MOMALICHE 4 CYCLE 8

NAME……CLASS……ADM NO….

PHYSICS PRACTICAL

TIME: 2½ HOUR

Instructions to candidates:

1. *Write your **name** and **index number** in spaces provided **above**.*
2. ***Sign** and write the date of examination in spaces provided **above**.*
3. *Answer **all** the questions in spaces provided in the question paper.*
4. *You are **NOT** allowed to spend the first 15 minutes of 2½ hours allowed for this paper reading the whole paper carefully before commencing the work.*
5. *Marks are given for clear record of the observations actually made, their suitability, accuracy and the use made of them.*
6. *Candidates are advised to record their observations as soon as they are made.*
7. *Non-programmable silent electronic calculators and KNEC Mathematical table may be used.*

FOR EXAMINER'S USE ONLY

Question 1	a	c	f(i)	f(ii)	f(iii)		**Total**	**20**
Maximum Score	1	8	5	3	3			
Candidate's Score								

Question 2	c(i)	c(i)	c(ii)	c(iii)	c(iv)	Part II b(i)	b(ii)	**Total**	**20**
Maximum Score	1	2	5	2	1	2	2		
Candidate's Score									

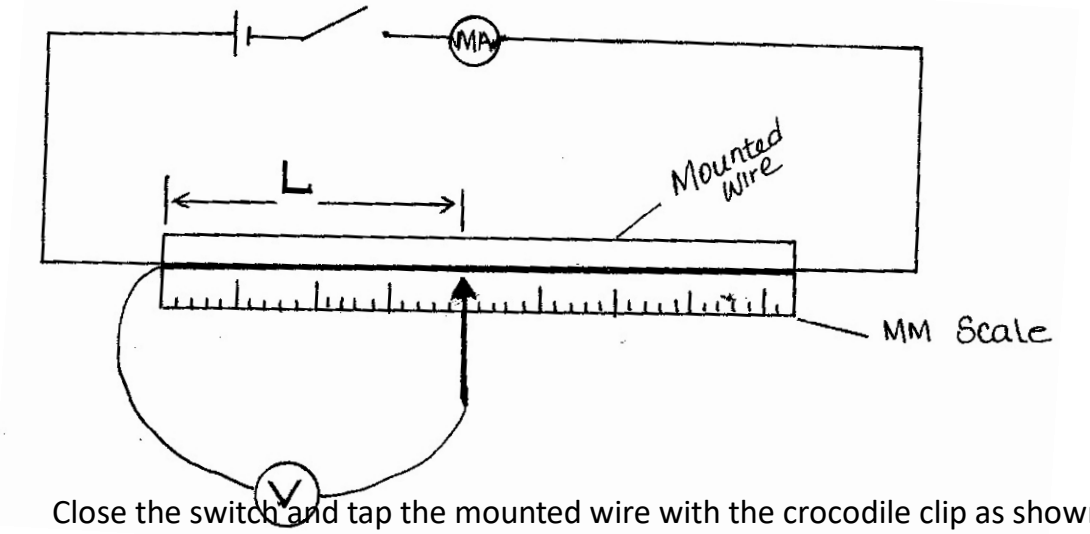
1 You are provided with the following.

- A millammeter.
- A voltmeter.
- A wire mounted on a mm scale.
- A switch.
- A long wire with a crocodile clip at one and (crocodile clip to be used as a slider or jockey).
- A new dry cell (size D) and a cell holder.
- A micrometer screw gauge (may be shared).
- 5 connecting wires, two with crocodile clips at the end.

Proceed as follows:

(a) Measure the diameter, d of the mounted at three different points.
Average diameter d = _____mm (1mk)

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



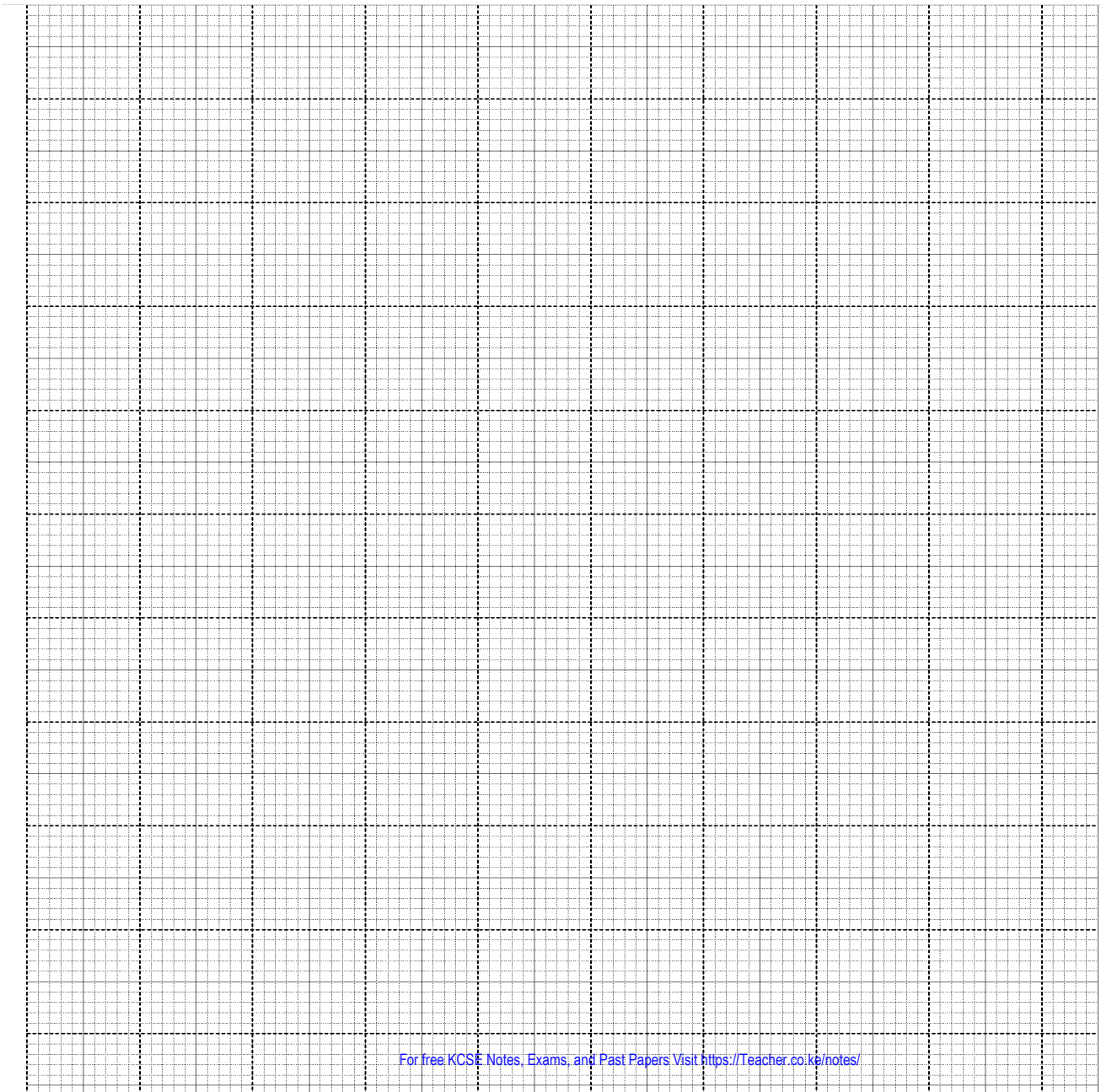
(c) Close the switch and tap the mounted wire with the crocodile clip as shown in the circuit. Ensure that both meters show positive deflection. Open the switch.

(d) Tap the wire at L = 20cm. Close the switch read and record in the time provided the milliammeter and voltmeter reading.

(e) Repeat the procedure in (c) for other values of L, shown in the table below and complete the table. (8mks)

L(cm)	L(m)	V (Volts)	I MA	Amps	$R = V/I$
20					
30					
40					
50					
60					
80					

(f) (i) Plot the graph of R (Y-axis) against L(m). (5mks)



(ii) Determine the slope of the graph. (3mks)

(iii) Given that $R = PL/A$ were A is the cross-sectional area of the wire and P is a constant for the material of the wire, determine the value of the constant P. (3mks)

2. You are provided with the following:

- A marble with a piece of thread attached.
- Two wooden blocks.
- Clamp, boss and retort stand.
- Meter rule.
- $1/2$ metre rule attached to a wooden block.
- Cello tape (2 pieces of about 10cm long)
- Stop watch.

Proceed as follows:

(a) Fix the thread between the two wooden blocks and fasten the clamp.
(b) Adjust the thread so that the length L shown in figure 1 is 50.0cm.
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.

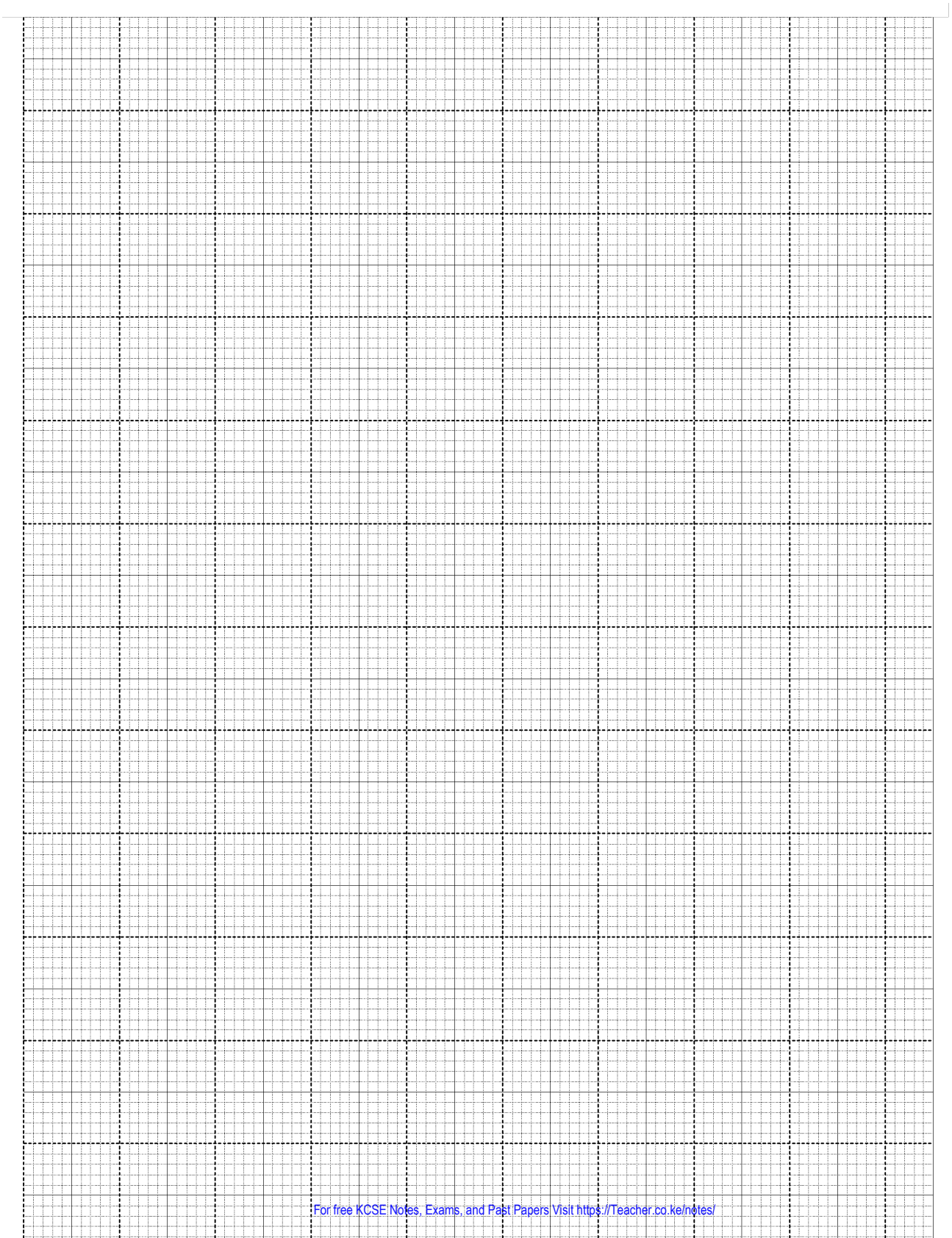
Fig.1

(i) Displace the marble by a horizontal distance X = 20cm and measure the corresponding vertical.
Displacement h = _____ cm (1mk)

(ii) Repeat the experiment to find h for each of the following values in the table.
(Complete the table). (2mks)

χ(cm)	h(cm)	χ^2(cm^2)	$\chi^2/_h$(cm)
20		200	
25		625	
30		900	
35		1225	
40		1600	
45		2025	

(iii) Plot the graph of $\frac{\chi^2}{h}$ (y-axis against h. Draw the best line through the points.(5mks)



(iv) Determine the slope of the graph. (2mks)

(v) From the graph, find the value of $\frac{\chi^2}{h}$ when h = 0. (1mk)

(b) Raise the clamp slightly without changing the length L so that the marble is free to swing. Determine the period, T, for one complete oscillation by timing ten oscillations.

Time for 10 oscillation = _____(1mk)

Period T = _____(1mk)

(c) Calculate the value of P from he following equation.

$T = 2\pi\sqrt{\left(P/g\right)}$ where g = 9.8ms^{-2} (2mks)

(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 **2 below**.

Fig.2

i Place the cross-wire before the lens so that U = 28cm. The lit candle should be placed close to the cross-wire.
Ii Adjust the position of the screen until a sharp image is cast on the screen.
Iii Measure and record the value of image distance, V, in the table.
Iv Repeat the same procedure for the other values in the table.

Table 2

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)

232/3

PHYSICS

PAPER 3

(PRACTICAL)

CONFIDENTIAL

INSTRUCTIONS TO SCHOOL:

1. The information contained in this paper is to enable the head of school and the teacher in charge of Physics to make adequate preparations for the Joint Physics Practical Examination. **NO ONE ELSE** should have access to this paper or acquire knowledge of its contents. Great care **MUST** be taken to ensure that the information herein does not reach the candidates either directly or indirectly.
2. The apparatus required by each candidate for the Physics Practical Examination are set out on page 2 and 3. It is expected that ordinary apparatus of Physics laboratory will be available.
3. The Physics teacher should note that it is his/her responsibility to ensure that each apparatus require for this examination requires with the specifications on page 2 and 3.
4. The question paper will not be opened in advance.
5. The Physics teacher is not expected to perform the experiments.

NB: Any use of apparatus other than the ones specified may leads to candiates being penalized.

QUESTION 1

Each candidate will require the following.

- A milliammeter.
- A voltmeter (0 – 3V) or (0 – 5V).

- A wire mounted on a mm scale (Nichrome wire SWG 32)
- A switch.
- A long wire with a crocodile clip at one end (crocodile clip to be used as a slider or jockey).
- A micrometer screw gauge (may be shared).
- 5 connecting wires, two with crocodile clips at the end.
- One new dry cell size D.
- Cell holder.

QUESTION 2

- A metallic marble (bob) with hook.
- Two wooden blocks measuring 1cm $\times$ 3cm $\times$ 4cm.
- Clamp, boss and retort stand.
- Meter rule.
- Stop watch.
- Thread of about 70cm.
- Cello tape (2 pieces of about 10cm long).
- $^{1}/_{2}$ metre rule attached to a wooden block of (5cm $\times$ 5cm $\times$ 5cm) as shown using cello tape/plastine.

- Candle.
- Lens of focal length 20cm (convex).
- Lens holder.
- Cardboard of 2cm $\times$ 20cm with a hole of diameter approximately 4cm at the centre (cross wire placed at the hole)
- Screen (white).
- Vernier calipers (to be shared).
- Match box (to be shared).

- Metre rule.

N**B:** The cardboard and screen to be supported on wooden block to enable them stand vertically upright.

MOMALICHE JOINT EXAMINATION - 2021

232/3 – PHYSICS MARKING SCHEME PAPER 3

1. (a) Evaluation of d (1mk)

d = 0.42mm = 4.2×10^{-4}m

(d)

L(cm)	L(m)	V(Volts)	I MA	A	$R = V/I$
20	0.2	0.20	0.20	0.0002	1000
30	0.3	0.30	0.18	0.00018	1667
40	0.4	0.38	0.16	0.00016	2375
50	0.5	0.45	0.15	0.00015	3000
60	0.6	0.50	0.14	0.00014	3571
80	0.8	0.60	0.12	0.00012	5000

Each correct entry of V columns (½mk)

Each correct entry of MA column (½mk)

At least 3 correctly corrected Amps (1mk)

At least 3 correctly evaluated vales of R (1mk)

Error Voltmeter $\pm$ 0.01

Milliameter $\pm$ 0.01

e(ii) Suitable scale (1mk)

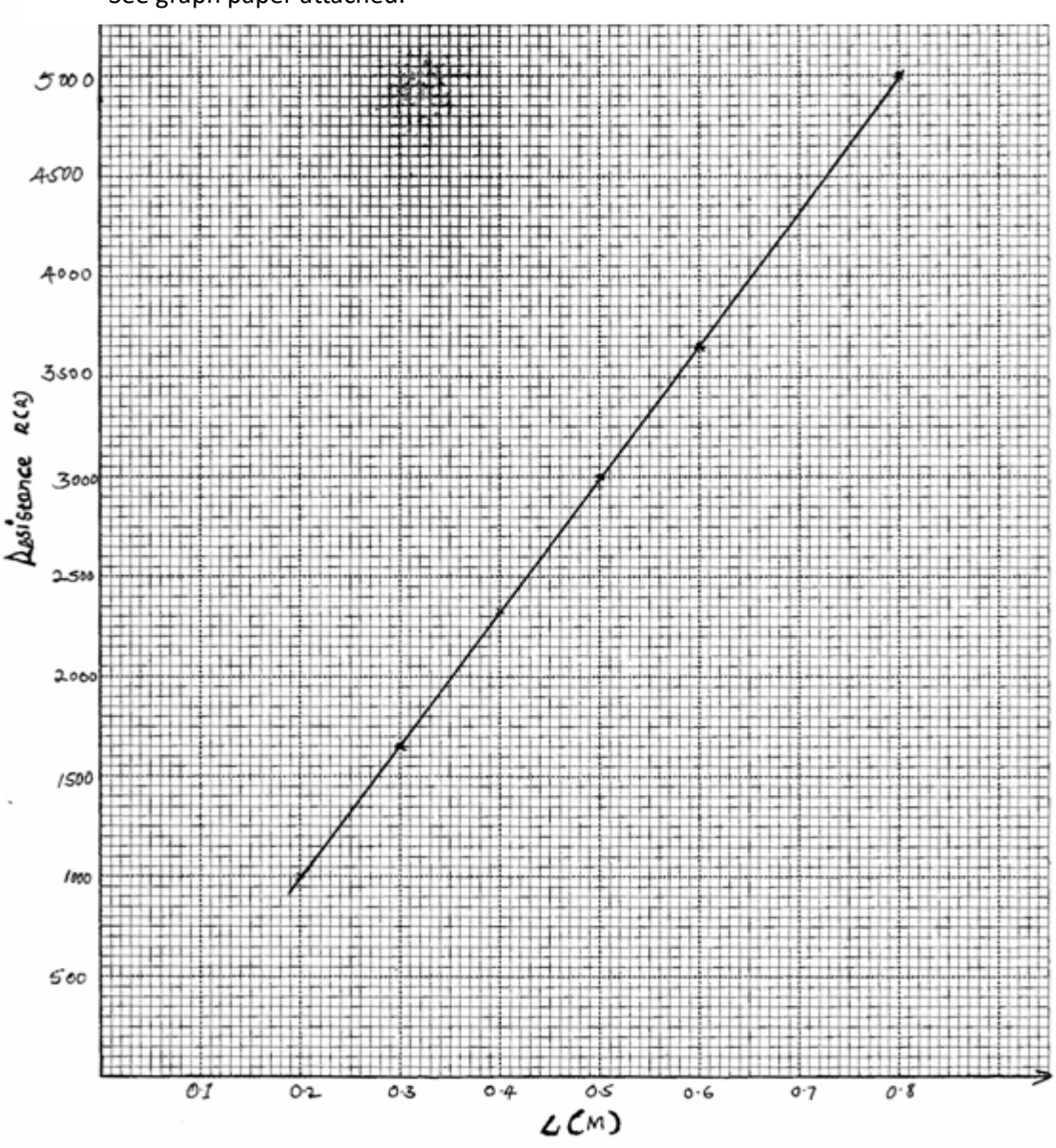
Labeling units indicated (1mk)

Plotting 5 - 6 correct points (2mks)

or 3 – 4 correct points (1mk)

Suitable straight line (1mk)

See graph paper attached.



(ii) $Slope = \frac{\Delta R(\Omega)}{\Delta L(M)}$ - Ready from graph (1mk)

$= \frac{5000 - 1000}{0.8 - 0.2}$ $-$ *Substitution* $(1mk)$

$= \frac{4000}{0.6}$ $-$ *Evaluation of gradient* $(1mk)$

= 6666Ω/m

(iii) $R = \frac{P\ell}{A}$

Comparing with

y = MX + C

$\frac{p}{A} = Slope$ ①

$\Rightarrow$ P = Slope x A ①

$= 6666 \times \frac{22}{7} \times \left(2.1 \times 10^{-4}\right)^2$ ①

= $9.24 \times 10^{-4}\Omega m$

2. (a) (i) h = 4.0 ± 0.5 ✓(1mk)

(ii)

h(cm)	χ^2/h (cm)
4.0	100.00
6.0	104.18
9.5	94.74
14.0	87.50
20.0	80.00
29.0	69.83

χ^2h correct (2mks)
Ay 5 h correct (1mk)

(iv) $Slope = \frac{\Delta \chi^2 h}{\Delta h} = \frac{65 - 92.5}{35 - 10} = \frac{-27.5}{25}$ ✓(1mk)

= -1.1 ✓(1mk)

(v) $\frac{\chi^2}{h} = 104.5 \pm 1$ ✓(1mk)

(b) (i) Time for oscillations = 27.66 sec. ± 1 sec. ✓(1mk)

Period T = 1.383

(ii) $T = 2\Pi\sqrt{P/g}$

$T^2 = 4\Pi^2 P/g$

$gt^2 = 4\prod^2 P$

$gt^2 = 4^2 P$

$P = \frac{gt^2}{4\Pi^2}$

$P = \frac{1.383^2 \times 10}{4\Pi^2} = 0.4845$ ✓(1mk)

Ans ✓(1mk)

2(b)

U(cm)	V(cm) ± 2	$M = V/U$
30	58	1.933
36	44	1.222

(1mk)

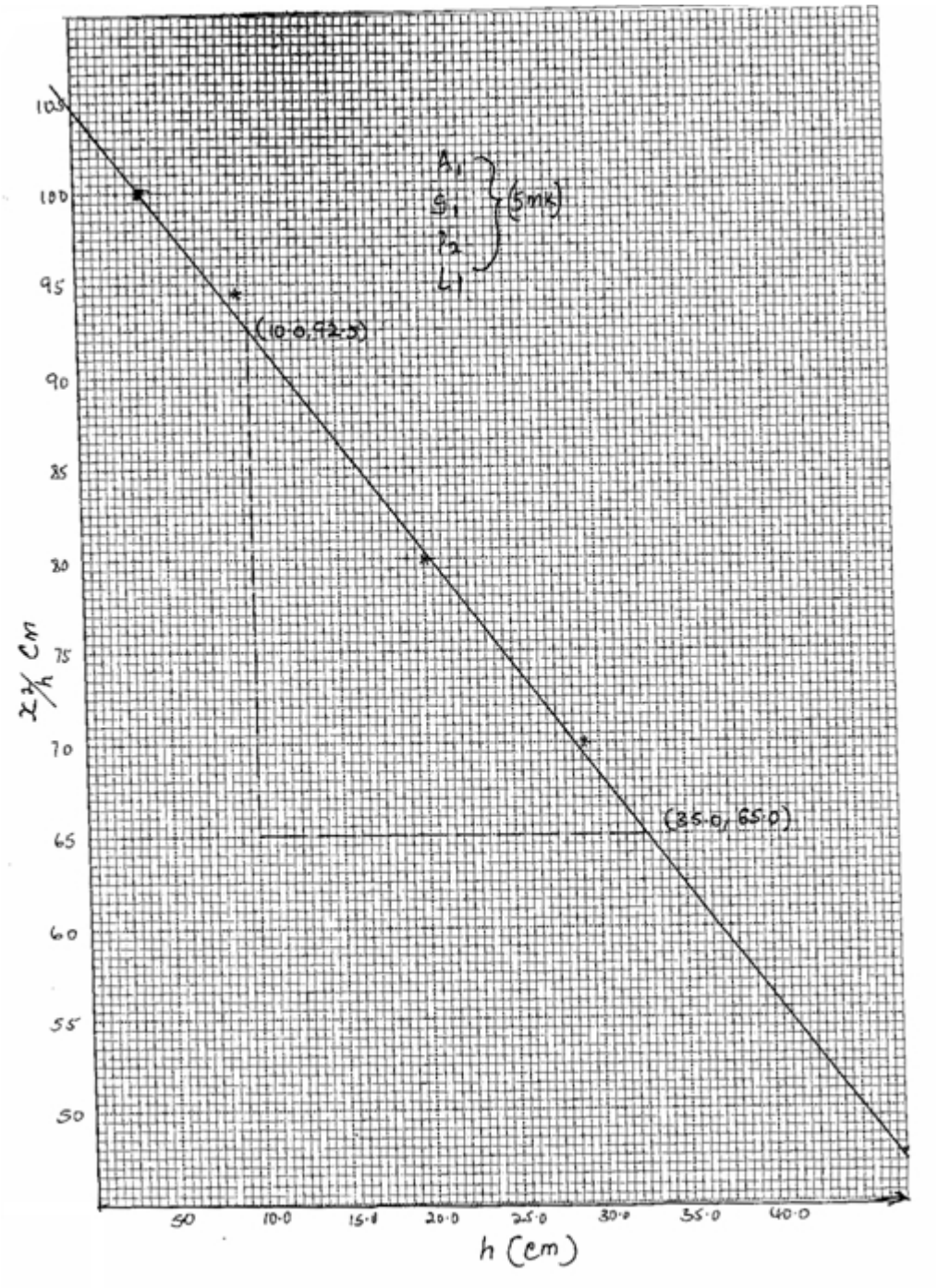
$F = \frac{V}{M+1}$

$f_1 = \frac{58}{1.933+1} = 19.775$ ✓(1mk)

$$f_2 = \frac{44}{1.222 + 1} = 19.802$$ ✓(1mk)

$$f = \frac{f_1 + f_2}{2}$$

$$\frac{19.775 + 19.802}{2} = 19.788$$ ✓(1mk)



CONFIDENTIAL

INSTRUCTIONS TO SCHOOLS

MOMALICHE MOCK EXAMINATION – 2021

Kenya Certificate of Secondary Education (K.C.S.E)

1. Constantan wire SWG 26 mounted on a metre rule
2. Ammeter (0 – 1)A
3. Voltmeter (0 –2.5)V
4. A jockey
5. 6 connecting wires with crocodile clips
6. A switch
7. A new dry cell and a cell holder
8. Micrometer screw gauge to be shared

QUESTION 2

1. copper wire of length = 150cm

Specification

(i) Diameter = 0.7mm
(ii) Size = 22
(iii) Length = 150cm

2. 50g mass
3. A metre rule
4. two pieces of wood
5. Test tube
6. Retort stand, boss and clamp

N/B

The copper wire is found in any electrical shop. It is suitable for making a simple spiral spring. The wire is coated and it is flexible. The sample of the same can be obtained in the following electrical shops.

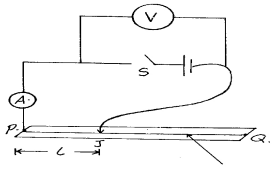
Question 1

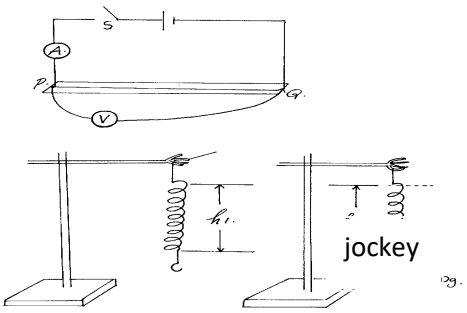
Q1. You are provided with the following apparatus

- A voltmeter
- An ammeter
- A wire x mounted on a metre rule
- 6 connecting wires with crocodile clips
- Micrometer screw gauge
- A switch
- A jockey
- One new dry cell and a cell holder.

Proceed as follows:

a) Connect the apparatus provided as shown in the circuit below.





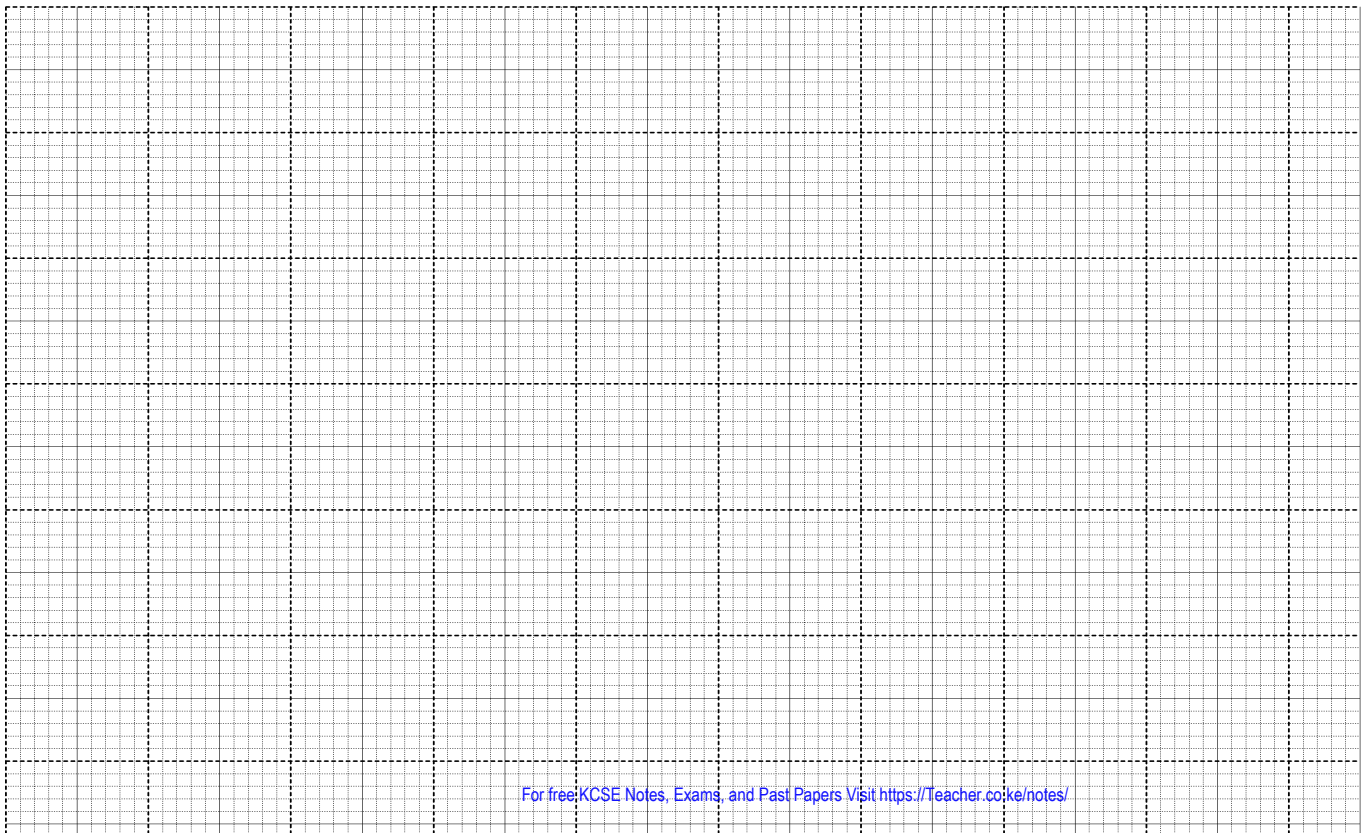
b) With the crocodile clip at L = 10 cm , close the switch S and record the ammeter and voltmeter reading.

I = _____ V = _____V

c) Repeat the procedure in (b) for other values of l = 15cm, 20cm, 25cm, 30cm, 35cm and record the readings in the table below.

Length. L. (cm)	10	15	20	25	30	35
Voltmeter reading , V (volts)						
Ammeter reading , I(A)						

d) Plot a graph of potential difference, V(y-axis) against the Current I . (5mks)



(2mks)

f) Given that V= E –I r, use your graph to determine the value of;

(i) E
(1mk)

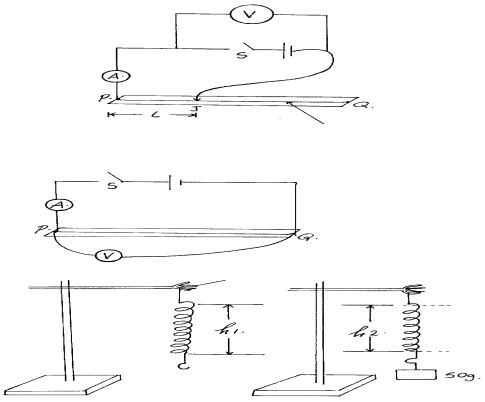
(ii) r
(2mks)

g) Measure the diameter d of the wire x using the micrometer screw gauge.

d = _____ mm

_____m
(1mk)

h) Dismantle the apparatus and set up the circuit as shown below.



i) Close the switch S and record the ammeter and the voltmeter readings

I = _____ A

V = _____ V

(1mk)

Hence find R, the resistance of the wire x.

R = _____ Ω

(1mk)

j) Given that $R = \frac{4\rho}{\pi d^2}$, determine ρ

(2 mks)

Question 2

You are provided with the following apparatus;

- A copper wire
- A 50g mass
- A metre rule
- Two pieces of woods
- A test –tube
- A retort stand, boss and clamp

Proceed as follows.

a) Measure the length, L, of the wire provided

L = _____ cm
(1mk)

b) Wind the whole length of the wire tightly on the test-tube making sure that the turns are as close as possible but not overlapping. Measure the length, φ , of the coil made.

φ =_____ cm
(1mk)

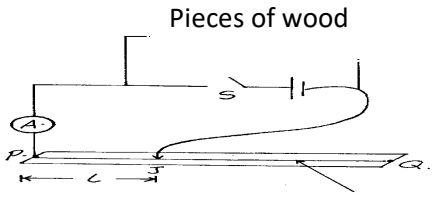
c) Count and record the number, N, of the complete turns on the coils.

N = _____
(1mk)

d) Remove the coil from the test-tube. Straighten the first and the last turns of coil. Bend one end to make a hook.

e) Count and record in the table below, the number, n , of complete turns remaining on the coil.

f) Measure and record in the table below, the distance, h_1 between the end turns of the coil as shown on the diagram below



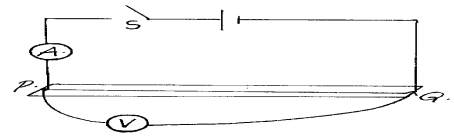
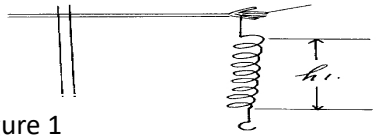


Figure 1



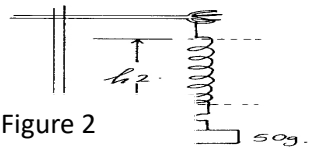


Figure 2

g) Load a 50 g mass on the coils as shown in figure 2 above. Measure and record in the table below, the distance,h_2 , between the end turns of the coil.

h) Remove the mass from the coil Reduce the number of turns by straightening three turns of the coil from the upper end and adjust the point of suspension of the coil as shown in figure 2.Record the number of turns, n, remaining.

i) Measure and record the new distances,h_1 in the table below.

j) Load 50g mass on the coil. Measure and record the new h_2 in the table below.

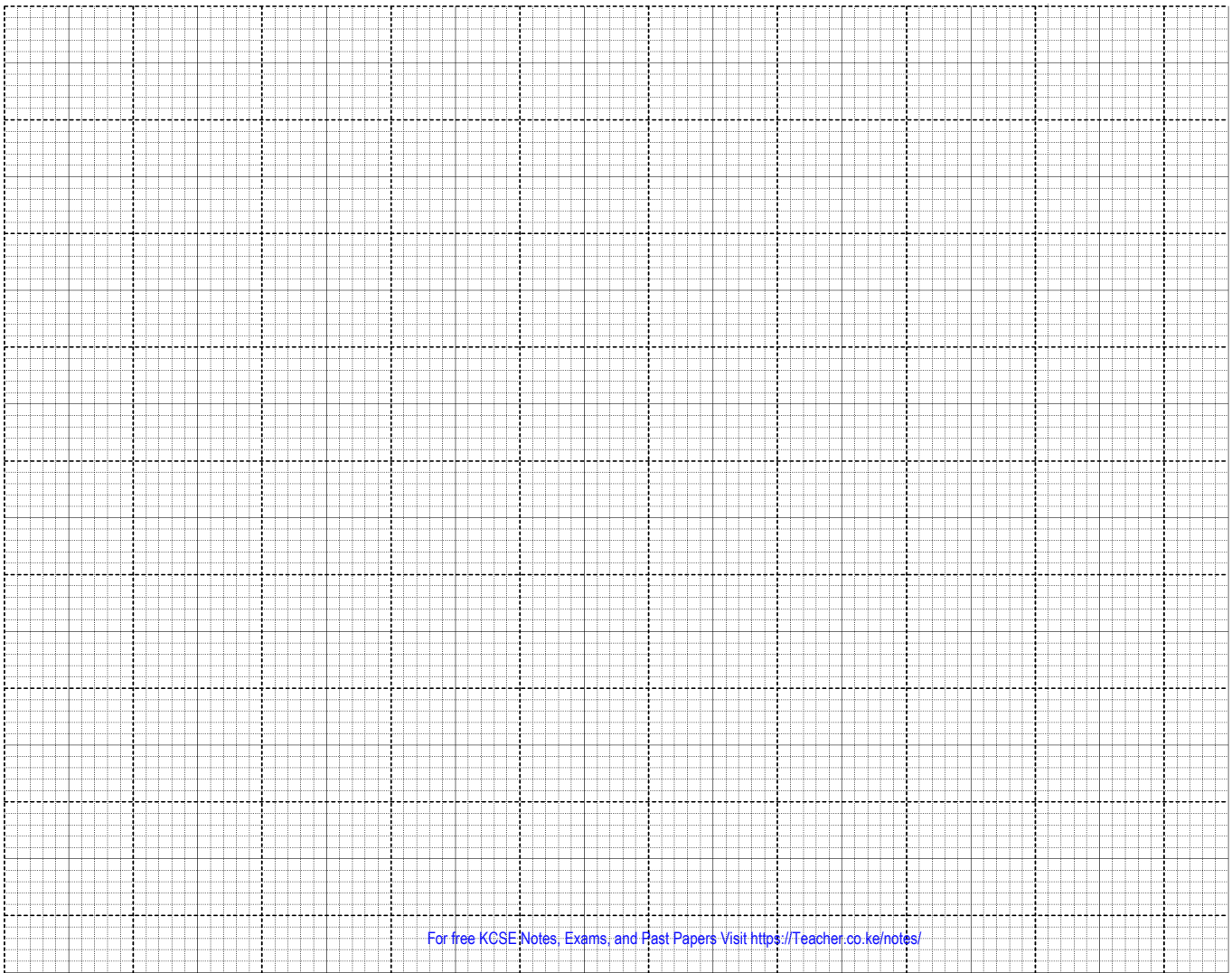
k) Repeat the procedure (i) and (j) above so as to obtain four sets of readings for, n,h_1 and h_2. Calculate the corresponding extension and complete the table below.

Number of turns, n, remaining					
Distance, h_2 (cm)					

Distance, h_1 (cm)					
Extension, e(cm)					

(6mks)

l) Plot the graph of extension, e(y-axis) against the number of turns, n, on the grid provided



m) I . Determine the slope ,s, of the graph. State its units. (2mks)

II Determine the constant, p, for the wire from the expression:

$$P = \frac{4mgR^3}{S r^4}$$

Where m is the mass used

g is acceleration due to gravity, $g = 10m/s^2$

$$R = \frac{L}{2\pi N}$$

$$r = \frac{\varphi}{2N}$$

(4mks)

Question 1

d) Table m

L(cm)	10	15	20	25	30	35
p.d (v)	1.0	1.1	1.15	1.20	1.25	1.3
Fl (A)	0.44	0.3	0.32	0.28	0.26	0.24

e) $\text{slope} = \frac{\Delta V}{\Delta I} = \frac{1.3 - 1.1}{0.24 - 0.36} = \frac{0.2}{-0.12}$ V/ A

$= \underline{-1.67 \text{ V/ A}}$

f) From $V = E - Ir$ $V = -(r)\, I + E$

(i) E vertical intercept

F = 1.52V (students values)

(ii) Slope = - r from the graph

- 1.667 = -r

r =1.667Ω

g) d = 0.45 mm $\pm$ 0.01mm

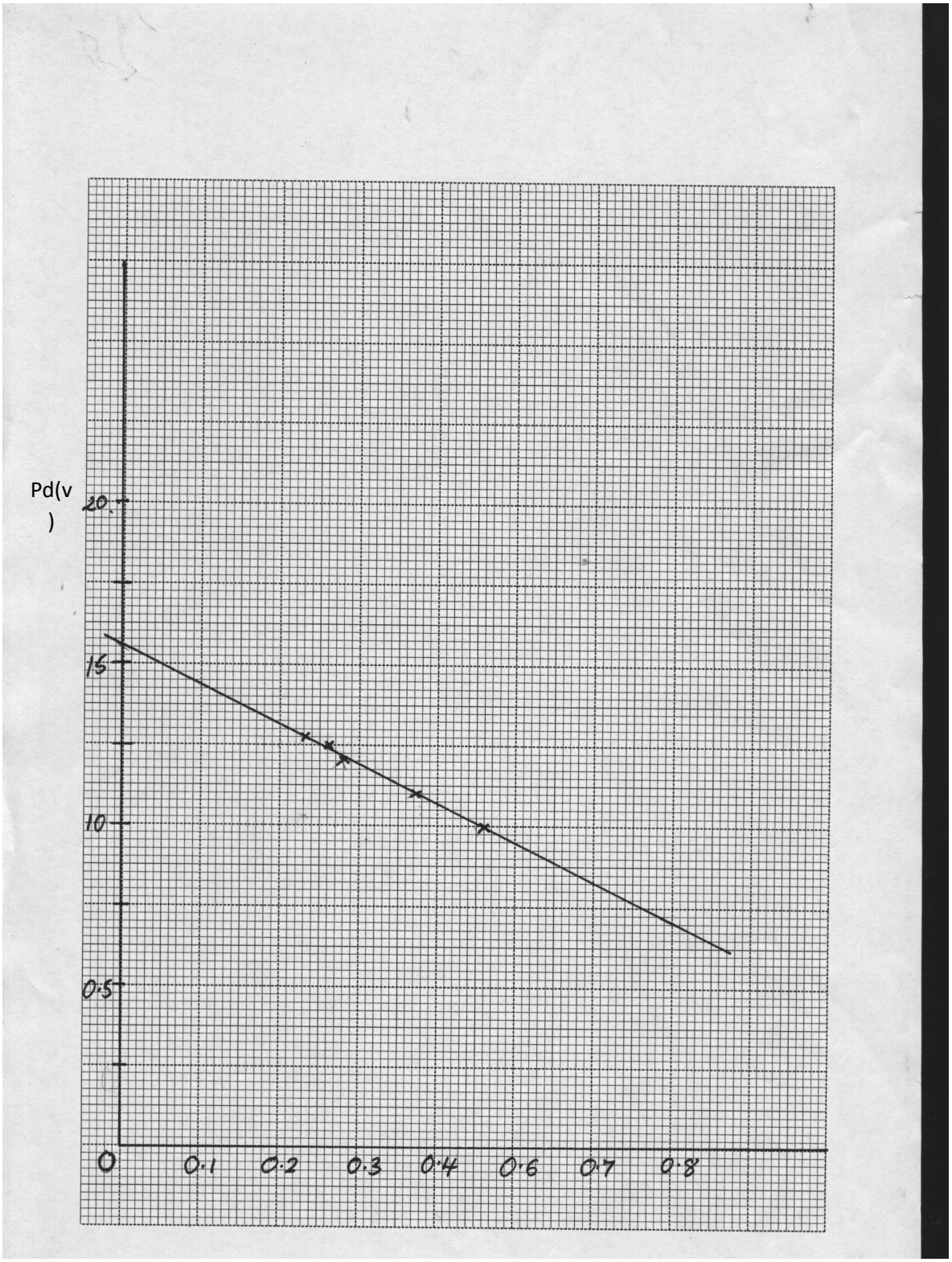
c) F = 1.0 A

V = 0.04 V $R = \frac{0.04}{1.0} = 0.04\,\Omega$

j) $R = \frac{4e}{\pi d^2}$ $P = \frac{R\,\pi d^2}{4}$

$P = \frac{0.04\,\Omega\,(0.0045)^2}{4}$

$P = (6.0 \times 10^{-8})\,\Omega\,m$



Question 2

a) l =150cm (student value)
b) a = 6.5 cm (student value)
c) M = 28 (student value)

k) Table

(i)

Number of turns	26	23	20	17	14
Distances h_2 (cm)	11.1	9.4	7.5	5.7	4.1
Distanceh_1 (cm)	6.0	5.4	4.8	3.7	2.7
F + tension e (cm)	5.1	4.0	2.7	2.0	1.4

(ii) slope = $\frac{1.4 - 5.1}{14 - 26} = \frac{-3.7}{-12}$

= 0.308 cm

Or slope = $\frac{(1.4 - 5.1) \times 10^{-2}}{(4 - 20)}$ = 0.308 m

l) $R = \frac{L}{2\pi N} = \frac{150 \times 10^{-2}}{2 \times 3.14 \times 28}$

= 0.00853 m

$R = \frac{\theta}{} = \frac{6.5 \times 10^{-2}}{}$

$\frac{2m}{2 \times 28}$

$= 0.00116\ m$

$P = \frac{4mgR^3}{S\ r\ 4}$

$= \frac{4 \times 0.05 \times 10 \times (0.00853)^3}{0.0308 \times (0.00116)^4}$

A graph of extension – Number of turns