NAME………………………………………………………….. INDEX NO…………………….......................

232/3 **CANDIDATE'S SIGN………….……….……..**
PHYSICS
PAPER 3 **DATE……….…………………………………**
(PRACTICAL)
TIME: 2½ HOURS

Atika School
Free Online Academy

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 supposed 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	b	c & d	d	f	g	h(i)	h(ii)	**Total**	**20**
Maximum Score	1	4	2	5	3	1	1		
Candidate's Score									

Question 2	a	b	c	d	Part II	b	c	**Total**	**20**
Maximum Score	5	5	2	5		1	2		
Candidate's Score									

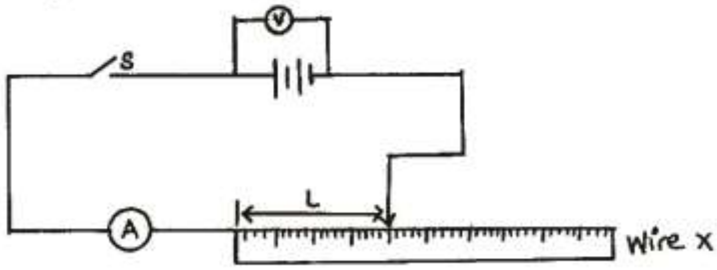
GRAND TOTAL	

1. You are provided with the following:

- 2 new dry cells size D.
- A cell holder.
- A switch.
- An ammeter (0 - 2.5A) or 0 – 1A)
- A voltmeter (0 – 5V)
- 6 connecting wires, 3 with crocodile clips.
- Nichrome wire mounted on the metre rule labelled X.
- A micrometer screw gauge (to be shared).

Proceed as follows:

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



Determining the area (X-section) of the wire.

(b) Measure the voltage, E before closing the switch.

E = ______________________________ (1mk)

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

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

(2dp)
(6mks)

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

(e) Calculate the values of $\frac{1}{I}$ and record in the 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. (1mk)

d_1 = ………………………… d_2 = ………………………d_3 = ………………….………..

Averaged d = ………………………………………………………………….…..

(ii) Determine the cross section area, A of the wire. (1mk)
From the equation.

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

(i) the value of K. (2mks)

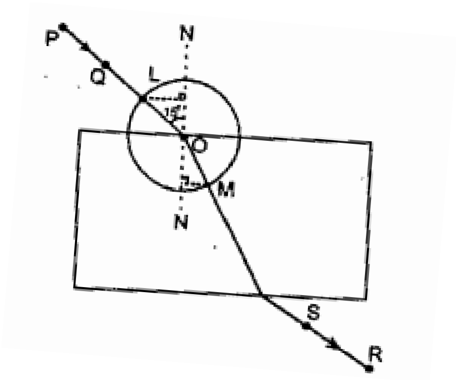
(ii) the value of Q. (1mk)

2. **PART I**

You are provided with the following

- A rectangular glass block.
- Soft board.
- Plain sheets of paper.
- 4 optical pins.
- 4 thumb pins.

You are required to determine the refractive index of the glass block by tracing rays of light through the block. Place the rectangular glass block on the plain paper (stuck on the soft board) and trace it round. Remove the block; draw a normal at point **O** and an incident at 15 degrees as shown below.



Stick two pins **P** and **Q** along the incident ray and replace the glass block while closing one eye, look through the glass block from the opposite side and insert two other pins S and R exactly in line with the images of **P** and **Q**.

Remove the glass block and join **SR** to the outline of the block. Hence obtain the refracted ray inside the glass as shown in diagram above.

With **O** as the centre, draw a circle of radius 5cm to cut both the incident ray and the refracted ray at **L** and **M** respectively. Using a set square, draw the perpendiculars **LN** and **MN** to the normal.

(a) Measure **LN** and **MN** in millimeters and record your values in table below. (5mks)

Angle of incidence (i)	LN (mm)	MN (mm)
15 degrees		
30 degrees		
45 degrees		
60 degrees		
75 degrees		

Repeat the above steps for angles of incidence of 30°, 45° and 75° degrees.
Complete the table below.
<u>**NB**</u>**:** (Insert the plain paper in the question paper).

(b) Plot a graph of **LN** against **MN** on the grid provided. (5mks)

(c) Calculate the slope of your graph. (2mks)

(d) (i) Also measure and record the values of the angle of refraction ® that corresponds to the given values of the angles of incidence (i). (5mks)

i	r	Sin i	Sin r	$\frac{Sin\ i}{Sin\ r}$
15°				
30°				
45°				
60°				
75°				

Calculate the ration Sin/Sin r and record in the table above.

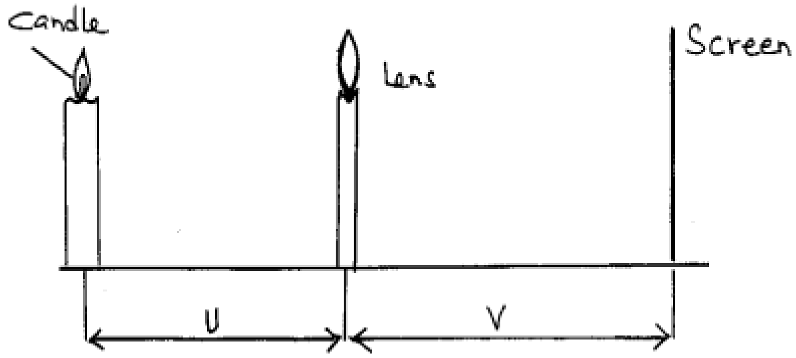
(ii) Calculate the average value of Sin i/Sin r

2. **PART II**

You are provided with the following

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

Set up the apparatus as shown in figure below.



(a) Starting with U = 30cm, adjust the position of the screen to obtain a sharp image of the candle. Record the value of V in table below.

(b) Repeat the procedure in (a) for U = 20cm. Complete the table (a). (1mk)

Table (a)

U (cm)	V (cm)	$M = \frac{V}{U}$
20		
30		

(c) Given that the focal length f of the lens satisfies the equation $f = \frac{V}{1+M}$ determine the average value of the focal length, f. (2mks)