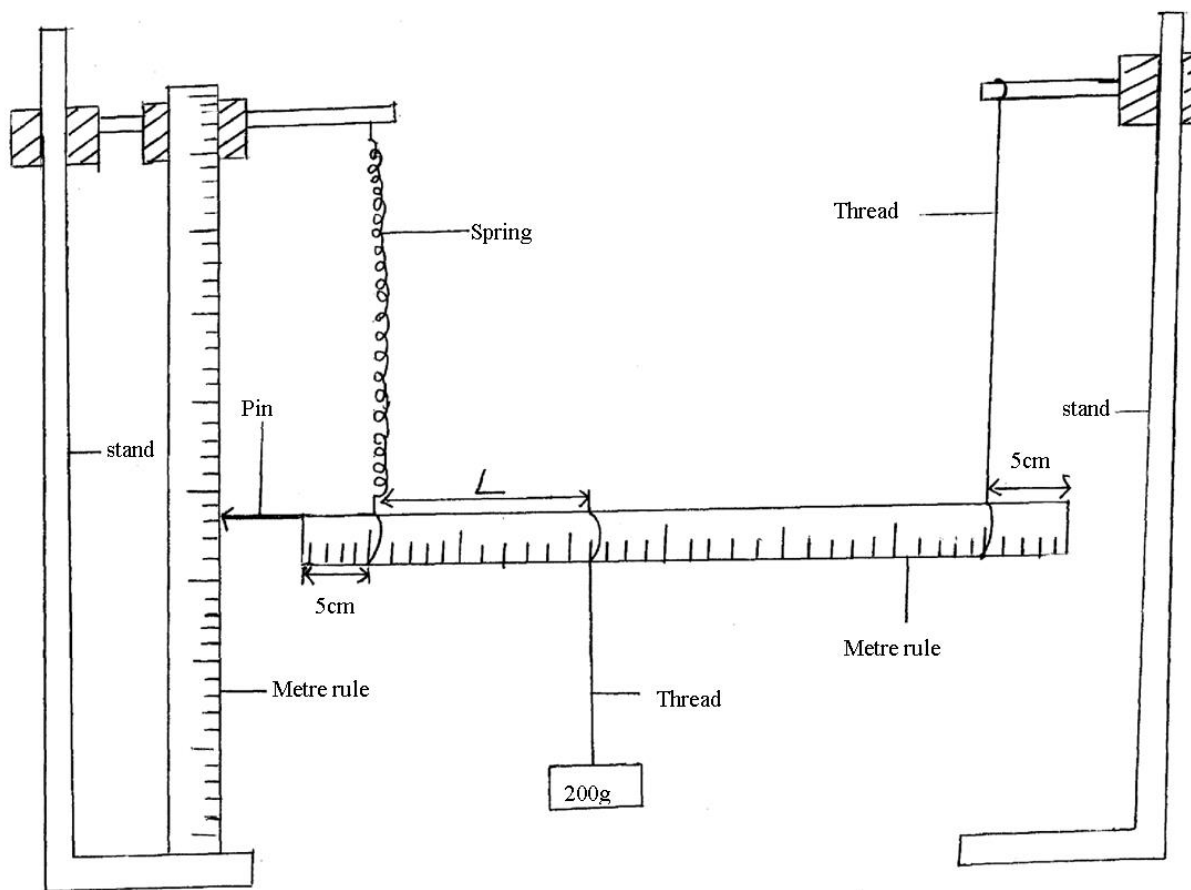
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1. You are provided with the following apparatus:-

- Two meter rules
- Two stands and two clamps
- Two bosses
- Three pieces of thread (at least 30cm each)
- One optical pin
- A piece of cello tape and a plasticine
- A spiral spring
- One mass of 200g
- One stop watch

(a) Set the apparatus as shown in the diagram 1. Below ;Attach the pin (to act as the pointer)at one end of the meter –rule using cellotape or plasticine;



- (b) Suspend one end of the metre –rule with thread at 5cm mark from the end .
- (c) Suspend the other end with a spring also 5cm from the end so that metre rule is horizontal.

- (d) Hold the other rule (with the spring) vertical on the beneath so that it is near the end with a pointer as shown in the diagram.
- (e) Read the pointer position .Lo=.....cm, (1mk)
- (f) Hang on the horizontal 1 metre rule, the 200g mass at a length, L =10cm from the spring.
Record the extension, e of the spring in the table below.
- (g) Displace the mass slightly downwards and release it to oscillate vertically. Take time for 20 oscillations and record in the table below.
- (h) Repeat for other position of L, of the mass.
N/B before taking the reading, ensure the oscillation is steady. (8mks)

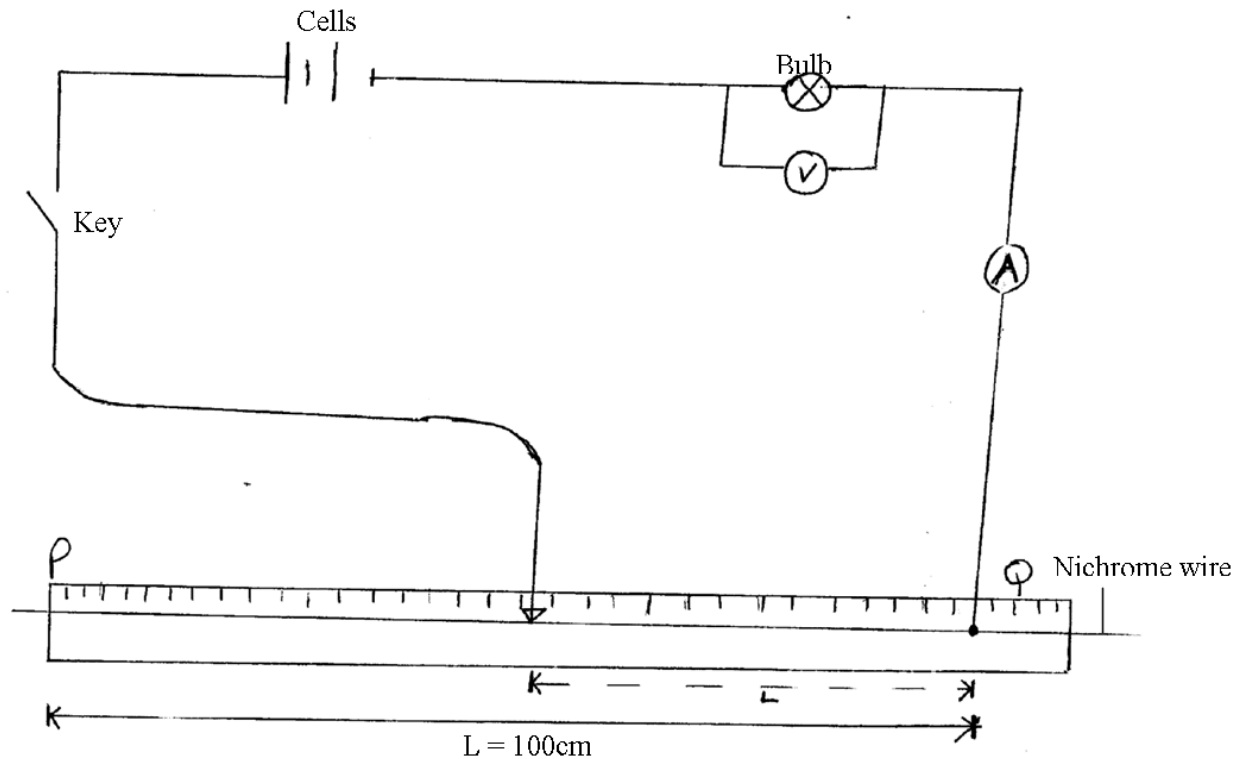
L(cm)	Extension e(cm)	Time (+) for 20 oscillation	Periodic table T(s)	T ² (s ²)
10.0				
20.0				
30.0				
40.0				
50.0				

- (i) On the grid provided plot a graph of extension, e (m) y-axis against T²(s²)(5)
- (j) Calculate the gradient of the graph drawn (3mks)
- (k) Given that $e = \frac{RT^2}{4\pi^2} + C$, determine the value of R (3mks)

2. You are provided with the following

- An ammeter
- A voltmeter
- Two dry cells size D
- A mounted resistance wire on a metre-rule or millimeter scale
- A bulb on bulb holder
- A cell holder
- A switch
- A jockey or crocodile clip
- Micrometre screw gauge (can be shared)

(a) (i) Connect the apparatus provided as shown in the circuit diagram below diagram 2.



(ii) With the crocodile clip at P take the voltmeter reading and the ammeter reading,

Record V and I, Repeat the readings for $L=80, 60, 40, 20$ and 0, respectively.

Complete the table below.

(4mks)

Length $l(\text{cm})$	Voltage $v(\text{v})$	Current $I(\text{A})$
100		
80		
60		
40		
20		
0		

(iii) What changes do you observe on the bulb as L decreases from P? (1mk)

(iv) On the grid provided plot the graph of Ammeter reading (y-axis) against voltmeter reading. (5mks)

- (v) Determine the slope of your graph at $v = 1$ volt. (3mks)
- (vi) What physical quantity is represented by the slope of the graph at the point in (v) above (1mk)
- (b) (i) Given the apparatus in a (i) above, draw a diagram of the circuit you would use to determine the current through the resistance wire and potential differences across it. (1mk)
- (ii) Set up the circuit you have drawn using the available apparatus in a(i) above.
 Record the ammeter reading I and voltmeter reading v , when $L = 100$ cm. (2mks)
 $V = \dots\dots\dots$
 $I = \dots\dots\dots$
- (iii) Using a micrometer screw gauge provided, measure the diameter d of the wire. (1mk)
- (iv) Calculate the quantity $P = 0.785 \left(\frac{V}{I} \right) \left(\frac{d}{L} \right)^2$ and give its SI units, where L is in m. (2mks)

NAME:..... ADM No:.....

CLASS:..... SIGN:.....

232/3

PHYSICS

FORM 4

PAPER 3

END TERM 1 2025

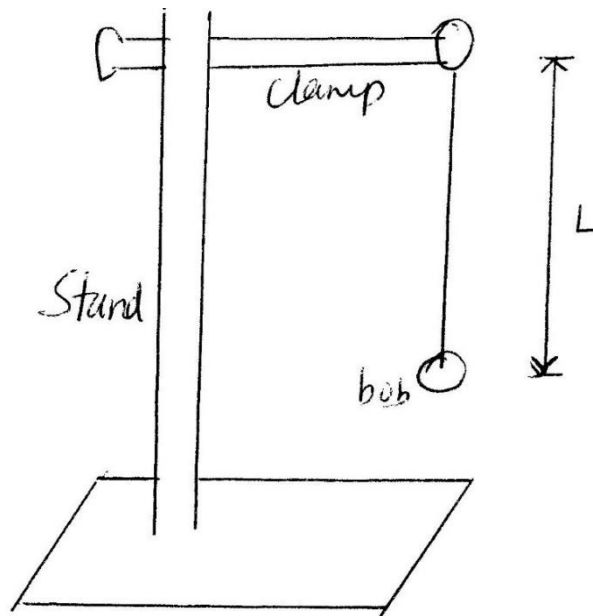
TIME $2\frac{1}{2}$ HRS

INSTRUCTIONS

- i) Answer All questions in the spaces provided.
- iii) All working must be clearly shown for numerical questions.
- iv) Candidates should check to ascertain that all questions are printed as indicated in the table below.

1. You are provided with the following;
 - A stopwatch
 - Cotton thread at least 120cm long
 - Stand and a clamp
 - Pendulum bob
 - Metre rule

Arrange your apparatus as shown



Proceed as follows;

- i) Adjust the length of the pendulum to 1meter.
- ii) Displace the bob side ways to an angle of about 45° (estimate) and let the pendulum switching for 10 oscillations and record the time, t , take for the ten oscillations.
- iii) Repeat the same for other values of L as shown in the table below and fill in the columns of the table as indicated. (8 Marks)

Length L (in m)	Time for 10 oscillations (in sec)	Periodic time (T)	(Periodic Time) ² T^2 (in 2 d.p.)
1.0			
0.8			
0.7			
0.6			
0.5			
0.4			
0.3			

- iv) Plot a graph of T^2 against L . (5 Marks)
- v) Determine the gradient (3 Marks)

vi) Given that period (T) of a pendulum and the length (L) are related by the equation

$$T = 2\pi\sqrt{\frac{L}{g}}$$

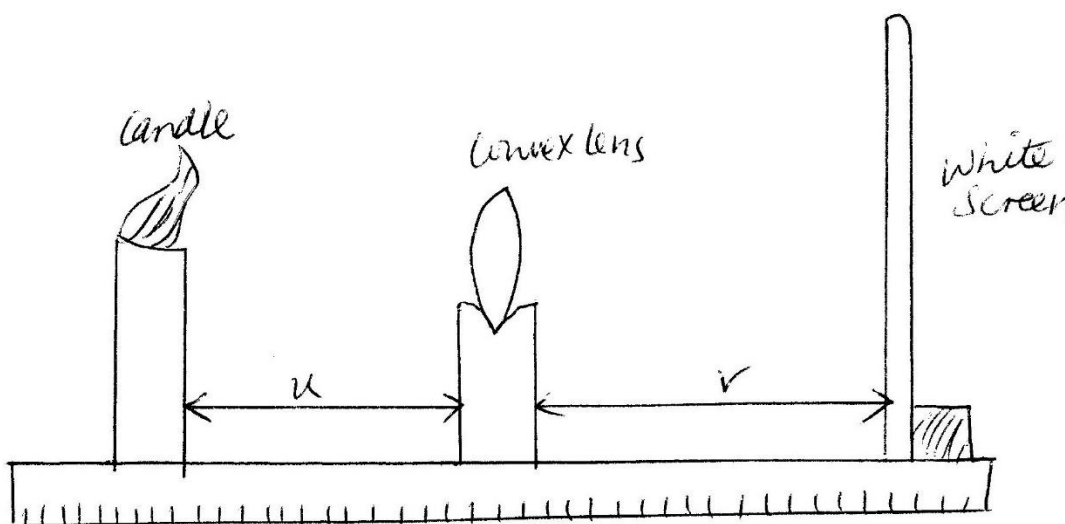
Where g is the gravitational pull, use your graph to determine the value of g. (4 Marks)

2. PART A

You are provided with the following apparatus.

- A Convex lens
- A candle
- White screen
- Lens holder
- Metre rule

a) Set up the apparatus as shown in the figure below.



- b) Place a lighted candle at object distance, $U = 20\text{cm}$. Move the screen, towards or away the lens until a sharp image of the candle flame is obtained on the screen. Measure the distance V and record the results in the table below.
- c) Repeat the same for other values of U as shown in the table and fill their respective values of V . (5mks)

Object distance U (in cm)	Image distance V(in cm)	$U + V$ (cm)	UV (cm ²)
20			
30			
45			
60			
75			

90			
----	--	--	--

- d) Plot a graph of $UV \text{ (cm}^2\text{)}$ against $(U + V) \text{ (cm)}$. (5 Marks)
- e) Determine the slope of the graph (2 Marks)
- f) Determine the power of the lens used in the experiment. (2 Marks)

PART B

You are provided with the following apparatus

- 2 New dry cells
- An ammeter
- A mounted wire labelled AB
- A cell holder
- A switch
- Connecting wires

- a) Draw a circuit that can be used to determine the resistance of the wire AB. (2 Marks)
- b) Set up the apparatus as in your circuit diagram and tabulate two set of values. (2 Marks)
- c) Calculate the resistance of the wire (2 Marks)

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NAME ADMISSION NUMBER

CANDIDATE'S SIGNATURE.....DATE.....

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STAREHE GIRLS' CENTRE MOCK EXAMINATION

232/3

PHYSICS

PRACTICAL

PAPER 3

TIME: 2 ¼ HOURS

INSTRUCTIONS TO THE CANDIDATES:

- Write your **name** and **index number** in the spaces provided above.
- Answer **all** questions in the spaces provided in the question paper.
- You are supposed to spend the first 15 minutes of the 2 ¼ hours allowed for this paper reading the whole paper carefully.
- Marks are given for a clear record of the observation actually made, their suitability, accuracy and the use made of them.
- Candidates are advised to record their observations as soon as they are made.
- Mathematical tables, slide rules and calculators may be used.
- Record your observations as soon as you make them.

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This paper consists of 6 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

Q. 1 PART 1 15 MARKS

Apparatus

- Two identical 100g masses
- Uniform meter rule
- Liquid **L** in a 250 ml beaker (almost full)
- Vernier calipers
- A string about one meter long

Method

a) Take one 100g mass and measure the diameter d and the height h in using vernier calipers.

i) $d = \dots\dots\dots\text{cm}$ (1mk)

ii) $h = \dots\dots\dots\text{cm}$ (1mk)

iii) Determine the volume V , given
 $V = \pi(d/2)^2h$

$V =$ (1mks)

iv) Using the formula $D = M/V$, determine the density of the solid D_s

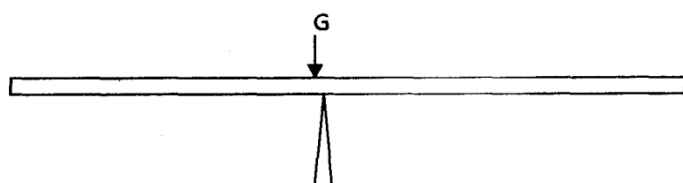
$D_s = 100/V$

$=$ (1mks)

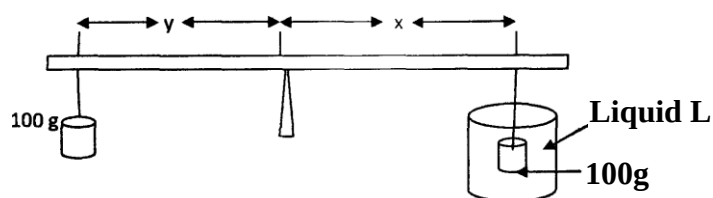
b) Adjust the meter rule so that it balances at its centre of gravity **G** as the knife edge.

N/B. This position should be measured throughout the experiment

$G = \dots\dots\dots\text{cm}$ (1mk)



c) Starting with the distance **X** for the mass in liquid **L** as 48cm, adjust the position of the other mass to obtain a balance condition. Record the corresponding distance y in the table of results.



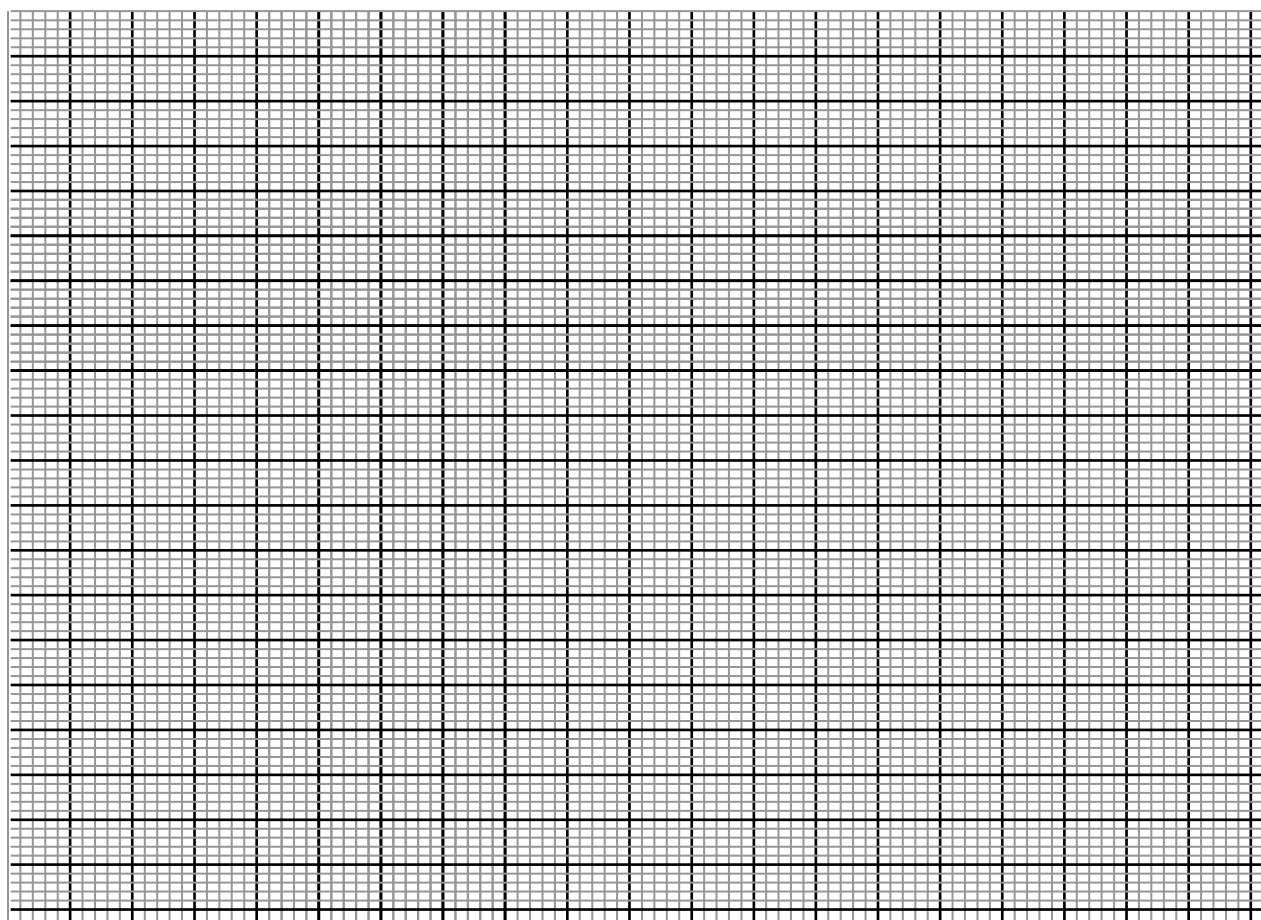
Repeat the above for the rest of the values of x given in the table below.

(3mks)

DISTANCE (x) cm	DISTANCE (y) cm
48	
43	
38	
33	
28	
23	

d) Plot a graph of Y against X.

(4mks)



e) Find the slope S of the graph.

(2mks)

f) Using the expression

$$S = \frac{D_s}{D_s - D_L} \text{ Where S is the slope}$$

Find the density D_L of the liquid.

(1mks)

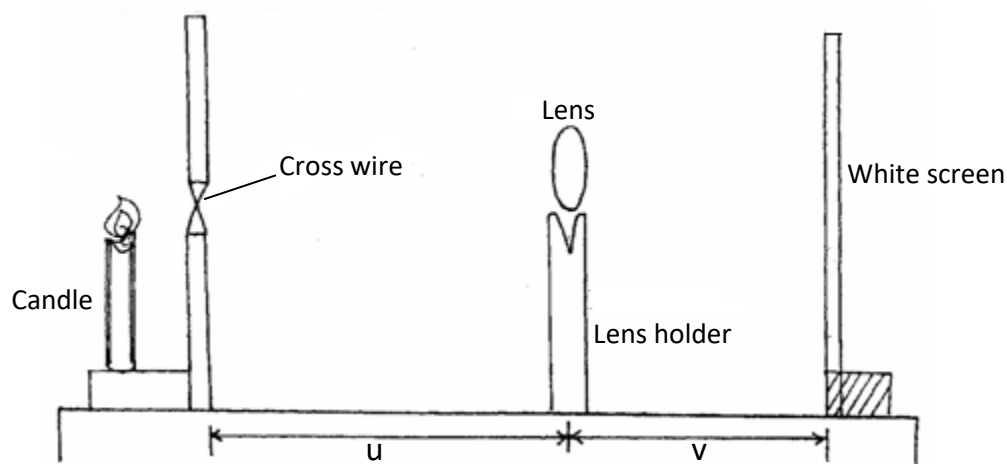
PART 2 5 MARKS

(b) You are provided with the following apparatus:

- Candle
- Lens
- Lens holder
- Metre rule
- Cross wire
- Screen
- Vernier calipers

Proceed as follows:

(i) Arrange the apparatus as shown in the figure **below**.



- (ii) Place the cross-wire before the lens so that $U = 28\text{cm}$. The lit candle should be placed close to the cross-wire.
- (iii) Adjust the position of the screen until a sharp image is cast on the screen.
- (iv) Measure and record the value of image distance, V , in the table.
- (v) Repeat the same procedure for the other values in the table.

U(cm)	V(cm)	$M = \frac{V}{U}$
30		
36		

(2mks)

(vi) Given that the focal length f of the lens satisfies the equation $f = \frac{V}{1 + M}$

determine average value of the focal length, f .

(3mks)

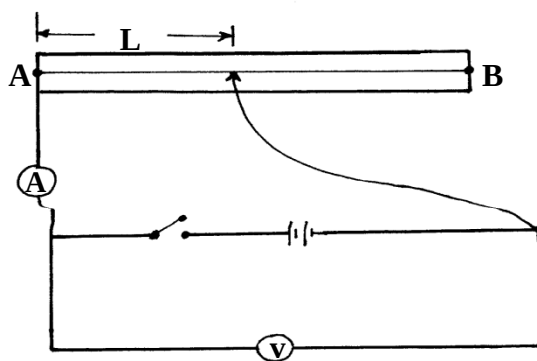
Q2. 20 MARKS

You are provided with the following apparatus

- Resistance wire fitted on a scale labeled **AB**
- Switch
- Voltmeter
- Ammeter
- Two dry cells
- Six connecting wires

Proceed as follows:-

(i) Set up the apparatus as shown below



(ii) Remove the crocodile clip from resistance wire **AB** and close the switch. Record the voltmeter reading $X = \underline{\hspace{2cm}}$ volts (1mk)

(iii) Attach the crocodile clip to the resistance wire such that $L = 10\text{cm}$

(iv) Record the voltmeter and ammeter reading in the table below

(v) Repeat the procedure in iii and iv for $L = 20\text{cm}, 30\text{cm}, 40\text{cm}, 50\text{cm}, 60\text{cm}, 70\text{cm}$, and 80cm

(vi) Complete the table below

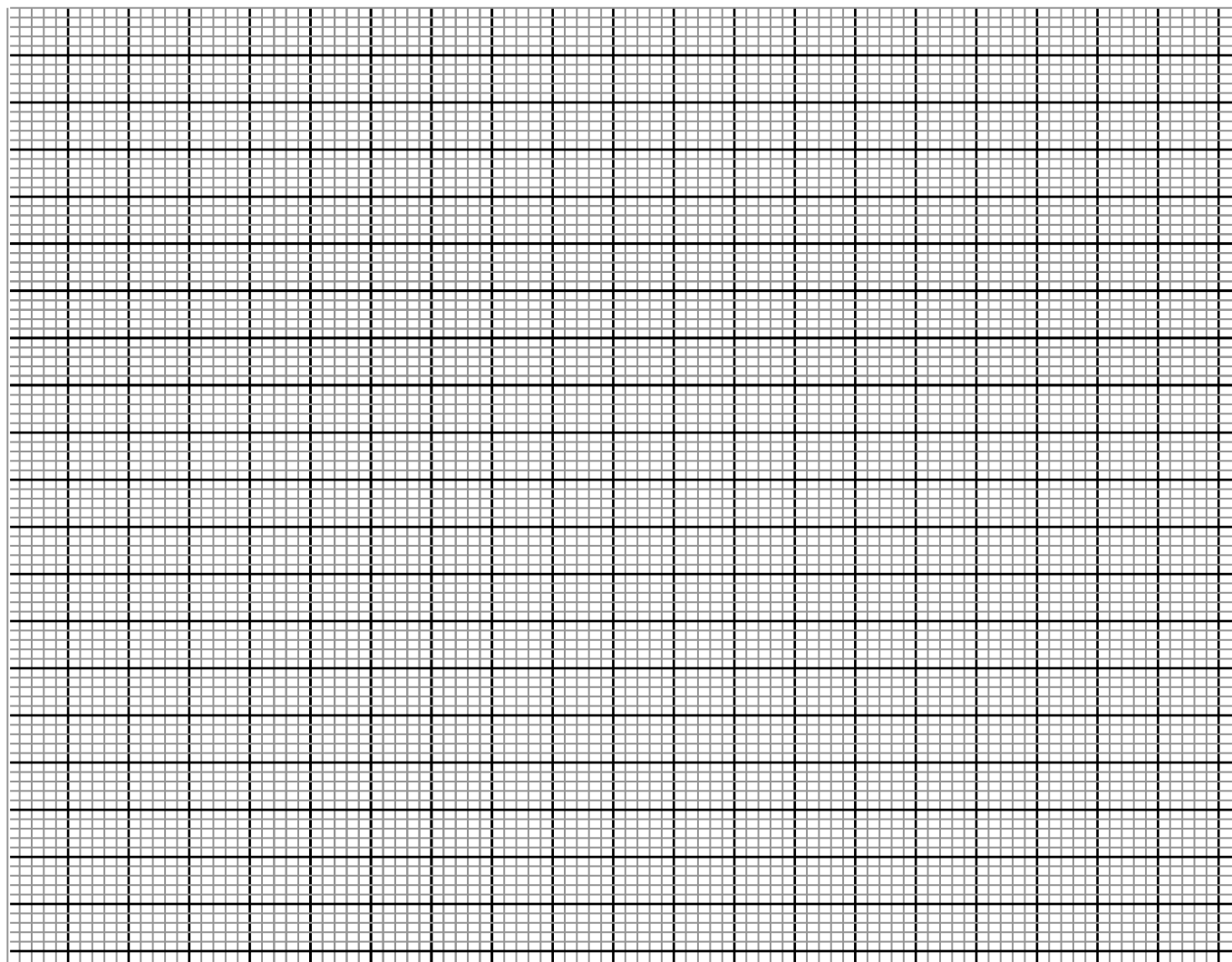
Length $L(\text{cm})$	10	20	30	40	50	60	70	80
Current $I(\text{A})$								
p.d $V(\text{v})$								
$X - V(\text{V})$								

$\frac{V}{X - V}$								
$\frac{V}{I} = R(\Omega)$								

(10mks)

(viii) (a) Plot the graph of $\frac{V}{X - V}$ against **R**

(5mks)



(b) Determine the slope **S** of the graph

(3mks)

(c) The graph is given by the equation

$$\frac{V}{X - V} = \frac{mR}{5} + d$$

Determine the value of **m** and **d**

(2mks)

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PHYSICS

PRACTICAL

INSTRUCTIONS TO CANDIDATES

- a) Write *your name and index number* in the spaces provided
- b) Answer *ALL* the questions in the spaces provided in the question paper.
- c) You are supposed to spend the first 15 minutes of the 2 1/2 hours allowed for this paper reading the whole paper carefully before commencing your work.
- d) Marks are given for clear record of observations made, their suitability, accuracy and the use made of them.
- e) Candidates are advised to record their observations as soon as they are made.
- f) *Non-programmable* silent electronic calculators and KNEC mathematical table may be used.
- g) This paper consists of 7 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

FOR EXAMINER'S USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
1	24	
2	16	
TOTAL	40	

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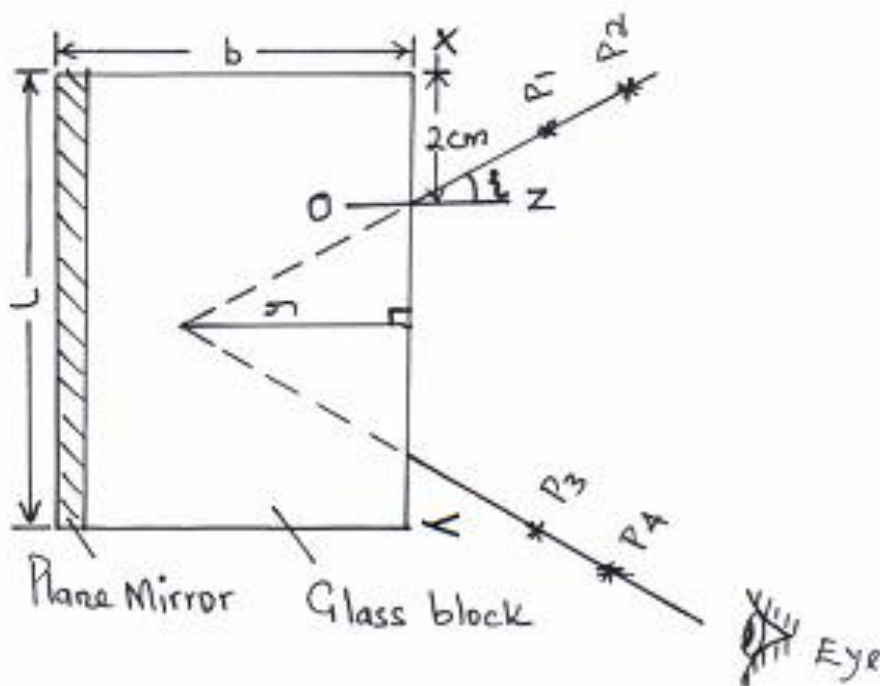
QUESTION 1 (PART A)

You are provided with the following apparatus:

- A rectangular glass block.
- Four optical pins.
- A soft board.
- A protractor.
- 30cm ruler.
- 2 white plain papers.
- A plane mirror.
- A vernier calipers (to be shared)

PROCEDURE

- Trace the outline of the glass block on the white paper.
- Draw a normal ON , 2cm from point X on side XY .
- Measure an angle (i) 10° from the normal.
- Place back the glass block on the outline and fix a plane mirror vertically along the length of the glass block on the opposite side of XY using a cello tape as shown in the figure below.



- Fix two pins P_1 and P_2 as shown in the figure.

- (f) By observing image of P_1 and P_2 , locate two pins P_3 and P_4 such that they appear to be in line with images of P_1 and P_2 .
- (g) Remove the pins and the block. Join P_3P_4 and produce the line to meet line P_1P_2 produced
- (h) Measure the perpendicular distance y .
- (i) Repeat the same for angles of 15° , 20° , 25° , 30° , 35° and 40° and record the results in table 2 below.

(NB: The paper work must be submitted together with the question paper).

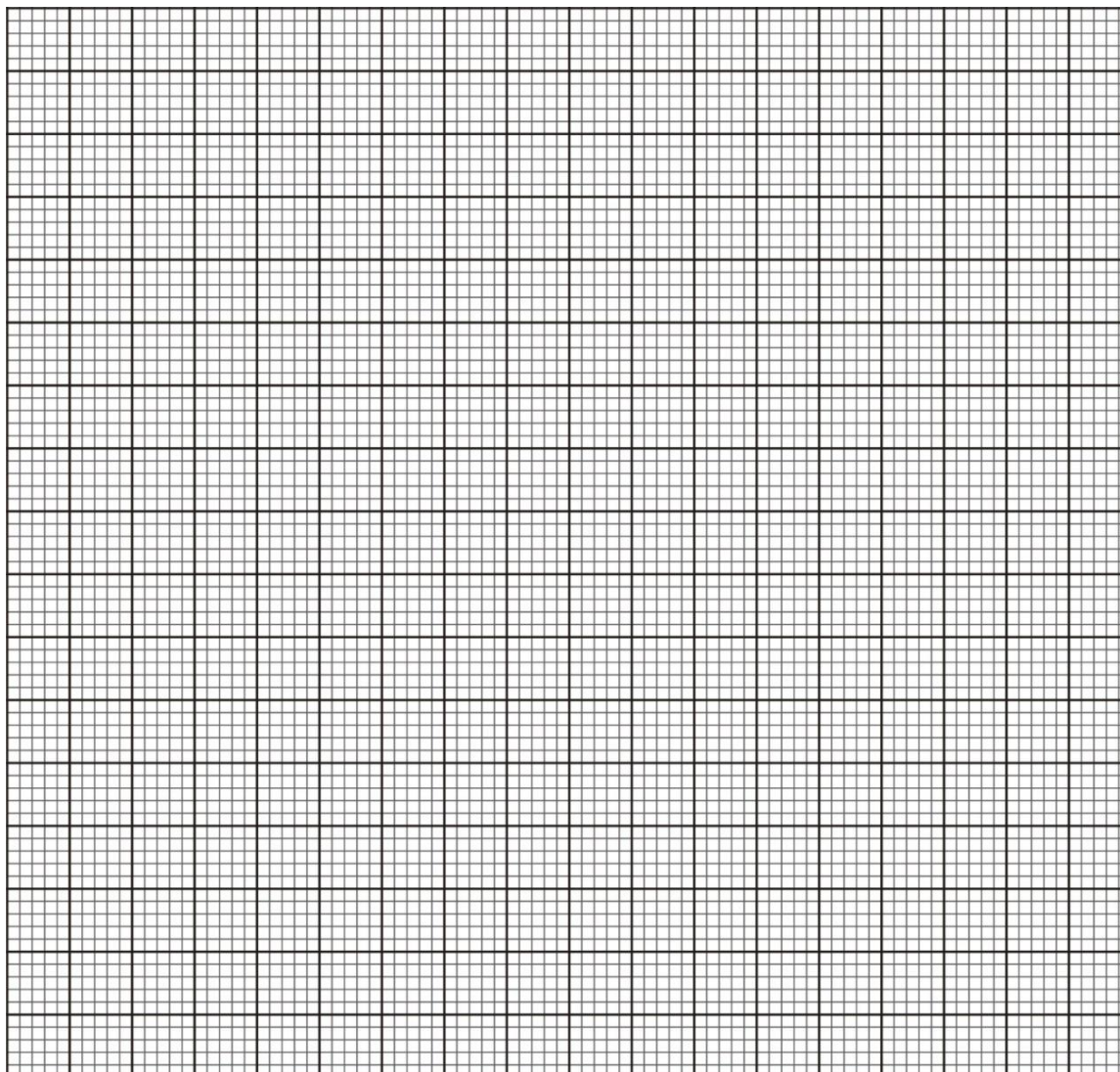
Table 2

Angle i	10°	15°	20°	25°	30°	35°	40°
$y(\text{cm})$							

(6marks)

- (j) Plot a graph of $y(\text{cm})$ against angle i .

(5marks)



i) Use the graph to determine y_o the value of y when $i = 0^\circ$

$y_o = \dots\dots\dots$ cm (1mark)

ii) Measure and record the breadth (b) of the glass block

$b = \dots\dots\dots$ Cm (1mark)

(ii) Determine the value of η given that

$$\eta = \frac{b}{y_o} \quad (1\text{marks})$$

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PART B

You are provided with the following:-

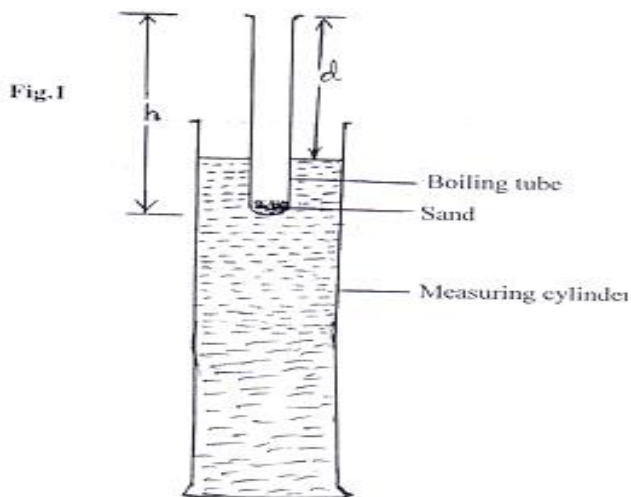
- A boiling tube.
- Some dry sand.
- A liquid in a measuring cylinder labelled L.
- Half metre rule.
- A vernier calipers (to be shared).
- A weighing machine (to be shared).
- Tissue paper.
- A measuring cylinder.

Proceed as follows:

a) Measure the length of the boiling tube.

$h = \dots\dots\dots$ cm (1mark)

b) Put a little amount of sand in the boiling tube and place it in the measuring cylinder which is almost filled with liquid L. Add sand, little by little until the tube floats upright as shown in figure below.



Measure the length, d , of the boiling tube which is above the liquid using half metre rule

$d = \dots\dots\dots$ cm (1mark)

c). Determine the length, t , of the boiling tube which is immersed in the liquid using half metre rule

$t = \dots\dots\dots$ cm (1mark)

d) Remove the boiling tube from the measuring cylinder, wipe it dry (on the outside) and measure its mass, m , including the sand inside.

$m = \dots\dots\dots$ g (1mark)

e) Measure the external diameter, D , of the boiling tube.

$D = \dots\dots\dots$ cm (1mark)

f) Determine the external radius, R .

$R = \dots\dots\dots$ cm (1mark)

g) Using the formula $m = 12\rho\pi R^2 t$, determine ρ for the liquid. (1marks)

QUESTION 2

You are provided with the following:

- An ammeter (0 – 1 A)
- A voltmeter (0 – 3 V or 0 – 5 V)
- A variable resistor
- A 10Ω carbon resistor
- A piece of resistance wire
- Two new dry cells
- A cell holder
- A switch
- Seven connecting wires

Proceed as follows:

- Take the resistant wire and coil it around the biro pen to make a coil.
- Set up the apparatus as shown **Figure 5** below such that the 10Ω carbon resistor and the coil are in parallel connection.

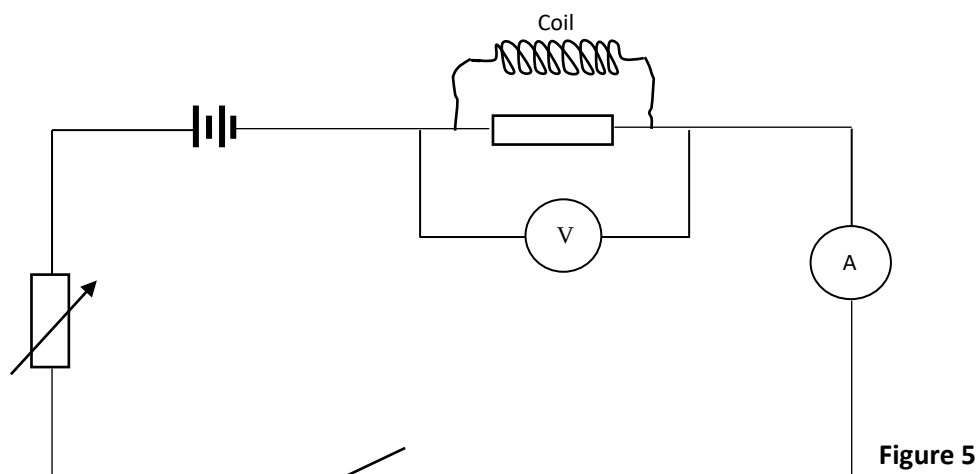


Figure 5

- Close the switch and the adjust the variable resistor such that the ammeter read a current of $I_1=0.08\text{A}$ and record the corresponding voltmeter reading V_1

i) $V_1 = \dots\dots\dots$ (1mark)

ii) Calculate resistance $R_1 = \frac{V_1}{I_1}$ (1mark)

d) Repeat (c) above for current of $I_2 = 0.16\text{A}$ and record the corresponding voltmeter reading V_2

i) $V_2 = \dots\dots\dots$ (1mark)

ii) Calculate resistance $R_2 = \frac{V_2}{I_2}$ (1mark)

e) Find the average value of resistance R (1mark)

f) Determine the resistance, C of the coil (2marks)

g) Now set up the apparatus as shown in **Figure 6** below such that the voltmeter is connected across the cells, 10Ω carbon resistor and the coil are in parallel connection.

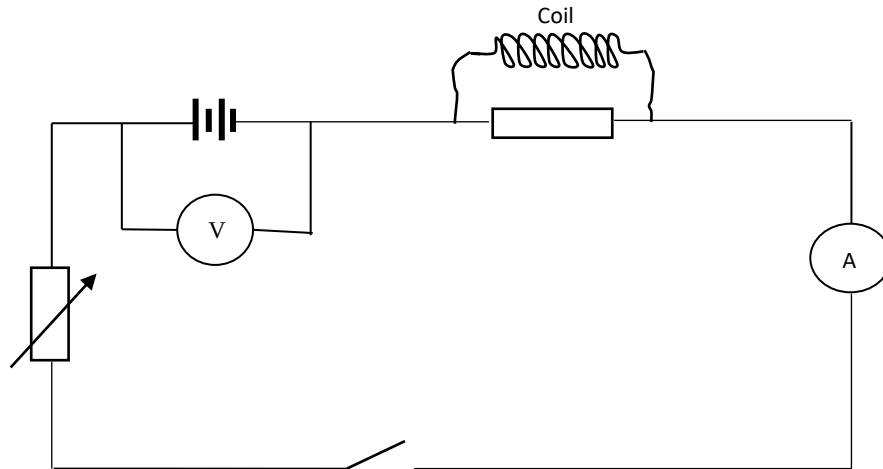


Figure 6

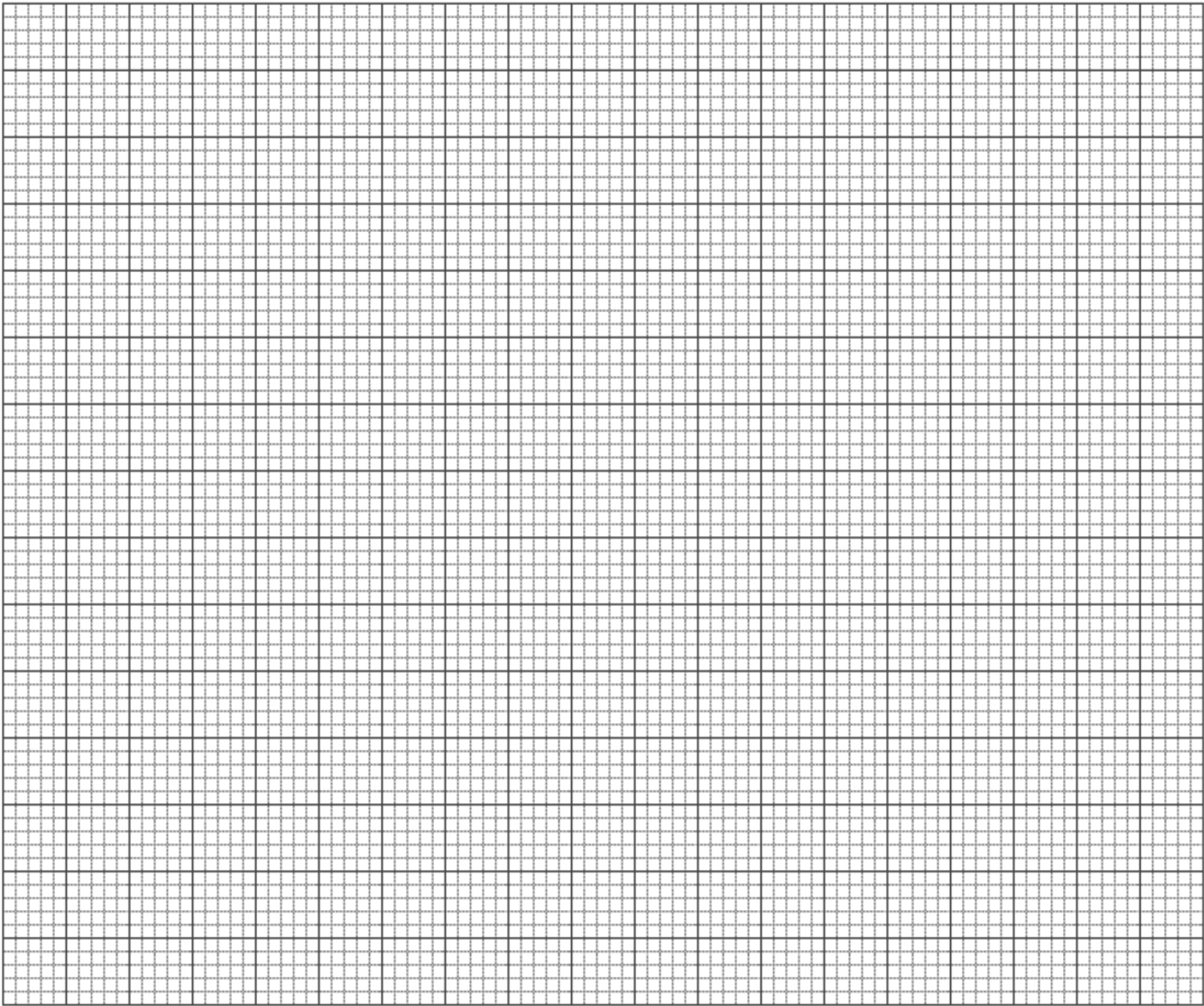
h) Close the switch and the adjust the variable resistor such that the ammeter reads a current of 0.04A and note the corresponding voltmeter reading. Record the value in the **Table 4** below.

i) Repeat (h) above for other values of current and voltage and complete the **Table 4** below

Current, I (A)	0.04	0.08	0.12	0.16	0.20	0.24
Voltage, V(V)						

(4marks) **Table 4**

j) On the grid provided plot a graph of **Voltage, V (V)** against **Current, I (A)** (5marks)



k) Determine the slope of the of the graph

(2marks)

l) Given that graph is related to equation $E = V + Ir$ where E and r are the emf and internal resistance of the cells respectively, use your graph to determine the value of:

$E = \dots\dots\dots$

(1mark)

$r = \dots\dots\dots$

(1mark)