

PHYSICS PAPER 3

EXPECTED QUESTIONS IN KCSE

**Comprises 6 KCSE prediction set exams
(Class of KCSE March 2022).**

For Marking Schemes Contact Mr Machuki
0795491185

Kenya Educators Contacts:

+254795491185

kenyaeducators@gmail.com

**For More e-learning resources contact Kenya
Educators via the contacts above.**

PREDICTION 1

231/3

PHYSICS

PAPER 3

PRACTICALS

CONFIDENTIAL INSTRUCTIONS TO SCHOOLS

The information contained in this paper is to enable the head of school and teacher in charge of physics to make adequate preparations for this year's 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.

-The physics teacher is NOT expected to perform the experiments

- The apparatus required by each candidate for the physics practical examination are set out on the next page. It is expected that the ordinary apparatus of a physics laboratory will be available.

- The physics teacher should note that it is his/her responsibility to ensure that each apparatus acquired, for this examination agrees with specifications below.

Each candidate requires

- A micrometer screw gauge (to be shared)
- Nichrome wire mounted on a mm scale labeled AB
- A voltmeter (0-3v or 0-5v)
- Ammeter (0-1A)
- A switch
- A jockey/long wire with crocodile clip attached
- TWO new dry cells and cell holder
- At least 8 connecting wires with crocodile clips attached to one end
- Two metre rules
- Two stands and two clamps
- Two bosses
- Three pieces of thread 70cm, 20 cm and 20cm.
- A helical spring length 4 inches
- One mass of 100g
- A stopwatch

PREDICTION 1

Name:.....Index No.....

Date:.....

Candidate's Signature:.....

PHYSICS PRACTICAL

PAPER 232/3

TIME:2 ½ HOURS

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

INSTRUCTIONS TO CANDIDATES

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) Answer ALL the questions in the spaces provided in the question paper.
- (d) You are supposed to spend the first 15 minutes of the 2½ hours allowed for this paper reading the whole paper carefully before commencing your work.
- (e) Marks are given for a clear record of the observations actually made, their suitability, accuracy and the use made of them.
- (f) Candidates are advised to record their observations as soon as they are made.
- (g) Non-programmable silent electronic calculators may be used.
- (h) This paper consists of 8 printed pages.
- (i) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
- (j) Candidates should answer the questions in English.

For Examiner's Use Only

Question 1

	b	c	d(i)	d(ii)	e	f	g	h	TOTAL
Maximum Score	1	1	5	5	1	2	2	3	20
Candidate's Score									

Question 2

	v	vii i	Ix	x	xi	TOTAL
Maximum Score	1	8	5	3	3	20
Candidate's Score						

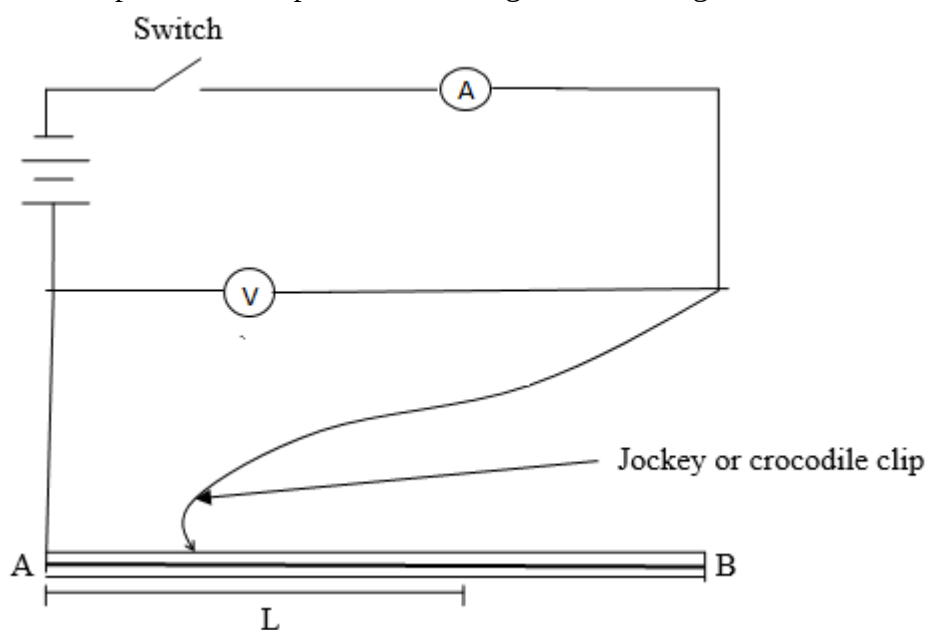
QUESTION 1 PART A

1. You are provided with the following

- A micrometer screw gauge (to be shared)
- Nichrome wire mounted on a mm scale labeled AB
- A voltmeter (0-3v or 0-5v)
- Ammeter (0-1A)
- A switch
- A jockey/long wire with crocodile clip attached
- TWO new dry cells and cell holder
- 8 connecting wires with crocodile clips attached to one end

Proceed as follows

- a) Set up the circuit as shown below ensure that when the switch is open, both meters read zero, keep the switch open when readings are not being taken.



- b) Measure and record the diameter d of the nichrome wire AB using the micrometer screw gauge.

$d = \underline{\hspace{2cm}} m$ (1mk)

- c) Disconnect the jockey from wire AB and close the switch. Record the value E of the voltmeter reading.

$E = \underline{\hspace{2cm}} v$ (1mk)

- d) Now, connect the jockey on AB at a distance $L=10\text{cm}$. Close the switch and record the voltmeter and ammeter readings, V and I respectively in table 1 below.

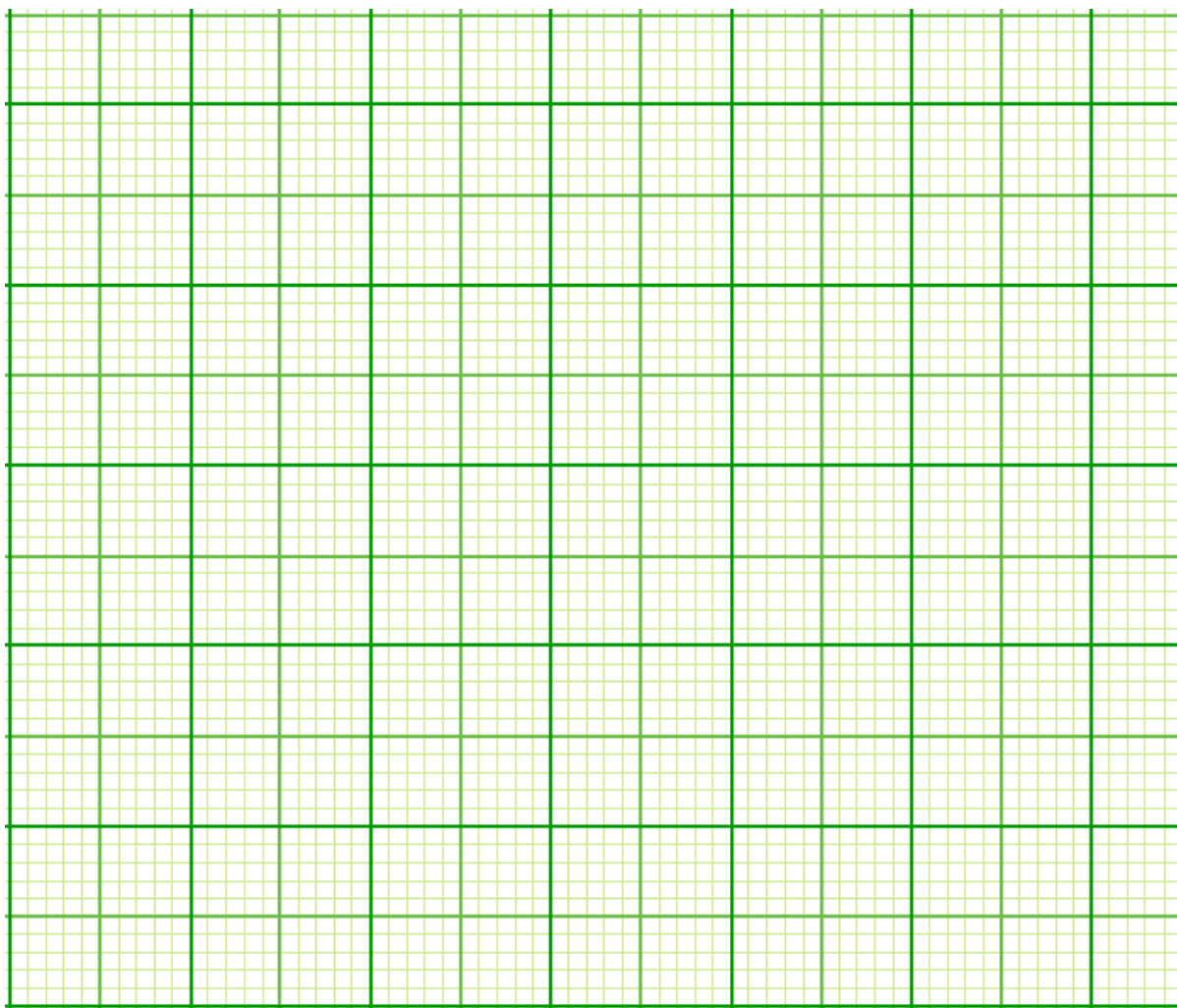
- e) Table 1

L(cm)	10	20	30	40	50	90
-------	----	----	----	----	----	----

V(v)						
I(A)						
IV(watts)						

i. Complete the table (5mks)

ii. Plot a graph of IV (y axis) against L (5mks)



f) Using your graph, find the value L_0 from your graph (the horizontal axis)

$L_0 = \underline{\hspace{2cm}} cm$ (1mk)

g) Now, place the jockey on AB such that the length L is equal to the value of $L = 63cm$.
close the switch and record both the voltmeter reading, V and the ammeter reading, I

$$V = \underline{\hspace{2cm}} \quad (1\text{mk})$$

$$I = \underline{\hspace{2cm}} \quad (1\text{mk})$$

g) Work out the values r where $r = \frac{E-V}{I}$ (2mk)

h) Work out the value of e where $e = \frac{\pi r d^2}{2.52}$ (3mk)

Question 2

You are provided with the following apparatus

- two metre rules
- two stands and two clamps
- two bosses
- three pieces of thread
- a spring
- one mass of 100g
- a stopwatch

i) Set the apparatus as shown in figure1 below.

ii) Suspend one end of the metre rule with a thread at 5cm mark from the end.

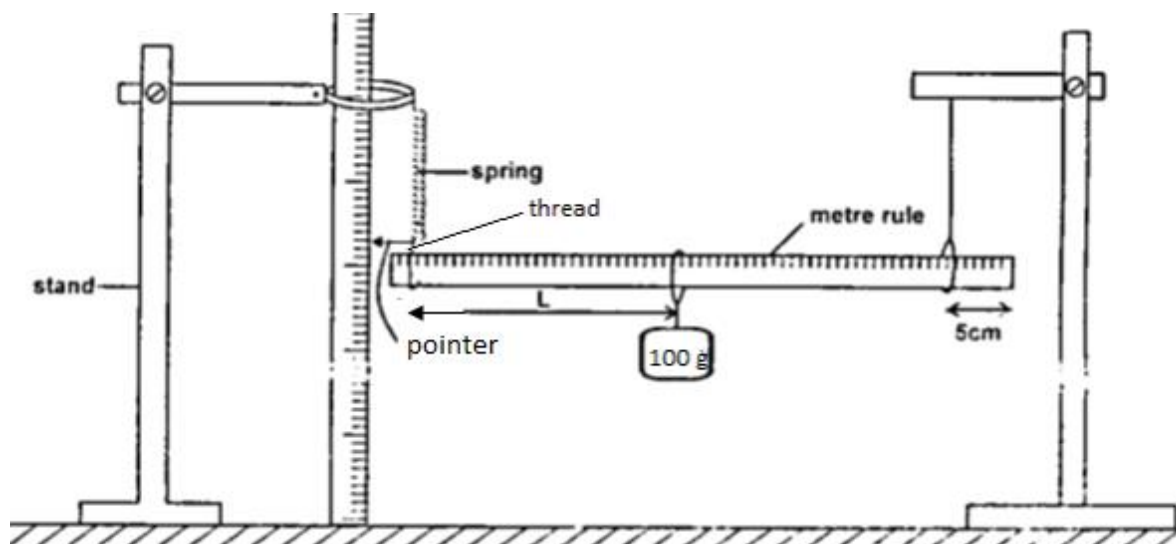


Figure 1

iii) Suspend the other end with a spring also 5cm from the end so that the metre rule is horizontal.

iv) Hold the other rule vertically on the bench so that it is near the end with a pointer as shown in the diagram above.

v) Read the pointer position, L_0 cm (1 mk)

vi) Hang on the horizontal metre rule, the 100g mass at a length, $L = 10\text{cm}$ from the spring. Record the pointer position X , in the table below.

vii) Displace the mass slightly downwards and release it to oscillate vertically. Take time for 20 oscillations and record in the table below,

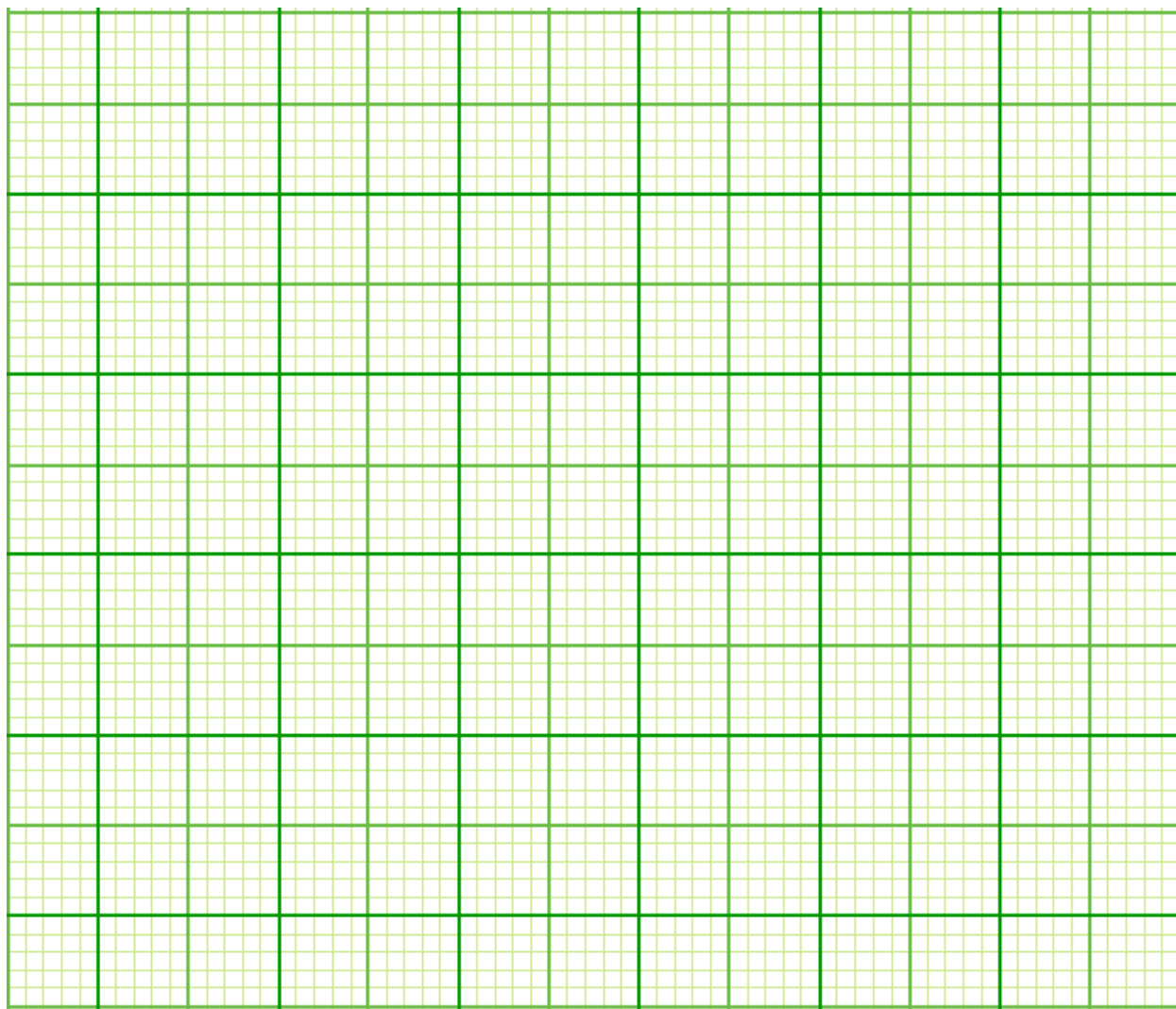
viii) Repeat the procedures above for other positions of L , and record the values in the table below

Length L (cm)	10	20	30	40	50
Pointer position X					
Extension (m)					
Time of 20 oscill, t (s)					
Periodic time, T (s)					
T^2 (s^2)					

(8mks)

ix) Plot a graph of extension, e (y – axis) against T^2

(5 mks)



x) Calculate the gradient of the graph.

(3 marks)

ix) Given that $e = \frac{RT^2}{4\pi^2}$ determine the value of R

(3 marks)

PREDICTION 2

232/3 – PHYSICS PAPER 3

CONFIDENTIAL

QUESTION 1

1. Two dry cells (Size D, each 1.5V)
2. Nichrome Wire (SWG 28 – 100cm long mounted on a mm scale).
3. An ammeter.
4. Cell holder.
5. 6 connecting wires with crocodile clips.
6. Switch.
7. A Voltmeter
8. A Jockey (Crocodile clip)

QUESTION 2

1. A metre rule.
2. One Stop watch.
3. One complete stand.
4. One spring, (spring constant 0.1N/cm) Range $0.07 - 0.12\text{Ncm}^{-1}$
5. 2 pieces of wood.
6. Beam balance or electronic balance (to be shared).
7. One 100g mass labeled M.

PREDICTION 2

NAME: INDEX NO:

SIGNATURE: DATE :

CANDIDATE'S SIGNATURE:

232 / 3

PHYSICS

PAPER 3

(PRACTICAL)

TIME: 2 ½ hours

Kenya Certificate of Secondary Education (KCSE)

INSTRUCTIONS TO CANDIDATES

- (a) Write your **Name**, **Index Number** and **School** in the spaces provided above.
- (b) **Sign** and write the **date** of Examination in the spaces provided above.
- (c) Answer **all** questions in the spaces provided.
- (d) You are supposed to spend the first **15 minutes** of the 2½ hours allowed for this paper reading the whole paper carefully before commencing your work.
- (e) Marks are given for a clear record of observations actually made, their suitability, accuracy and the use made of them.
- (f) Non-programmable silent electronic calculators and KNEC Mathematical tables may be used in calculations.

FOR EXAMINER'S USE ONLY

QUESTION 1

Part A								Part B				Sub-total
Question	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	Question	e	f	g	
Max score	½	½	½	½	½	½	3	Max score	6	5	3	20
Candidate's score								Candidate's score				

QUESTION 2

Question	c	d(i)	d(ii)	e(i)	e(ii)	f	g	Sub-total
Max score	7	5	3	1	1	2	1	20
Candidate's score								

TOTAL SCORE
40

1. PART A

You are provided with the following:-

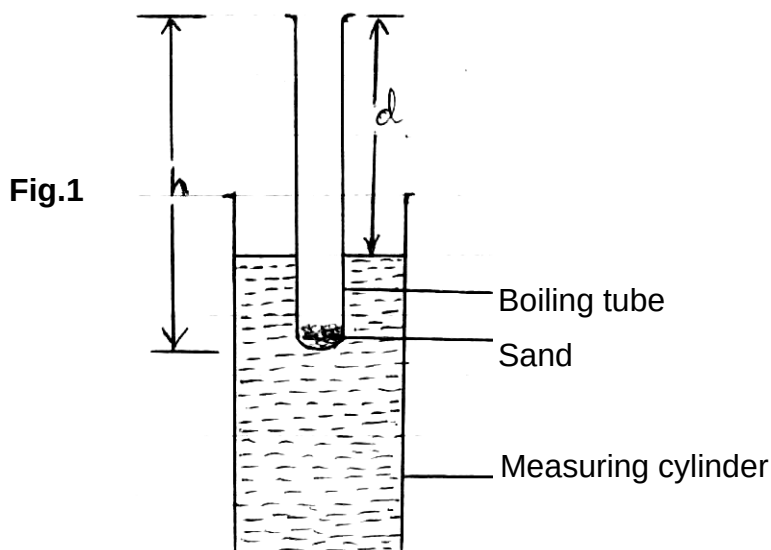
- A boiling tube.
- Some dry sand.
- A liquid in a measuring cylinder labelled L.
- Half metre rule.
- A vernier calipers (to be shared)
- A weighing machine (one per form)
- Tissue paper.
- A measuring cylinder.

Proceed as follows:

- (i) Measure the length of the boiling tube.

$h =$ _____ cm (½mk)

- (ii) 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 fig. 1



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

$d =$ _____ cm (½mk)

- (iii) Determine the length, t , of the boiling tube which is immersed in the liquid.

$t =$ _____ cm (½mk)

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

m = _____ g (½mk)

(v) Measure the external diameter, D, of the boiling tube.

D = _____ cm (½mk)

(vi) Determine the external radius, R

R = _____ cm (½mk)

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

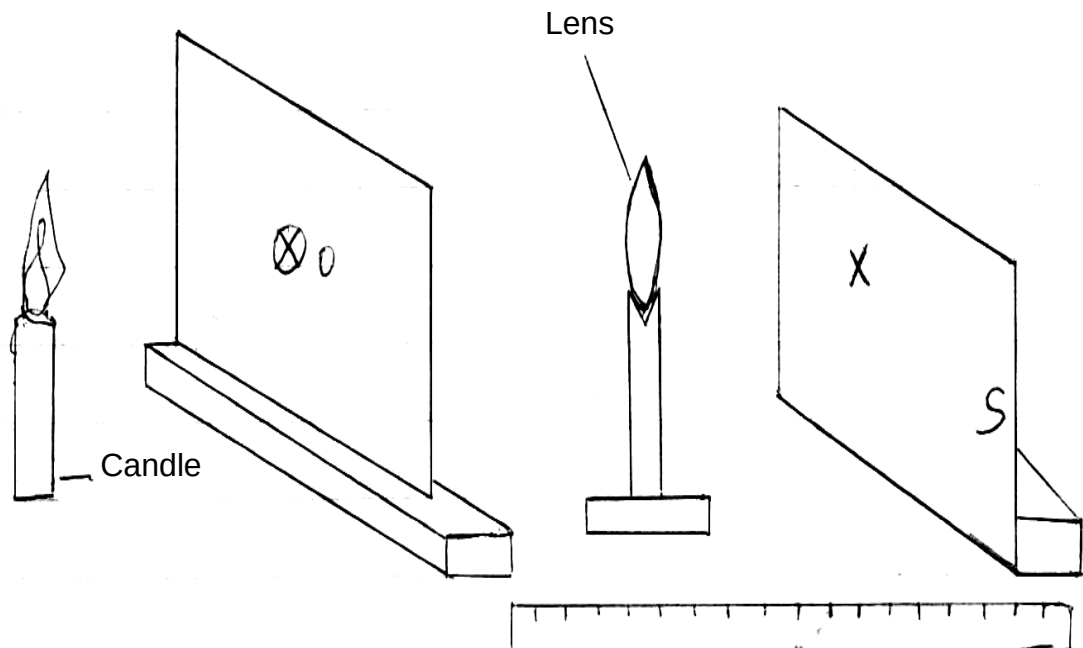
ρ _____ cm (3mks)

PART B

You are provided with the following:-

- A white screen with cross wires labelled O.
- A lens and a lens holder.
- A white screen labelled S.
- A metre rule.
- A candle.

(a) Set up the apparatus as shown in fig. 2.



(b) Position the lens so that the object distance $u = 20\text{cm}$.

(c) Adjust the screen S so that a sharp image of the cross wire is formed on the

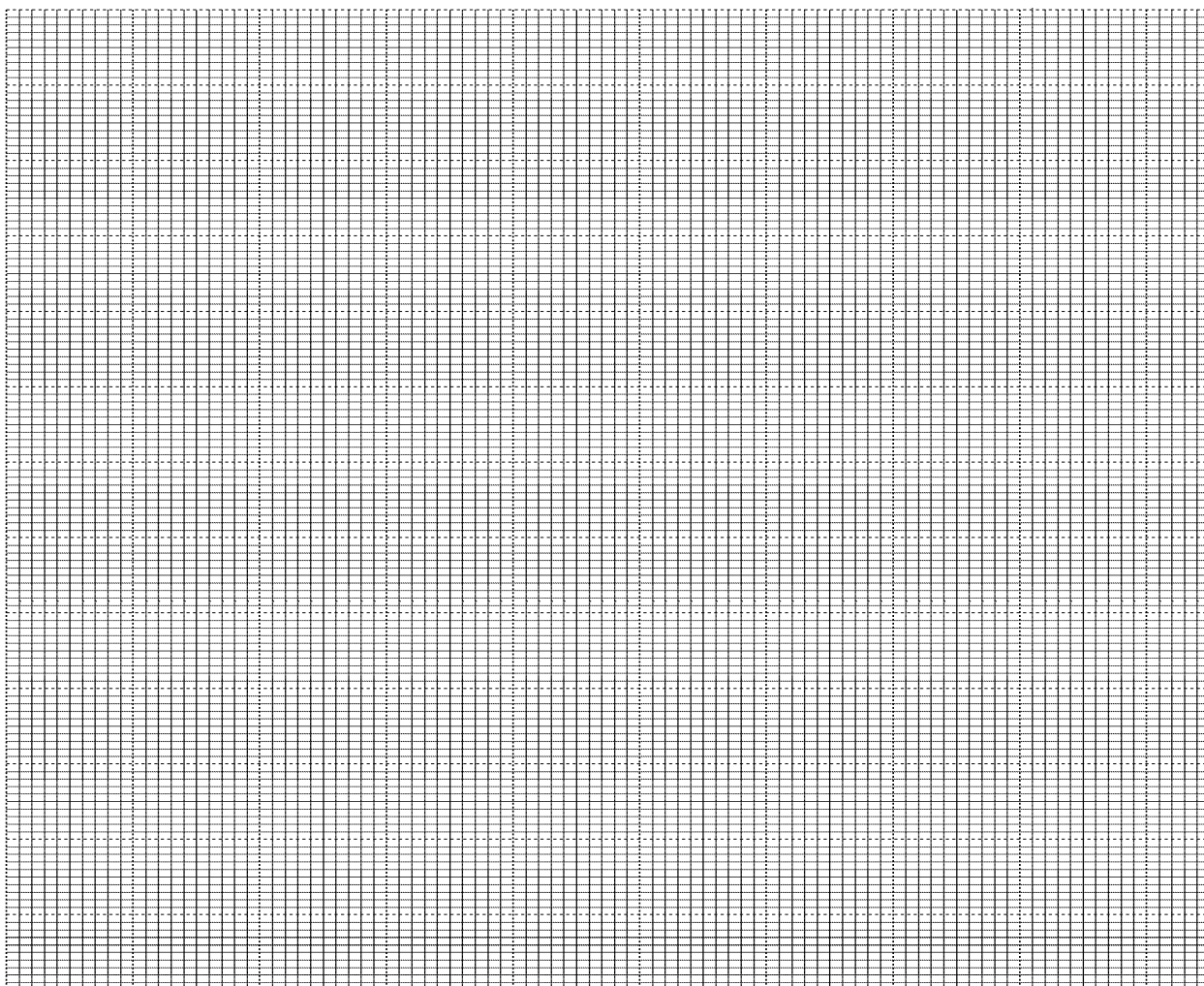
screen S. Measure the image distance v . Record the value u and the corresponding value of v in table 1.

(d) Repeat (b) and (c) above for other values of u in table 1.

(e) Complete table 1.

u (cm)	20	25	30	35	40	45
v (cm)						
$u + v$ (cm)						
uv (cm ²)						

(f) On the grid provided, plot a graph of uv against $(u+v)$ (5mks)



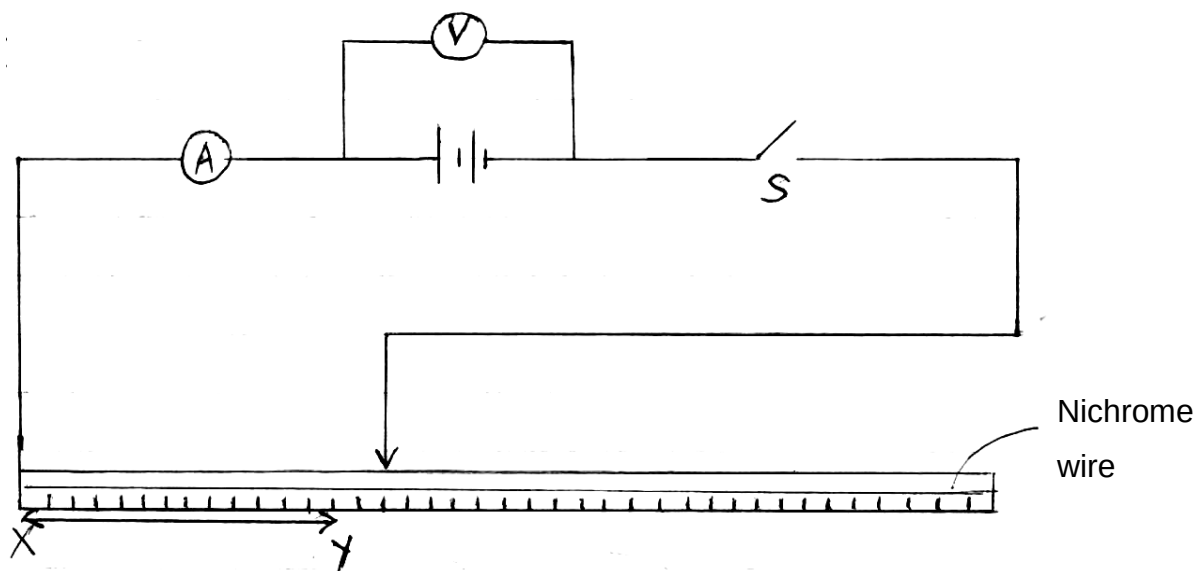
(g) Determine the slope of the graph and state its significance. (3mks)

2. You are provided with the following apparatus:-

- A voltmeter
- An ammeter
- A switch
- 6 connecting wires (one with a crocodile clip)
- 2 new dry cells.
- A cell holder.
- A nichrome wire mounted on a millimetre scale.

Procedure

(a) Connect the apparatus as shown in fig. 3



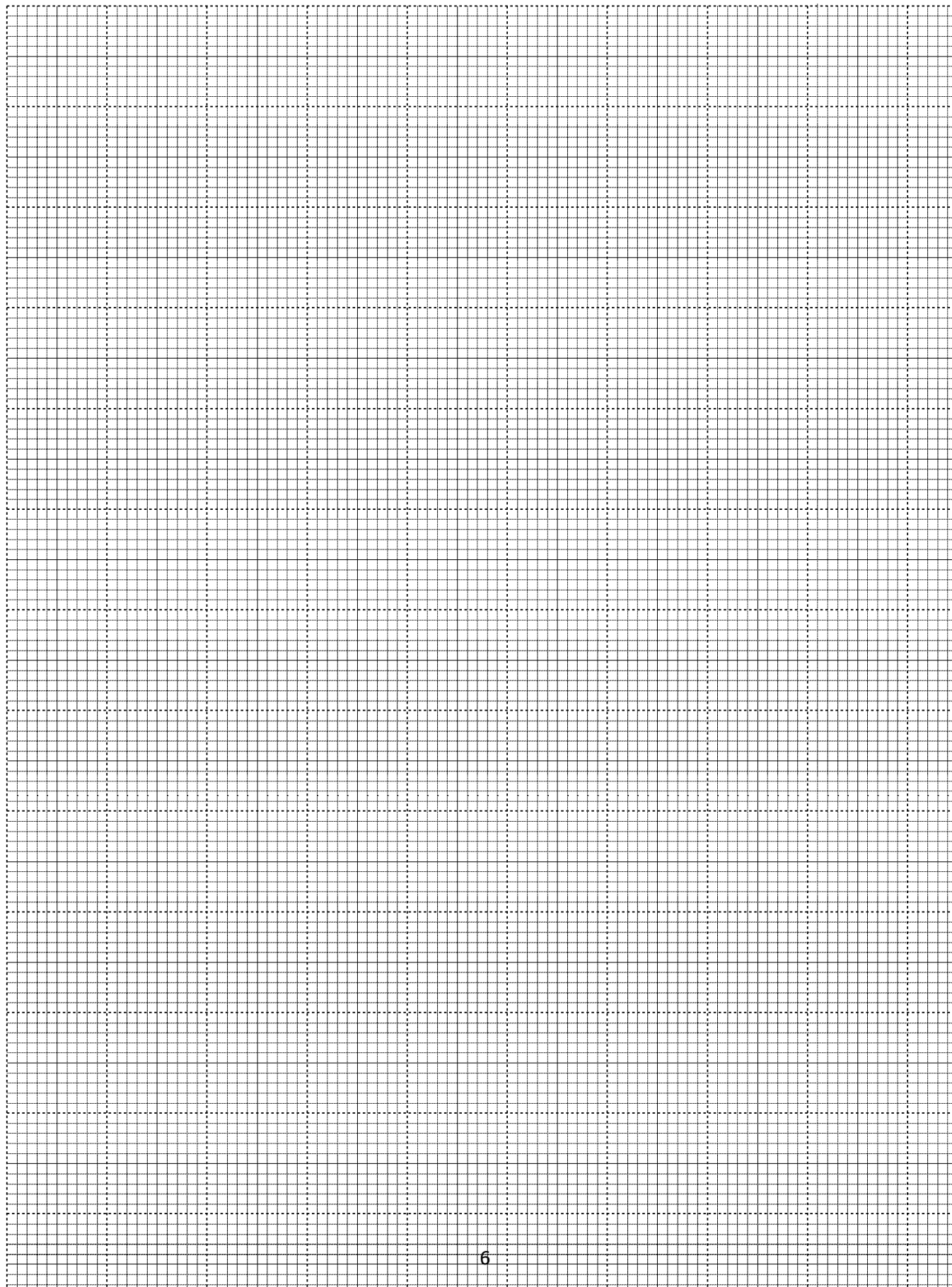
(b) With the crocodile clip at y, 80cm from x, close the switch and record the voltmeter reading and the corresponding ammeter reading in table 2.

(c) Repeat the procedure in part (b) for other lengths of xy as shown in table 2. complete the table.

Length (xy) cm	80	70	60	50	40	30	20
Voltmeter reading (V)							
Ammeter reading (A)							

(d) (i) On the grid provided, plot a graph of p.d(V) against current I (A).

(5mks)



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

(e) Given that $V = K_1 I + K_2$ where K_1 and K_2 are constants, determine:

(i) The value of K_1 . (1mk)

(ii) The value of K_2 . (1mk)

(f) What quantity do constants K_1 and K_2 represent? (2mks)

(g) State the reason why the switch should be open when no readings are being taken. (1mk)

PREDICTION 3

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PHYSICS

CONFIDENTIAL

KCSE PREDICTION 3

KENYA CERTIFICATE OF SECONDARY EDUCATION (KCSE)

CONFIDENTIAL TO ALL SCHOOLS FOR PHYSICS TEACHERS

INSTRUCTIONS TO SCHOOLS

The information contained in this paper is to enable the head of the school and the teacher in charge of Physics to make adequate preparations for this year's physics practical mock 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. Physics teachers **SHOULD NOT** perform any of the experiments in the same room as the candidates or make the results of the experiments available to the candidates or give any other information related to the experiments. Doing so will constitute an examination irregularity which is punishable.

- The apparatus required by each candidate for the Physics practical examination are set out on page 2 of this paper. It is expected that ordinary apparatus of a Physics laboratory will be available

- The Physics teacher should note that it is his/her responsibility to ensure that each apparatus acquired for this examination agrees with the specification on page 2 of this paper
 - Teachers are reminded that electronic calculators may be allowed in this examination room.
 - The question paper will **not** be opened in advance
- NB:- ANY USE OF APPARATUS OTHER THAN THE ONES SPECIFIED MAY LEAD TO CANDIDATES BEING PENALIZED**

Each student will require the following :-

1. 2 new dry cells (size D)
2. A cell holder
3. A switch
4. An ammeter (0-2.5A)
5. A voltmeter (0 – 5v)
6. 6 connecting wires
7. 2 crocodile clips
8. A nichrome wire 1.0m long mounted on a scale (SWG 32) labeled X
9. A candle
10. A lens ($f = 20\text{ cm}$) and a lens holder
11. A screen
12. A metre rule
13. Rubber bung (hard).
14. Vernier calipers (shared).
15. Electronic beam balance (shared).
(which records to 1 d.p.)
16. a retort stand, one boss, one clamp
17. One 500ml beaker $\frac{3}{4}$ full of water
18. One 100g mass
19. One 50g mass
20. 3 pieces of thread approximately 30cm long

PREDICTION 3

NAME ADM. NO.

SCHOOL DATE.....

PHYSICS

FORM 4

PAPER 3

TIME: 2 HRS 30 MIN

INSTRUCTIONS

Answer all the questions in the spaces provided

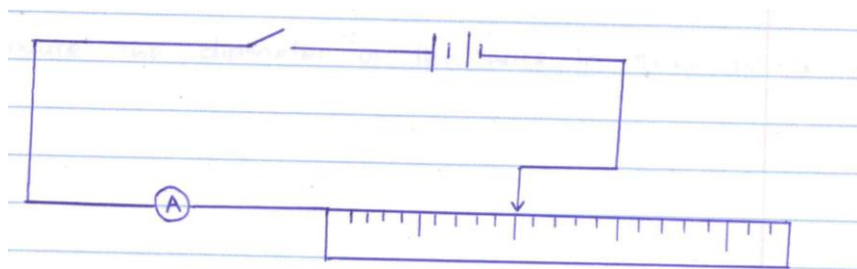
Question 1:

Each student will require the following

- 2 new dry cells (size D)
- A cell holder
- A switch
- An ammeter (0-2.5A)
- A voltmeter (0 – 5v)
- 6 connecting wires
- 2 crocodile clips
- A nichrome wire 1.0m long mounted on a scale (SWG 32) labeled X
- A micrometer screw gauge (can be shared)

Proceed as follows

a) Connect the circuit as shown in the figure below



b) Measure the voltage, E (across the cells) before closing the switch

$E = \dots\dots\dots$

1mk)

c) Adjust the length L of the wire 0.2, close the switch S and read the value of current and record 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})						

d) Repeat the procedure in (c) above for the value of lengths given

6mks)

e) Calculate the values of $\frac{1}{I}$ and record in table above

f) On the grid provided, plot a graph of $\frac{1}{I}$ (y axis) against L

5mks)

g) Determine the gradient of the graph

3mks)

h) i) Measure the diameter of the wire in three points used

$d_1 =$

$d_2 =$

$d_3 =$

Average $d =$

1mk)

ii) Determine the cross section area of the wire

2mks)

i) From the equation
 $\frac{1}{I} = \frac{kL}{AE} + \frac{Q}{E}$ determine,

i) The value of k

2mks)

ii) The value of Q

1mk)

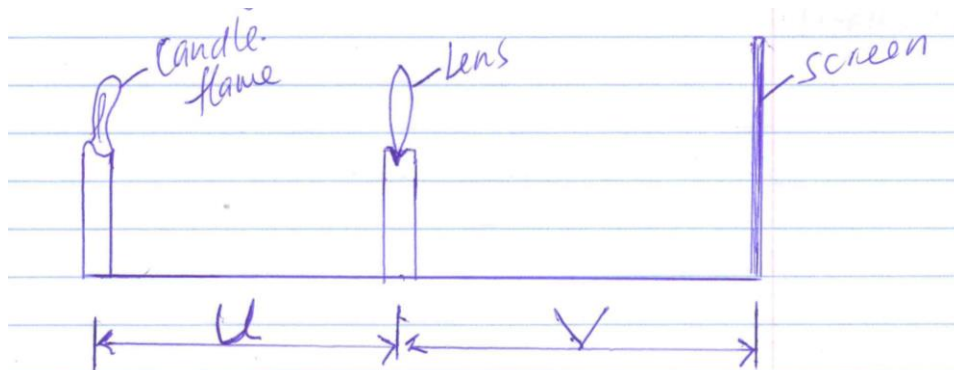
Question 2.

Section A

You are provided with the following

- A candle
- A lens and a lens holder
- A screen
- A metre rule

a) Set up the apparatus as shown in figure below (ensure that the candle flame and the lens are approximately the same height above the bench)



b) Set the position of the lens so that the 40cm from the candle ($U=40$). Adjust the position of the screen until a sharp image of the candle flame is obtained. Measure the distance, V between the lens and the screen. Record the value of V_1 $V = \dots\dots\dots \text{cm}$)

1mk)

c) Repeat the procedures in b) above for other values of U in the table b below.

Table b)

U(cm)	45	50	55
V(cm)			
Magnification (m) $\frac{v}{u}$			

d) Given that $f = \frac{v}{m+1}$,

where f is the focal length of the lens, use the results in table above to determine the average values of f. 4mks)

PART B.

You are provided with the following:

- rubber bung.
- vernier calipers.
- beam balance.

Proceed as follows:

a) Using a vernier caliper, measure the lengths D, d, and h as shown in **figure 2**.

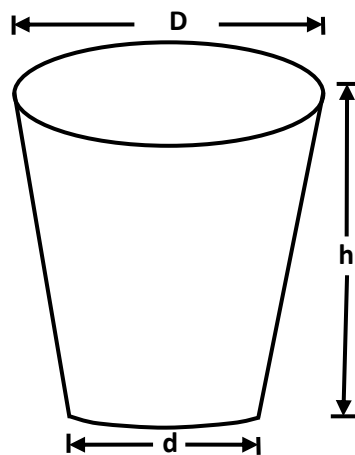


Figure 2

$$D = \dots\dots\dots \text{ m} \quad (1$$

mark)

$$d = \dots\dots\dots \text{ m} \quad (1$$

mark)

$$h = \dots\dots\dots \text{ m} \quad (1$$

mark)

b) (i) Measure the mass, M of the rubber bung using the beam balance.

$$M = \dots\dots\dots \text{ kg} \quad (1 \text{ mark})$$

(ii) Given that $Q = \left(\frac{d + D}{4} \right)$, determine the value of Q .
(1 mark)

(iii) Determine the value of r given that $\pi r Q^2 = \frac{M}{h}$
(3mark)

(iv) what are the units of r (1 mrk)

(v) what is the significance of r (1 mrk)

SECTION C

You are provided with the following

- a metre rule
- a retort stand, one boss, one clamp

- One 500ml beaker $\frac{3}{4}$ full of water
- One 100g mass
- One 50g mass
- 3 pieces of thread approximately 30cm long

Procedure

a) Balance the metre rule horizontally by suspending it from the stand and clamp with one of the threads.

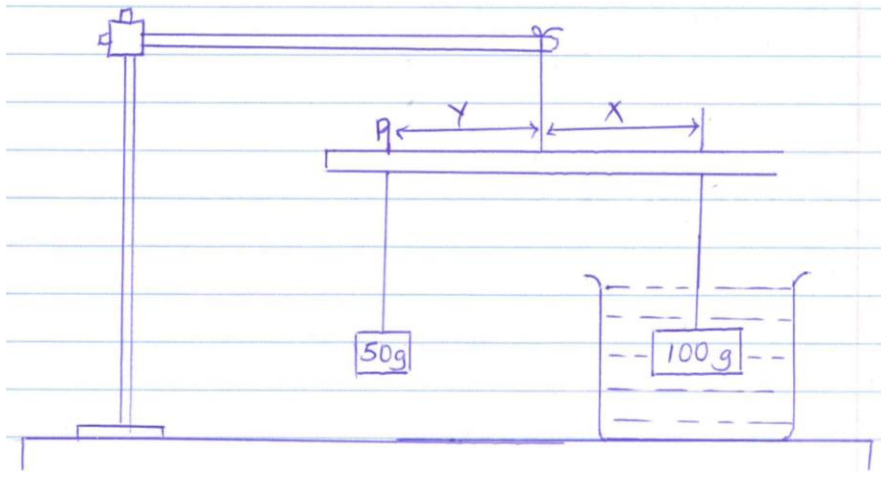
Record the balance point G

G = _____ cm (1mk)

b) suspend the 100g mass from the metre rule at a point such that $x = 5\text{cm}$ from point G, with the 100g mass completely immersed in water in the beaker hang the 50g mass from the metre rule.

Note the point of suspension (p) of the mass

P = _____ (1mk)



c) Calculate the apparent weight of the 100 g mass in water. (3mk)

d) Find the upthrust of 100g mass in water. (2mk)

PREDICTION 4

PHYSICS CONFIDENTIAL

QUESTION ONE

- stopwatch
- 250ml beaker
- Rubber bung
- Thermometer
- 150 ml of boiling water
- Tripod
- Gauze
- Retort stand and clamp
- Hot water

QUESTION 2

PART A

- One resistor labelled $R = 40\Omega$
- A wire labelled W mounted on millimetre scale (32 gauge)
- A wire labelled S mounted on a millimetre scale (28 gauge)
- One dry cell and a cell holder
- One jockey
- One centre zero galvanometer
- Eight connecting wires, four with crocodile clips at both ends
- A micrometer screw gauge
- A switch

PART B

- Lens and a lens holder ($f=10\text{cm}$)

- Half metre rule

- White screen

PREDICTION 4

Name:..... Index No.....

232/3

Candidate's Signature:.....

PHYSICS

PRACTICAL

PAPER 3

Date:.....

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

KCSE PREDICTION 4.

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

INSTRUCTIONS TO CANDIDATES

- Write your name and index number in the spaces provided.
- Mathematical tables and non-programmable calculators may be used.
- This paper consists of three questions.
- Attempt all the questions in the spaces provided.
- ALLOW working MUST be clearly shown.

<u>For Examiners Use</u>		
QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
1	20	
2	20	
TOTAL	40	

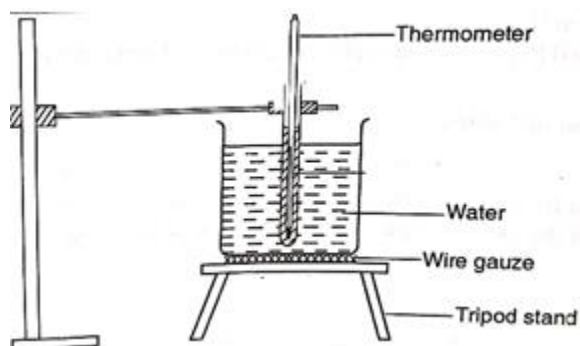
This paper consists of 11 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing

QUESTION ONE

Apparatus

- stopwatch
- 250ml beaker
- Rubber bung
- Thermometer
- Bunsen burner
- Tripod
- Gauze
- Retort stand and clamp
- Hot water

Figure 2.



Procedure

- (a) (i) Measure and record the ambient temperature, $T_A = \dots\dots\dots^\circ\text{C}$ (1 mark)
- (ii) Fill an empty beaker with exactly 150ml of hot water (check the side scale of the beaker)
- (iii) Set up the apparatus as shown in **figure 2**. Ensure the thermometer is about 2cm above the bottom of the beaker.

- (i) Record the initial highest temperature of water $T_H = \dots\dots\dots$ $^{\circ}\text{C}$
(1 mark)

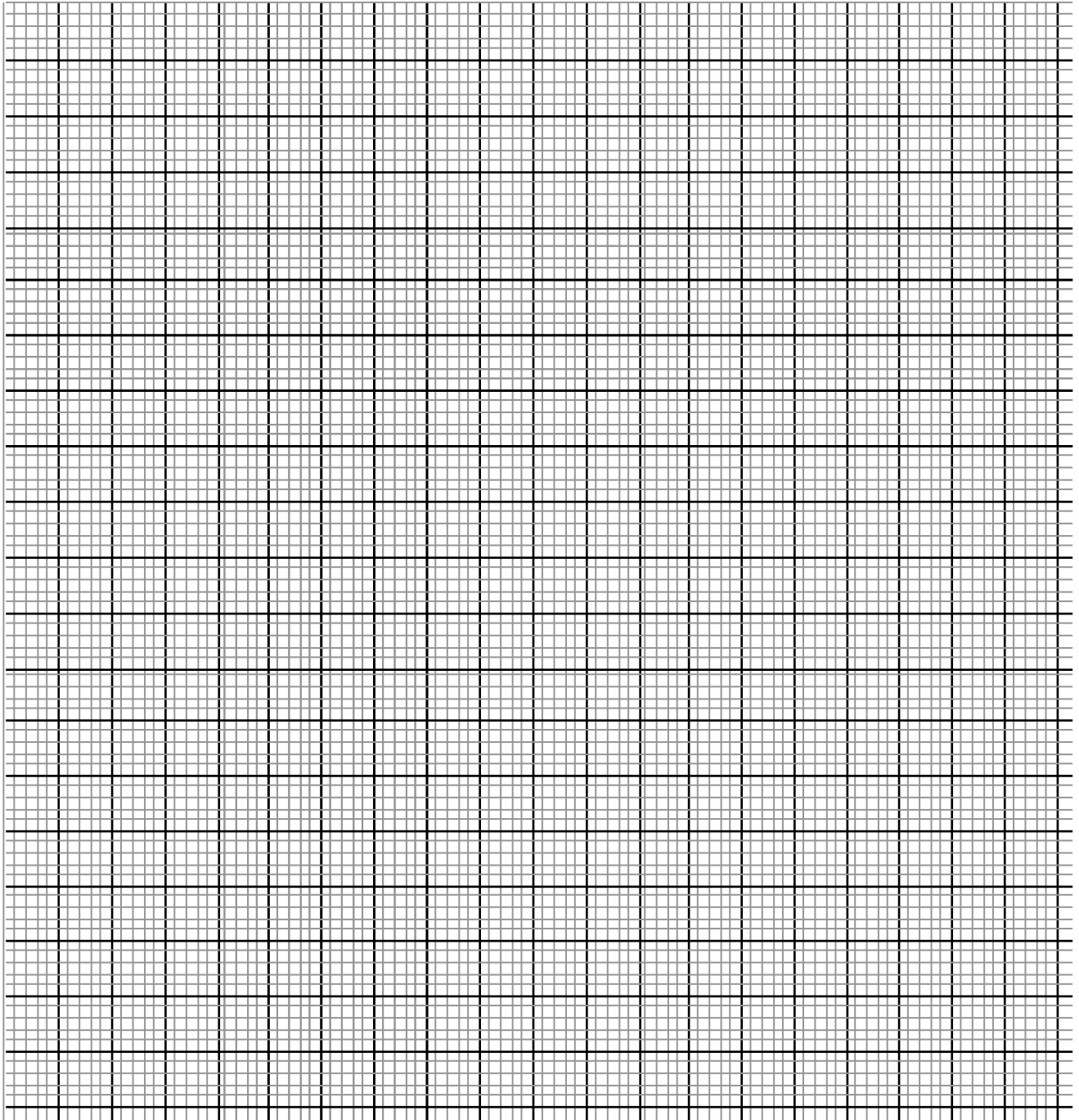
- (b) Start the stopwatch and time for every 2.0 minutes the temperature T of water.

Record the temperature in **Table 2** for 20 minutes

Time (t) in minutes	2	4	6	8	10	12	14	16	18	20
Temperature (T) in $^{\circ}\text{C}$										
$(T - T_A)^{\circ}\text{C}$										
$\text{Log}_{10}(T - T_A)$ (2 d.p)										

(6 mark)

(c) Plot a graph of $\text{Log}_{10}(T-T_A)$ against time (5 mark)



(d) From the graph determine:

(i) The Slope S

(3marks)

.....

.....

.....

.....

(ii) The cooling constant , K of water given $S = -0.4343K$

(2 mark)

.....

.....

(e) Given that the specific heat capacity of water is $4.2J/g/^{\circ}C$ determine the heat lost when the water cools to the temperature of the surrounding
(2 mark)

.....

.....

.....

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2. PART A

You are provided with the following apparatus :

- One resistor labelled $R = 40\Omega$
- A wire labelled W mounted on milliammeter scale
- A wire labelled S mounted on a milliammeter scale
- One dry cell and a cell holder
- One jockey
- one centre zero galvanometer
- Eight connecting wires, four with crocodile clips at both ends
- A micrometer screw gauge
- A switch

Proceed as follows

- a) Determine the average diameter D , of the wire labelled W using the micrometer screws gauge provided.

$D_1 = \dots\dots\dots$ mm (½ mark)

$D_2 = \dots\dots\dots$ mm (½ mark)

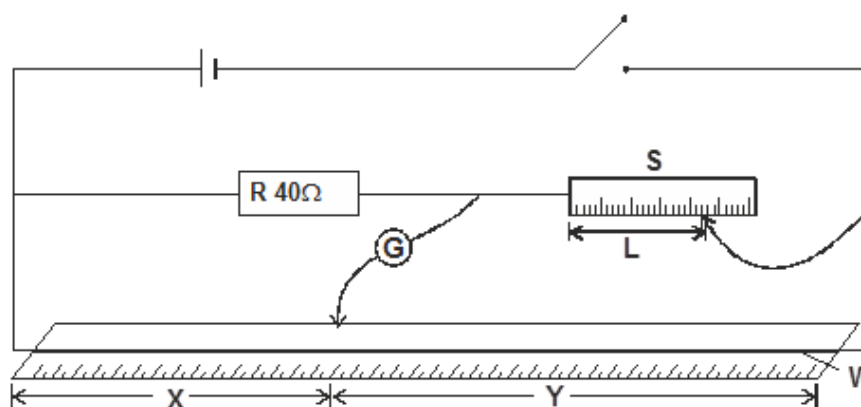
$D = \frac{D_1 + D_2}{2}$ (in cm)

2 (1 mark)

.....

- b) Set up the apparatus as shown in the circuit diagram in **figure 3** below.

Use the crocodile clips to fix length L , of wire labelled S at 50cm from the end connected to the galvanometer G .



- c) Close the switch and use the jockey to touch one end of the wire W , and then the other end. The deflections on the galvanometer should be in opposite directions, if not check the circuit. Adjust the positions of the jockey along the wire W until there is no deflection in the galvanometer. Record the value of x and y .

$x = \dots\dots\dots$ cm (½ mark)

$y = \dots\dots\dots$ cm (½ mark)

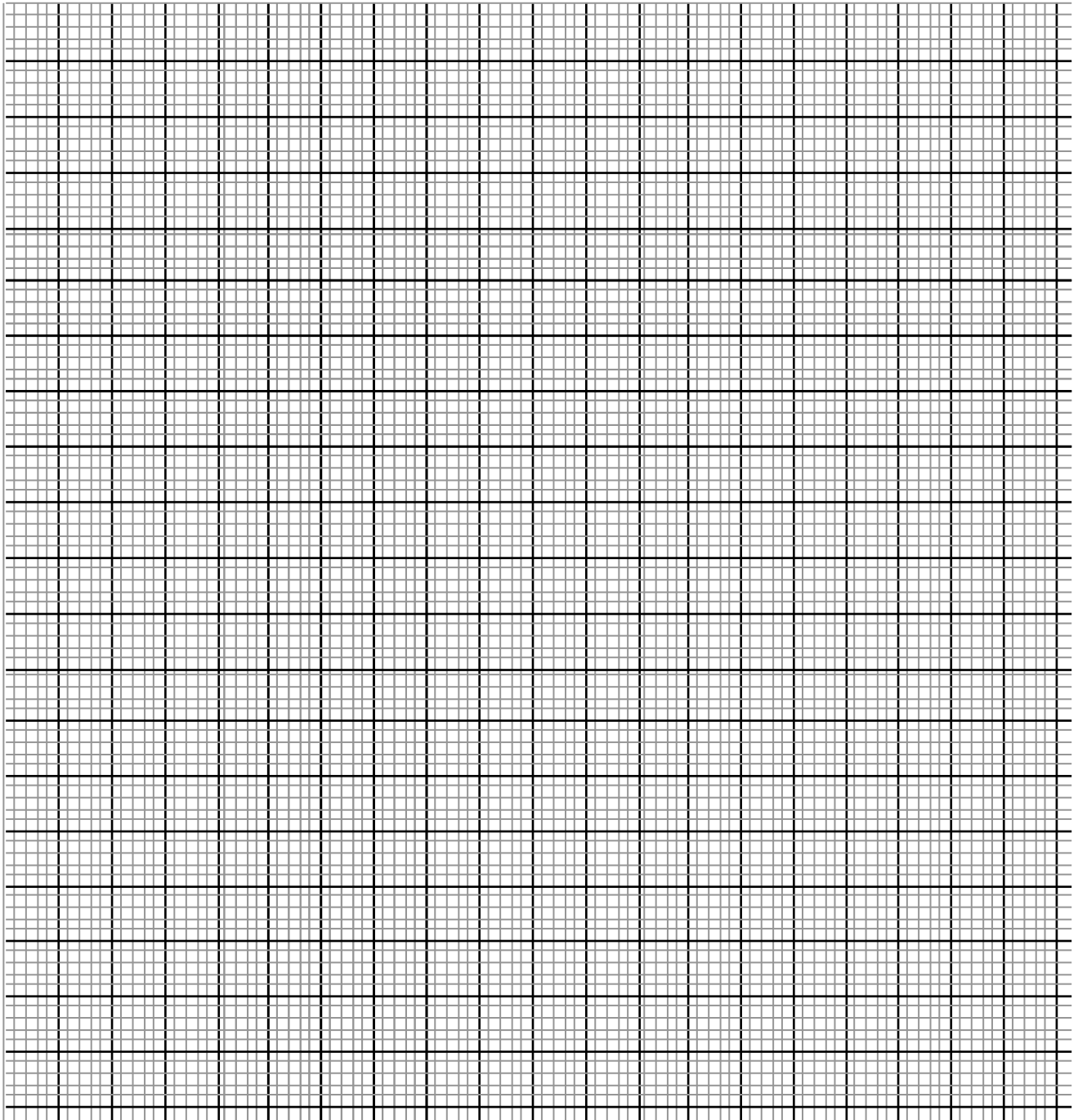
d) Record for other values of L in **table 3** below

L (cm)	45	40	35	30	25	20
X (cm)						
Y (cm)						
y/x (3 d.p)						

(4 marks)

e) i) Plot a graph of v_x (y-axis) against L.

(5 marks)



ii) Determine the slope, m of the graph.

(2 marks)

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.....

.....

.....

iii) Given that $K = \frac{100}{D}$, determine the value of K .

(2 marks)

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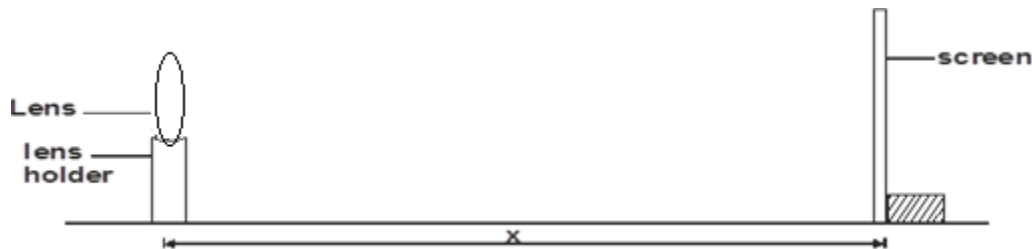
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PART B

b) You are provided with a lens P a lens holder a white screen and half metre rule.

Procedure

i) Set the apparatus as shown in **figure 4** below. Focus a sharp image of a distant object on the screen (e.g window)



a) Measure the distance x in cm between the lens and the screen at which a sharp image is obtained repeat this two times, using different objects and record your readings in **table 4** below.

Object	Distance X , (cm)
1	
2	

(2 marks)

ii) Calculate the average value of x

(1 mark)

.....

.....

iii) What is the physical significance of the result obtained in (iii) above? (1 mark)

.....

.....

.....

PREDICTION 5

PHYSICS 232/3

CONFIDENTIAL

Question 1

EACH STUDENT REQUIRES

- ✓ Micrometer screw gauge (shared between 4 students)
- ✓ Vernier callipers
- ✓ Masses
 - ♦ 10g
 - ♦ 2 – 20g
 - ♦ 50g
 - ♦ 100g
- ✓ Helical spring ($K = 0.08\text{N/cm}$)
- ✓ Metre rule or half metre rule
- ✓ Complete retort stand

Question 2

- ✓ 2 plain papers (photocopy papers)
- ✓ 5 optical pins
- ✓ Glass block
- ✓ Softboard
- ✓ 4 thumb pins
- ✓ Triangular prism ($60^\circ \times 60^\circ \times 60^\circ$)

PREDICTION 5

NAME DATE

INDEX NO. SIGNATURE

232/3
PHYSICS
PAPER 3
PRACTICAL
TIME: 2 $\frac{1}{4}$ HOURS

KCSE PREDICTION 5

Kenya Certificate of Secondary Education

232/3
PHYSICS
PAPER 3
PRACTICAL
TIME: 2 $\frac{1}{2}$ HOURS

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 $\frac{1}{4}$ 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.
- Candidates are advised to record their observations as soon as they are made.
- **Non-programmable** silent electronic calculators and KNEC mathematical table may be used.
- This paper consists of 6 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 1

	a	b	c	d	f	g	h	i
maximum score	1	1	1	2	6	4	2	3
Candidate's scores								

Question 2

	b(i)	b(ii)	e	f	g	h
maximum score	2	2	6	5	2	3
Candidate's scores						

Question 1

You are provided with the following:-

- Vernier callipers
- Micrometer screw gauge
- Masses; 10g, 20g, 50g and 100g
- A helical spring
- Metre rule or half metre rule

Proceed as follows

- (a) Determine the number of complete turns of the helical spring.

$N =$ _____ (1 Mark)

- (b) Measure the external diameter of the spring using the vernier callipers

$D =$ _____ m (1 Mark)

- (c) Use the micrometer screw gauge to determine the diameter of the wire of the spring.

$d =$ _____ m (1 Mark)

- (d) Determine the value of m

$N = \frac{0.4D}{dm}$ (2 Marks)

.....

- (e) Suspend the helical spring vertically alongside the clamped half metre rule as shown in figure 1 below.

Determine the length L_0 , of the spring before loading it.

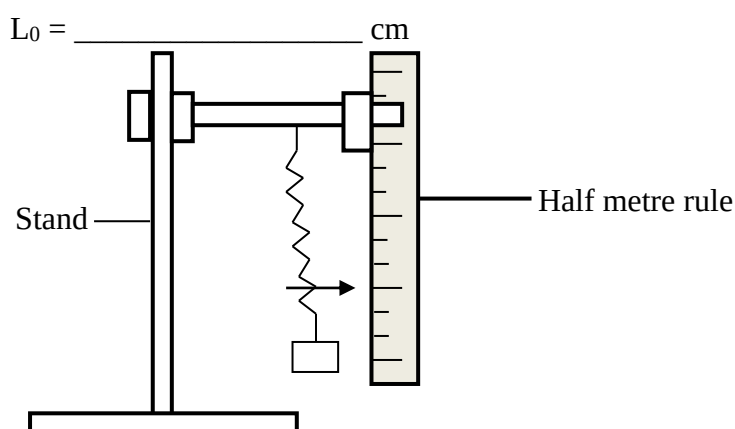


Figure 1

- (f) Load the spring with a mass of 20g and determine the new reading on the metre rule. (L) Record this in the table below.

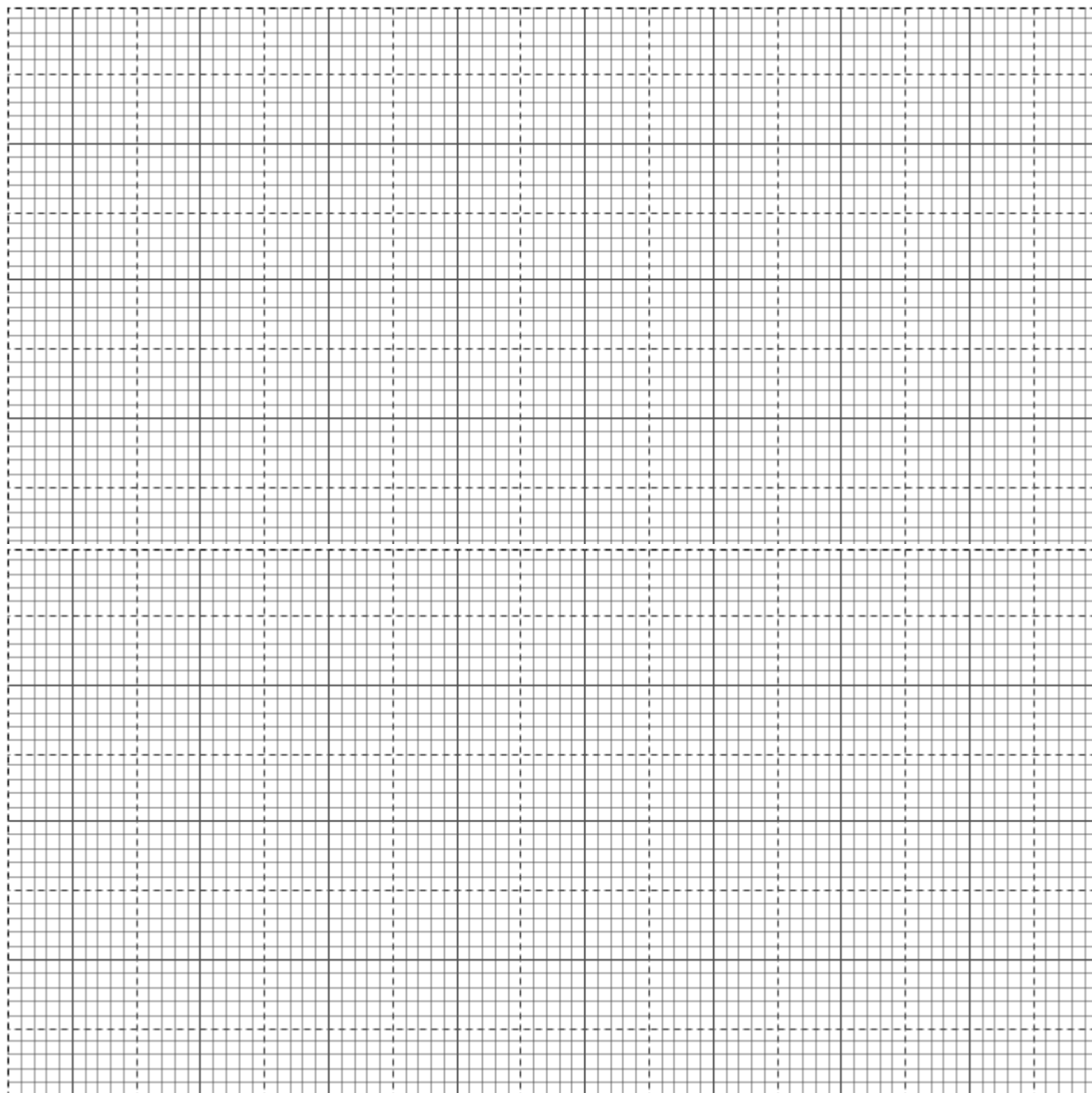
Calculate the extension $e = L - L_0$ due to the mass of 20g and record the value in the table given below. Repeat step f for other masses and complete the table.

Mass (g)	0	10	20	30	40	50	60	70	80	90	100
Weight (N)											
Reading (L) (cm)											
Extension e (cm)											
$\frac{1}{e}$ (cm ⁻¹)											

(6 Marks)

(g) Plot a graph of weight (N) against $\frac{1}{e}$ (cm^{-1})

(4 Marks)



(h) Determine the slope (s) of the graph at a mass of 45g

(2 Marks)

.....

(i) Given that $m = \frac{-255T}{(S+60)^2}$

Determine the value of T where (S) is the slope at 45g

(3 Marks)

.....

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

PART A

You are provided with the following:

- 5 optical pins
- A glass block
- A plain paper
- A soft board
- 4 thumb pins

Proceed as follows:

- (a) Fix the white piece of paper on softboard using the thumb pins provided. Place the glass slab on the white paper and draw the outline of the block on the paper. Remove the block and indicate the sides ABC and D as shown. On side BC determine the centres of side BC using your ruler and fix pin P_0 as shown. Looking from one side at the opposite end of the slab fix pin P_1 , P_2 so that they are in with the image I of P_0 . On the other side locate the same image using pins P_3 and P_4 as shown in figure 2. Remove the glass block and produce lines P_1 , P_2 and P_3 , P_4 to their points of intersection which is the position of the image I.

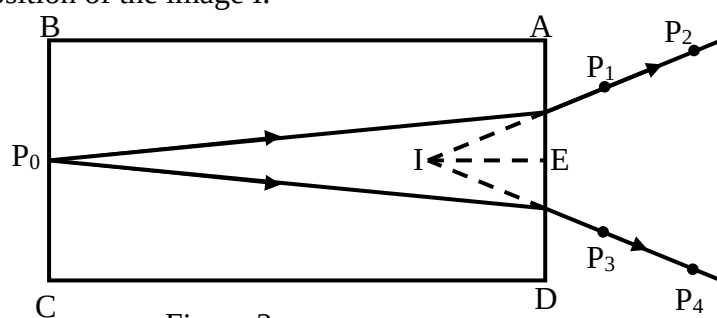


Figure 2

- (b) (i) Using the half metre rule measure the lengths

$EP_0 =$ _____ cm

(1 Mark)

$EI =$ _____ cm

(1 Mark)

- (ii) Work out the ratio $n = \frac{EP_0}{EI}$ (2 d.p)

(1 Mark)

- (iii) What does n represent?

(1 Mark)

Part B

You are provided with the following.

- A plain sheet of paper
- A soft board
- 4 optical pins
- 4 thumb pins
- A triangular prism

Proceed as follows

- (c) (i) Firmly fix the plain sheet of paper on the softboard using the thumb pins and place the prism near the centre of the paper. Trace the outline of the prism using a pencil.

(ii) Remove the prism from the outline and label the vertices of the outline PQ and R.

On the side QR mark a point and draw a normal OZ at this point. Measure an angle of 20° from the normal and draw a line along this angle as shown in figure 3.

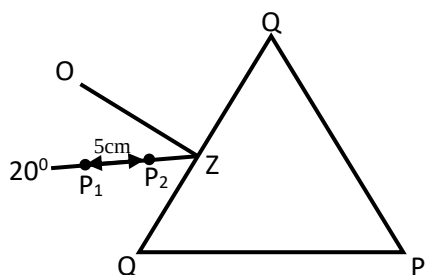


Figure 3

(d) Replace the prism on the outline and fix pins P_1 and P_2 on the 20° line at a distance of 3cm from each other.

View the images of the pins P_1 and P_2 through side PR and fix other pins P_3 and P_4 so that all the pins appear on one line. Remove the prism and draw a line to pass through the holes made by pins P_3 and P_4 extend the line into the outline as shown in figure 3. Also extend the 20° line so that the two lines cross each other. Determine angle θ and record in the table below.

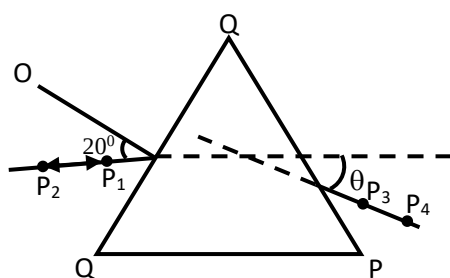


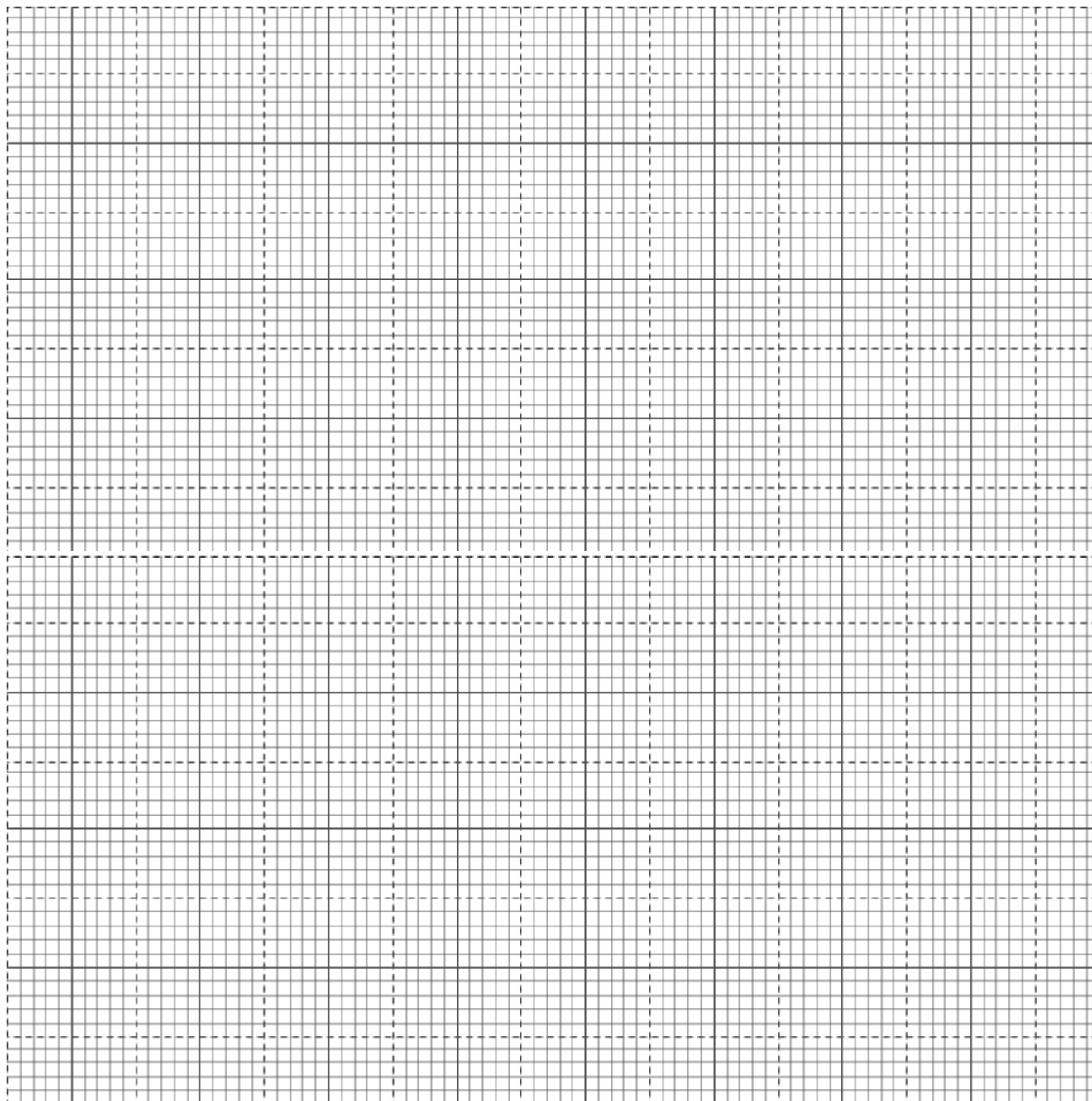
Figure 4

(e) Repeat the procedure and complete the table below.

Angle i ($^\circ$)	20	30	40	50	60	70
Angle θ						

(f) On the grid provided plot a graph of angle θ against angle i

(5 Marks)



(g) Use your graph to determine the highest value $H_{\max}$ of angle θ $H_{\max} =$

(2 Marks)

.....

.....

.....

.....

(h) Determine the constant R for the glass prism from the formula.

(3 Marks)

$$R = \frac{\cos 40}{\sin^2 \left(16 + \frac{H_{\max}}{3} \right)}$$

.....

.....

.....

PREDICTION 6

PHYSICS PP3

CONFIDENTIAL

QUESTION 1 (PART A).

1. You are provided with the following:

- A watch glass.
- A small piece of plasticine.
- A marble.
- A stopwatch.
- Vernier calipers.
- An electronic balance (to be shared).

QUESTION 1 (PART B).

You are provided with the following:

✓ Triangular prism of 60^0 .

Four optical pins

✓ A softboard

✓ A plain paper

QUESTION 2.

1. You are provided with the following apparatus.

- Two dry cells.
- Nichrome wire 100cm on a mm scale.
- An ammeter.
- Cell holder.
- Voltmeter.
- Connecting wires with crocodile clips.
- Switch.

PREDICTION 6

Name: Index No.

School: Candidate's Sign.

232/3

PHYSICS

PAPER 3

TIME: 2 ½ HOURS

KCSE PREDICTION 6
Kenya Certificate of Secondary Education.
232/3
PHYSICS
PAPER 3
TIME: 2½ HOURS.

INSTRUCTIONS TO CANDIDATES:

- Write your **name** and **index number** in the spaces provided above.
- Sign and write the **date** of the examination 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	

This paper consists of 8 printed pages candidates should check the questions to ascertain that all pages are printed as indicated and that no questions are missing

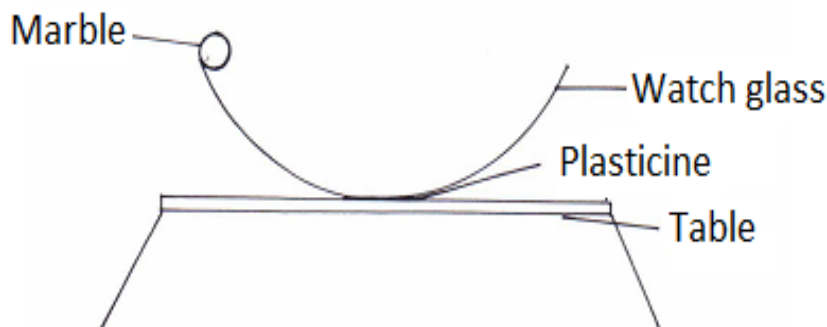
QUESTION 1 (PART A)

You are provided with the following:

- A watch glass.
 - A small piece of plasticine.
 - A marble.
 - A stopwatch.
 - Vernier calipers.
 - An electronic balance (to be shared).
- (a) Measure the mass M of the marble.

$M = \dots\dots\dots\text{g}$ ($\frac{1}{2}\text{mk}$)

- (b) Place the watch glass flat on the table with a small piece of plasticine to fix it firmly to the table at the place it touches.
- (c) Release the marble from one end of the watch glass and time 10 complete oscillations with a stop watch. Repeat this three times.



- (d) Record your values in table 1 below

Table 1

	Time for 10 oscillations	Periodic time $T(\text{s})$
1		
2		
3		

(2mks)

Find the average periodic time T .

$T = \dots\dots\dots\text{S.}$ ($\frac{1}{2}\text{mk}$)

- (e) Measure the diameter of the marble with the vernier callipers and hence find its radius.

Diameter $d = \dots\dots\dots$ m (½mk)

Radius $r = \dots\dots\dots$ m (½mk)

(f) Determine the volume (V) of the marble given that:

$$V = \frac{4}{3}\pi r^3 \quad (1\text{mk})$$

(g) Calculate the radius of curvature of the watch glass R from the formula.

$$R - r = \frac{5gT^2}{7(2\pi)^2} \quad (2\text{mks})$$

Where $g = 9.8\text{m/s}^2$ and $\pi = 3.142$.

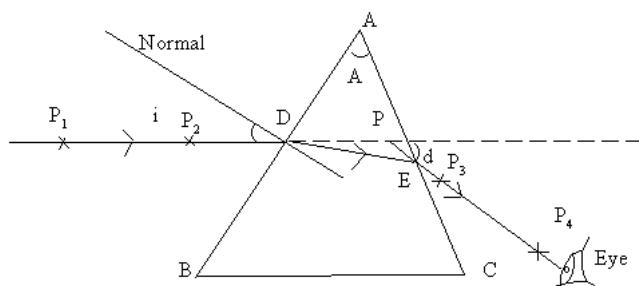
PART B

You are provided with the following

- ✓ A triangular prism of 60° .
- ✓ Four optical pins
- ✓ A soft board
- ✓ A plain piece of paper

Proceed as follows

- (a) Place the plain sheet of paper on the soft board
- (b) Place the prism with one face on the plain paper and trace its outline.
- (c) Remove the prism from the plain sheet of paper.



(d) Mark angle A and record its value.

A = ...(1mk)

(e) Draw a normal as shown and draw a ray of incident on the normal at an angle of incidence of 30° .

(f) Replace the prism on the outline on the sheet.

(g) Stick two pins P_1 and P_2 along the path of the incident ray as shown in the diagram.

(h) View the images of P_1 and P_2 through the glass prism through face AC as shown on the diagram.

(i) Stick two pins P_3 and P_4 so that they appear to be in line with P_1 and P_2 as seen through the glass prism.

(j) Remove the pins and prism from the sheet. Trace the path of the ray until it emerges from the glasses shown in the diagram.

(k) Extend the incident ray and the emergent ray until they meet at P. Measure and record the angle of deviation d.

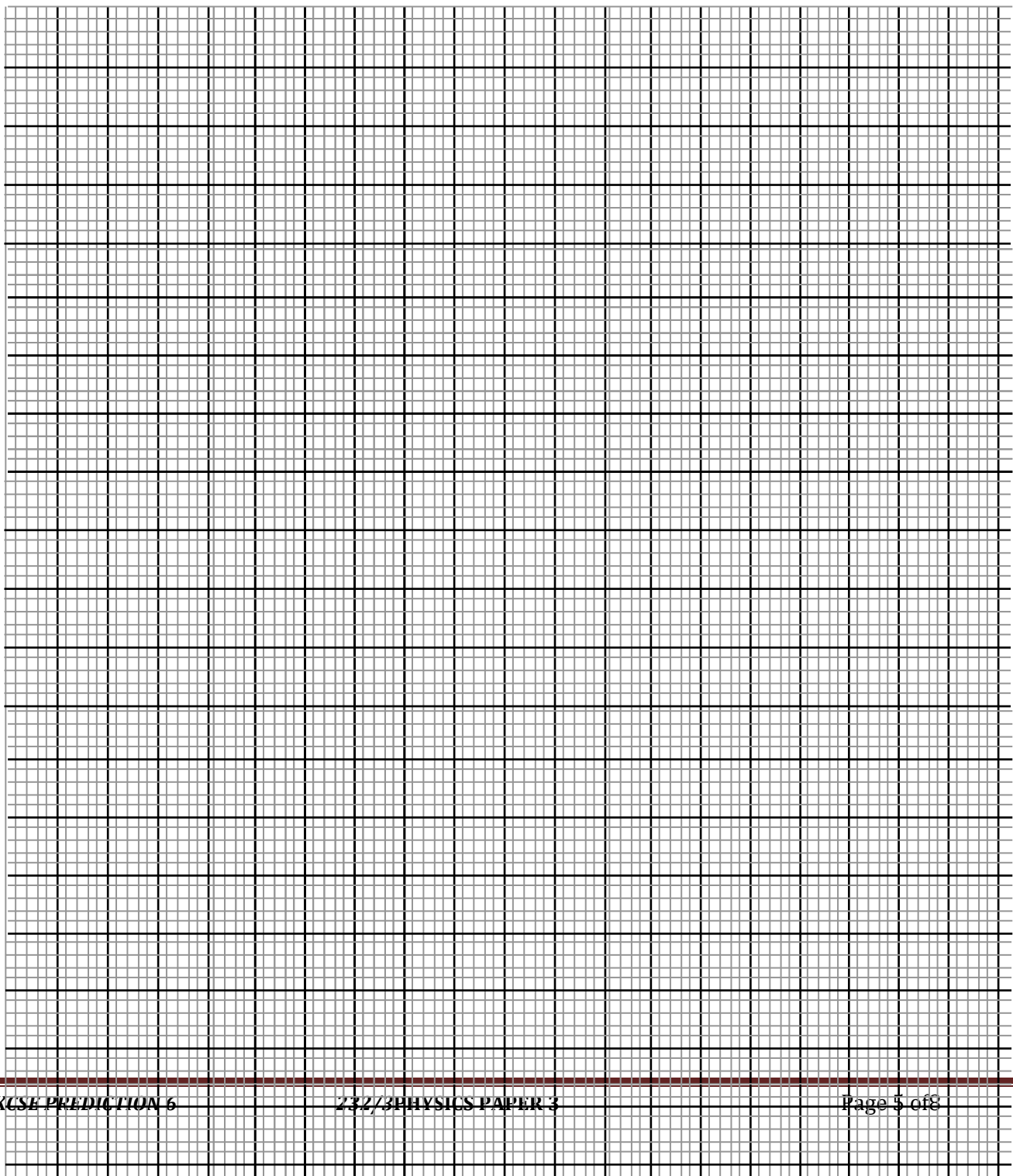
(l) Repeat the experiment for other angles of incidence shown in the table.

Angle of incidence (i) ⁰	30	35	40	45	50	55	60
Angle of deviation (d) ⁰							

(3 marks)

(m) Plot a graph of angle of deviation (d)⁰ against angle of incidence (i)⁰. (5 marks)

(l) Present your working.



(n) From the graph determine the minimum angle of deviation D. (1 marks)

(p) Find the refractive index of the prism material using (3 marks)

$$n = \frac{\sin \left(\frac{A + D}{2} \right)}{\sin \left(\frac{A}{2} \right)}$$

QUESTION 2

PART A

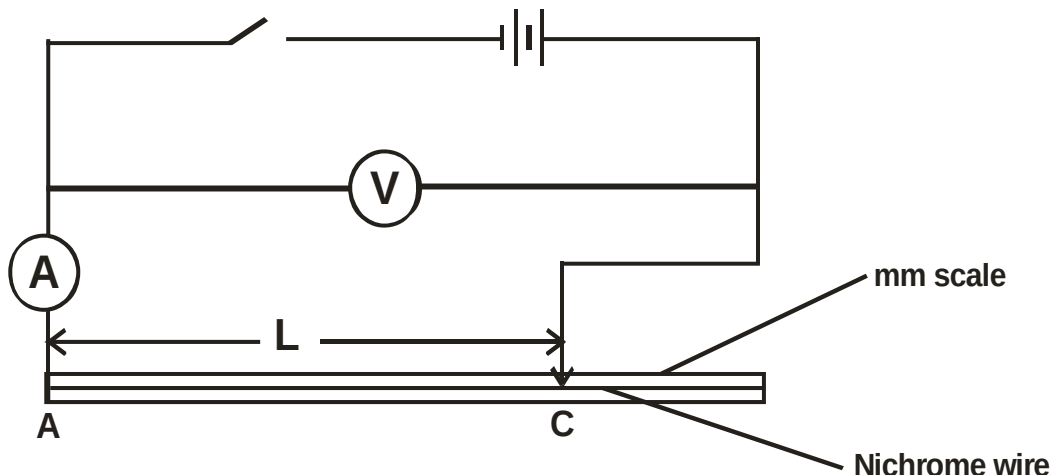
1. You are provided with the following apparatus.

- Two dry cells.
- Nichrome wire 100cm on a mm scale.
- An ammeter.
- Cell holder.

- Voltmeter.
- Connecting wires with crocodile clips.
- Switch.

Proceed as follows;

a) Connect the circuit as shown in the diagram.



b) Connect the ends A and C where AC is the length L of the Nichrome wire across the terminals as shown. Close the switch and measure both current I and potential difference (P.d) across the wire AC when $L = 100\text{cm}$.

Current I = ... (1 mark)

P.d, V = ... (1 mark)

c) Measure the E.m.f of the cells, E.

E = ... (1 mark)

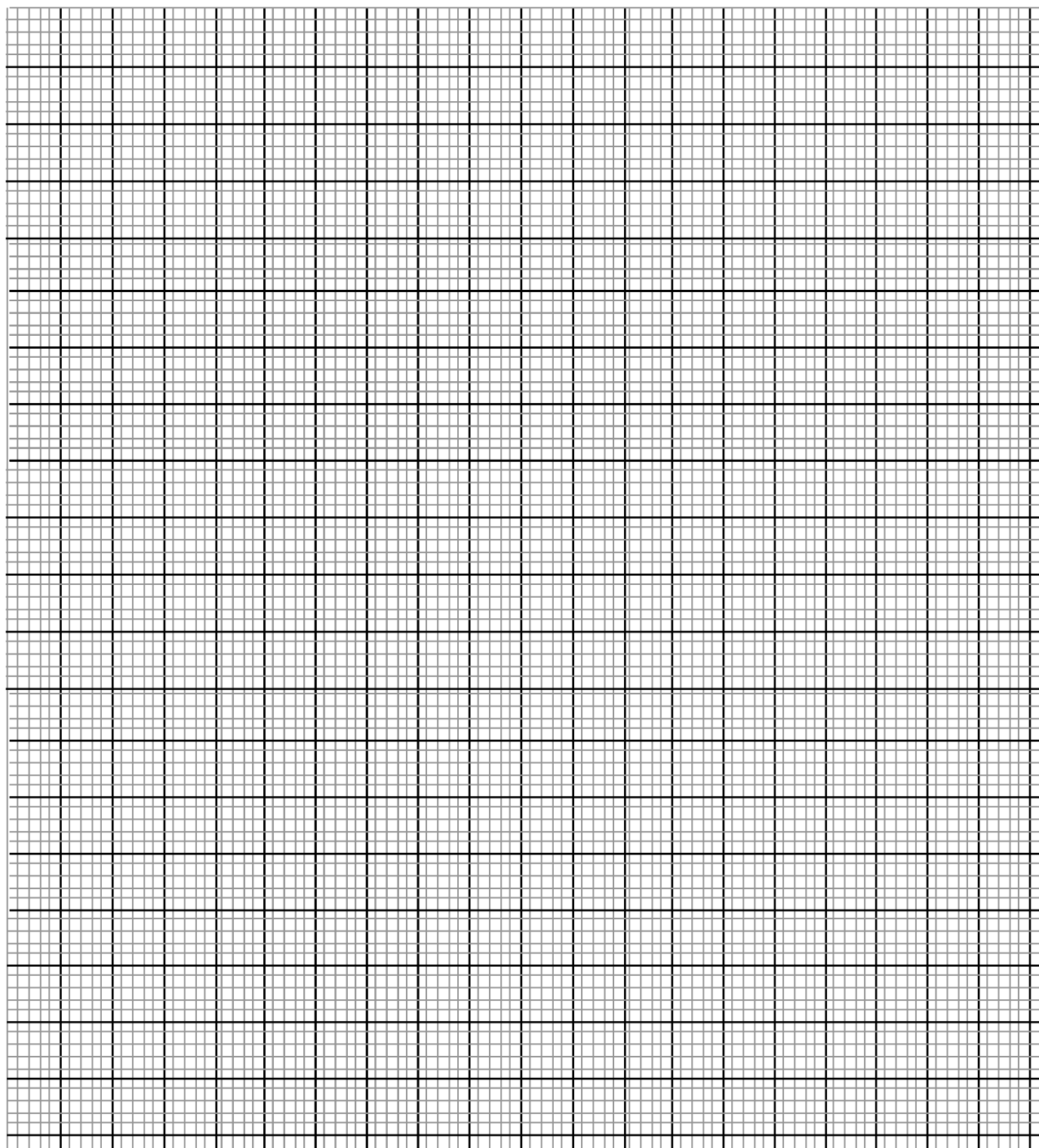
d) Reduce the length L (AC) to the lengths shown in the table below. In each case record the current, I, and the corresponding P.d.

Length L (cm)	100	70	60	50	40	20
I (A)						
P.d (V)						
E – V (v)						

(6 marks)

e) Plot a graph of E – V against I(A) on x-axis in the grid provided.

(5 marks)



- f) Given that $E = V + Ir$, determine the internal resistance, r , of each cell. (3 marks)

