

NAME: ADM NO:.....

CLASS:

232 / 3
PHYSICS
PAPER 3
JULY / AUGUST 2016
2 HOURS, 30 MIN

Kenya Certificate of Secondary Education (KCSE)

INSTRUCTIONS TO CANDIDATES

- ❖ *Write your name and index number in the spaces provided above.*
- ❖ *Answer ALL the questions in the spaces provided in the question paper.*
- ❖ *You are supposed to spend the first 15 minutes of the 2.5 hours allowed for this paper reading the whole paper carefully before commencing your work.*
- ❖ *Marks are given for a clear record of the observations actually made, for their suitability, accuracy and the use made of them.*
- ❖ *Candidates are advised to record their observations as soon as they are made.*
- ❖ *Mathematical table and non-programmable electronic calculators **may be** used.*

For Examiners Use Only

Question	1	2 Part a	2 Part b	Total
Marks				

1. You are provided with the following
- ❖ 100cm Nichrome wire mounted on a metre rule label X.
 - ❖ An ammeter
 - ❖ A volt meter
 - ❖ Three new dry cells
 - ❖ Cell holder
 - ❖ Eight connecting wires (at least 4 with crocodile clips at the end)
 - ❖ A 2.5 volt bulb fixed into a lamp holder
 - ❖ A switch
 - ❖ Micrometer screw gauge

Procedure:-

- (a) Connect the apparatus provided as shown in **figure 1**

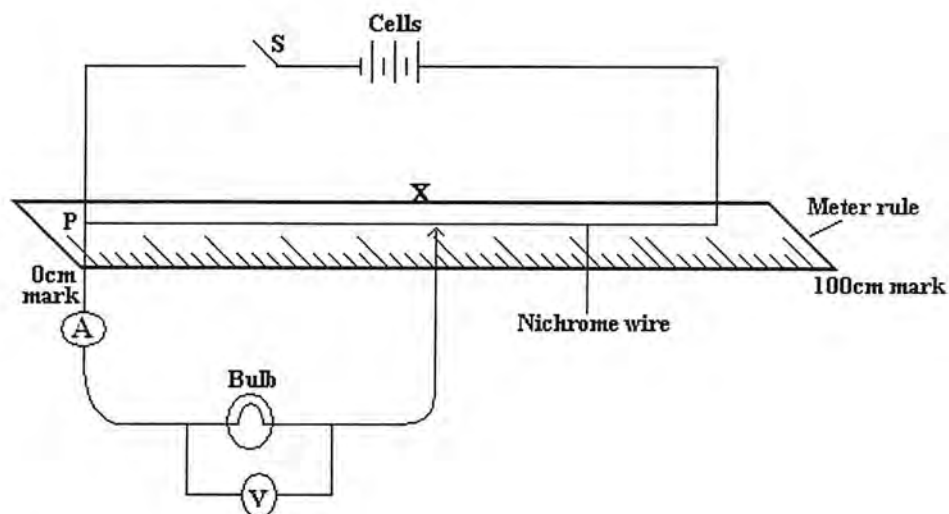


Figure 1

- (b) Place the sliding contact at **X**, 20cm from **P** then close the switch and record the ammeter and the voltmeter readings in **table 1**
- (c) Repeat the procedure in (b) by placing the sliding contact at **X**, 40cm, 60cm, 80cm and 100cm from **P**. Record your readings in **table 1**

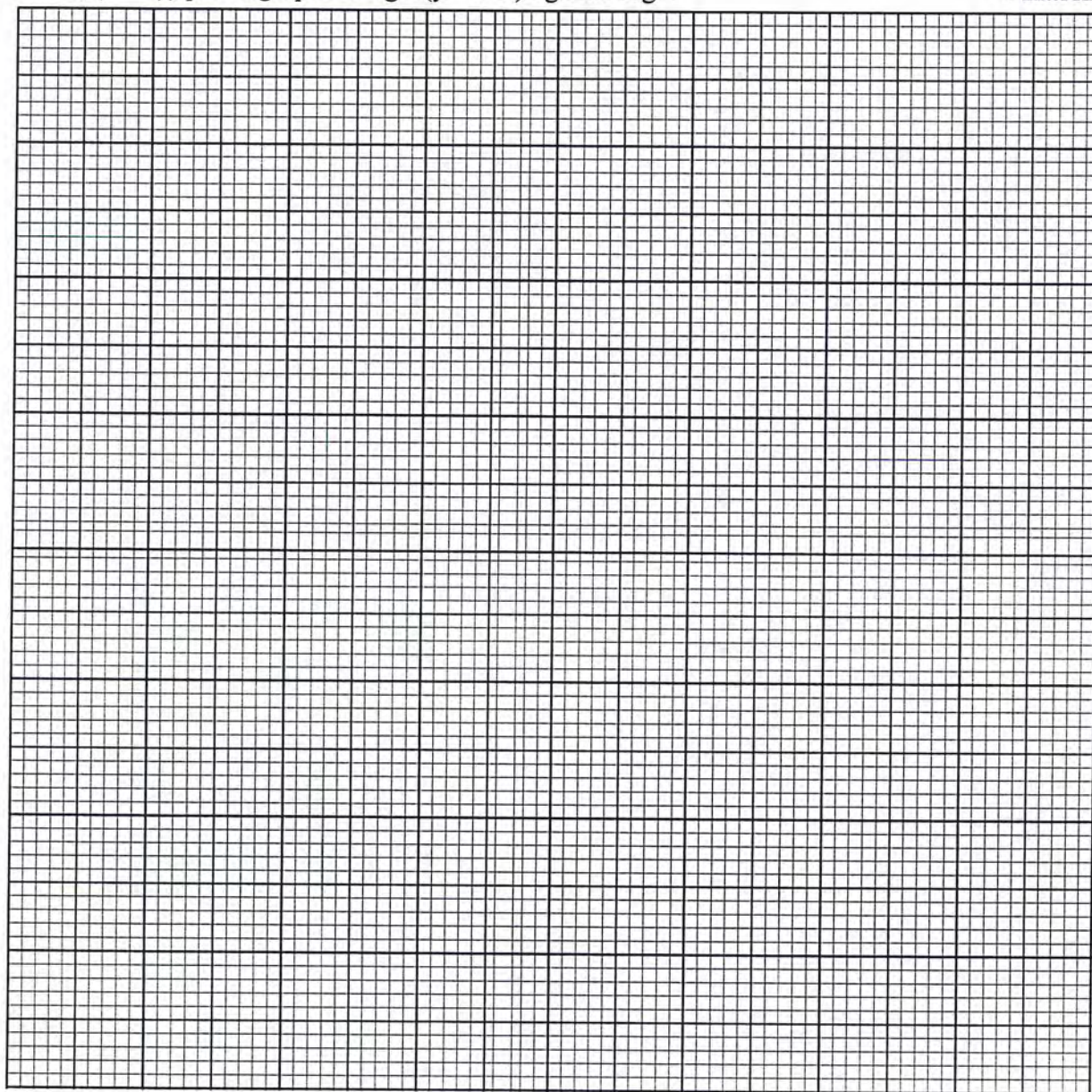
Table1

Length, L(cm)	I(A)	p.d.(V)	I(mA)	p.d.(mV)	Log I(mA)	Log V(mV)
20						
40						
60						
80						
100						

Complete the table

8 marks

(d) (i) plot a graph of log I (y –axis) against log V

4 marks

(ii) **Determine** the slope of the graph

2 marks

(e) The relationship between the current I (mA) and p.d (mV) is given by the equation ;

$$\log I = n \log V + \log k$$

Where n and k are constants.

Determine using your graph the value of;

(i) k -----

1 mark

(ii) n -----

1mark

(f) (i).Record the ammeter reading I and the voltmeter reading V when $PX = L = 100\text{cm}$.

$V =$ -----Volts **1/2 mark**

$I =$ -----Amperes **1/2 mark**

(ii).Using a micrometer screw gauge measure the diameter d of the wire.

$d =$ -----m **1 mark**

(iii).Determine the quantity **p** given that ;

$$P = 0.785 \frac{v d^2}{i L}$$

where $L = 100\text{cm}$

2 marks

2. PART A

You are provided with the following:

- a glass prism
- a plain sheet of paper (the last sheet of this question paper)
- a soft board
- 4 optical pins
- 4 paper pins

Proceed as follows;

- a) (i) Place the plain sheet of paper on the soft board and fix it there using the paper pins provided. Do not detach this sheet from the question paper.

Place the prism near the centre of the paper .

Use a pencil to trace the outline of the triangular surface in contact with the paper.

Remove the prism and label the vertices of the outline A,B and C.

- (ii) Mark a point N on the side AB of the diagram and draw a normal ON at this point.

Draw lines at angles $i=30^\circ, 35^\circ, 40^\circ, 50^\circ$ and 60° to the normal. See figure 2

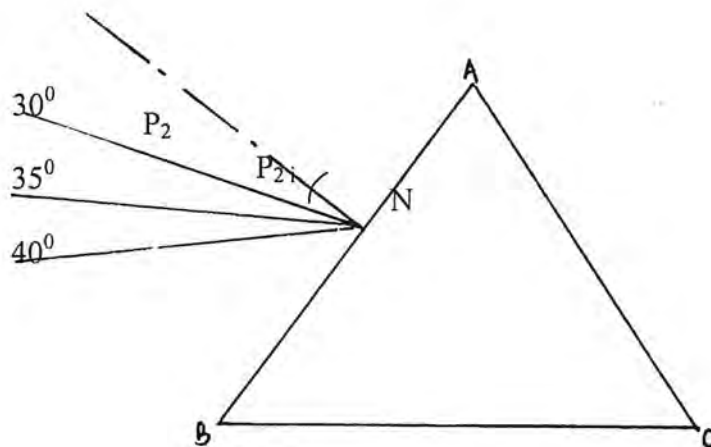


Figure 2

b) (i) Replace the prism on the outline. Fix two pins, P_1 and P_2 vertically on the 30° line such that they are about 4cm apart.

By viewing the images of the pins P_1 and P_2 through side AC, fix two other pins P_3 and P_4 in line with those images. Remove the prism.

Draw a line through the holes made by P_3 and P_4 and extend it into the outline. Now extend the 20° line so that the two lines cross each other. See figure 3.

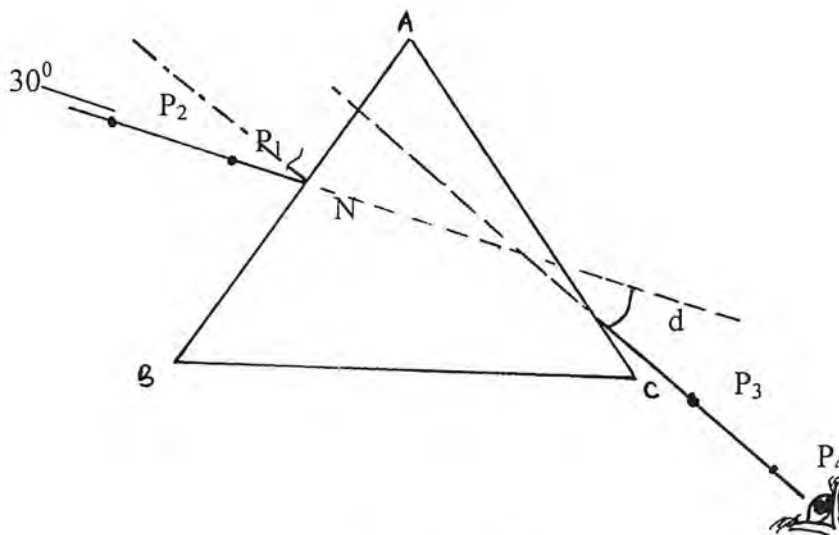


Figure 3

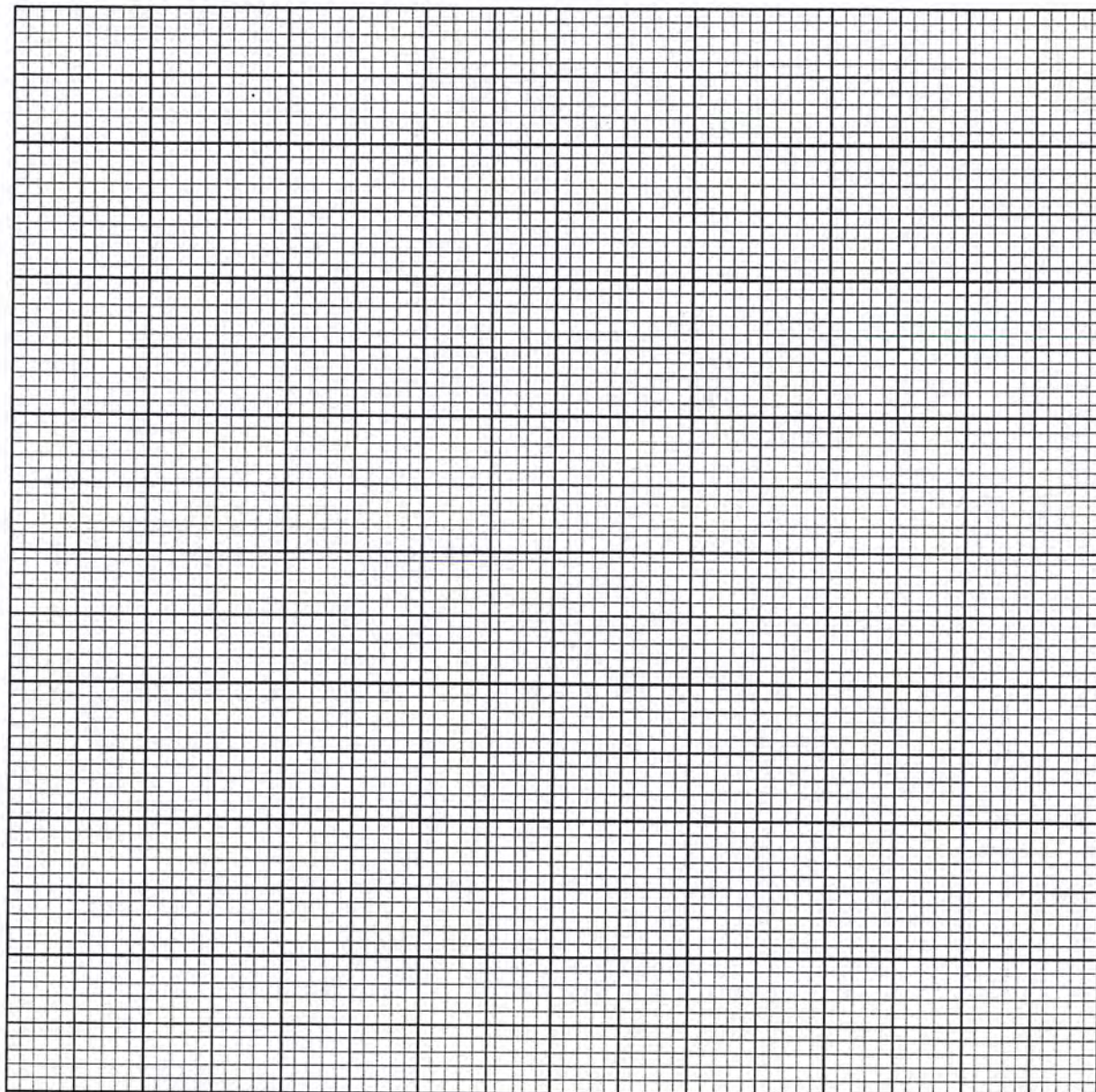
(ii) Measure and record in **table 2** the acute angle d between the two lines.

Angle i degrees	30	35	40	50	55
Angle, d (degrees)					

(c) Repeat the procedure in (b) for other angles shown in the table. **5marks**

NOTE: Attach the outline paper as evidence of work

d) On the grid provided, plot a graph of d (y-axis) against i . **4marks**



(e) From the graph, determine the minimum value, d_{\min} of d .

$d_{\min} = \dots\dots\dots$ **1mark**

(f) Determine the constant K for the prism from the formula.

$$K = \frac{\left(\sin 30^\circ + \frac{d_{\min}}{2} \right)}{\sin 30^\circ}$$

2marks

2. PART B

You are provided with the following apparatus:-

- A metre rule.
- One stop watch. one stand, clamp and boss.
- One spring.
- Two pieces of wood.
- A beam balance or electronic balance (to be shared)
- One mass labeled M .

Proceed as follows:

- (a) Hang the spring vertically by clamping one end as shown in figure 4. (Use the small pieces of wood to clamp the spring).

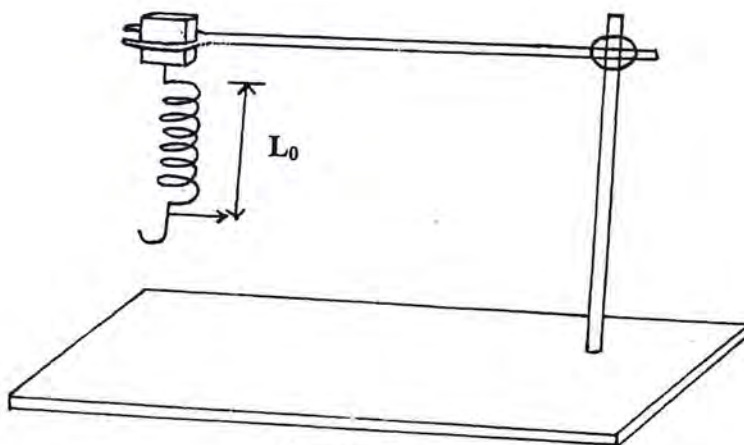


Figure 4

- (b) Measure the length, L_0 of the unloaded spring, and record below.

$L_0 =$ -----m **½ mark**

- (c) Hang the mass M given from the lower end of the spring. Measure the length, L_1 of the loaded spring.

$L_1 =$ ----- m **½ mark**

- (d) Find the value of $L_1 - L_0$

$L = L_1 - L_0 =$ ----- **1 mark**

- (e) Using the beam balance , determine the mass, M of the object .

$M =$ -----kg **1 mark**

- (f) Hang the mass M from the lower end of the spring. Displace it by a small vertical distance and release so that the spring makes vertical oscillations.

Measure and record, time for the number of oscillations given in the table below.

Oscillations, N	10
Time in seconds, t (s)	
$Q = \frac{(N + 10t)}{10} \text{ (s)}$	
$Q^2 \text{ (s}^2\text{)}$	

Complete the table . **3marks**

- (g) Determine the constant k, given that:

$$k = \frac{MS}{13L}$$

$$\text{where } S = \frac{Q^2}{10}$$

-----2marks