NYAMBARIA HIGH SCHOOL

END OF YEAR EXAMS

Paving Way For Kenya Certificate of Secondary Education Success

Name …….. Admission no…….

Candidate's Signature…… Date…….

FORM 3

PHYSICS

PAPER 3

TIME: 2Hours

Instruction to candidates:

- Write your name and admission number in the spaces provided above
- Answer all questions in the spaces provided in the question paper
- Marks are given for a clear record of the observations actually made, their suitability, accuracy and the use made of them
- Candidates are advised to record their observations as soon as they are made
- All questions MUST be answered in English
- Scientific calculators may be used where necessary

FOR EXAMINERS USE ONLY

QUESTION	TOTAL SCORE	CANDIDATES' SCORE
1	20	
2	20	
TOTAL		

QUESTION ONE

You are provided with the following

- Two dry cells
- An ammeter
- One voltmeter
- A variable resistor
- A bulb
- A switch
- 8 connecting wires 4 with crocodile clips
- A meter rule or half 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)
- A mass labelled, M

Proceed as follows:

a) Set up the apparatus provided as in the diagram (figure, 1) below.

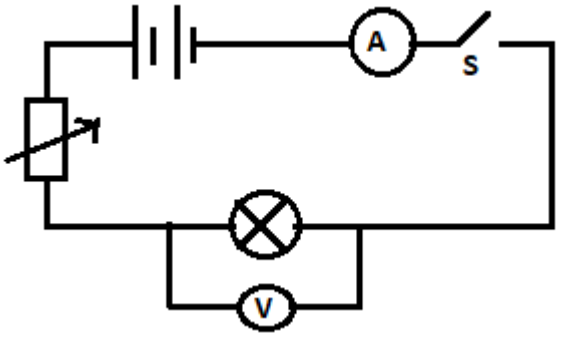


Figure 1

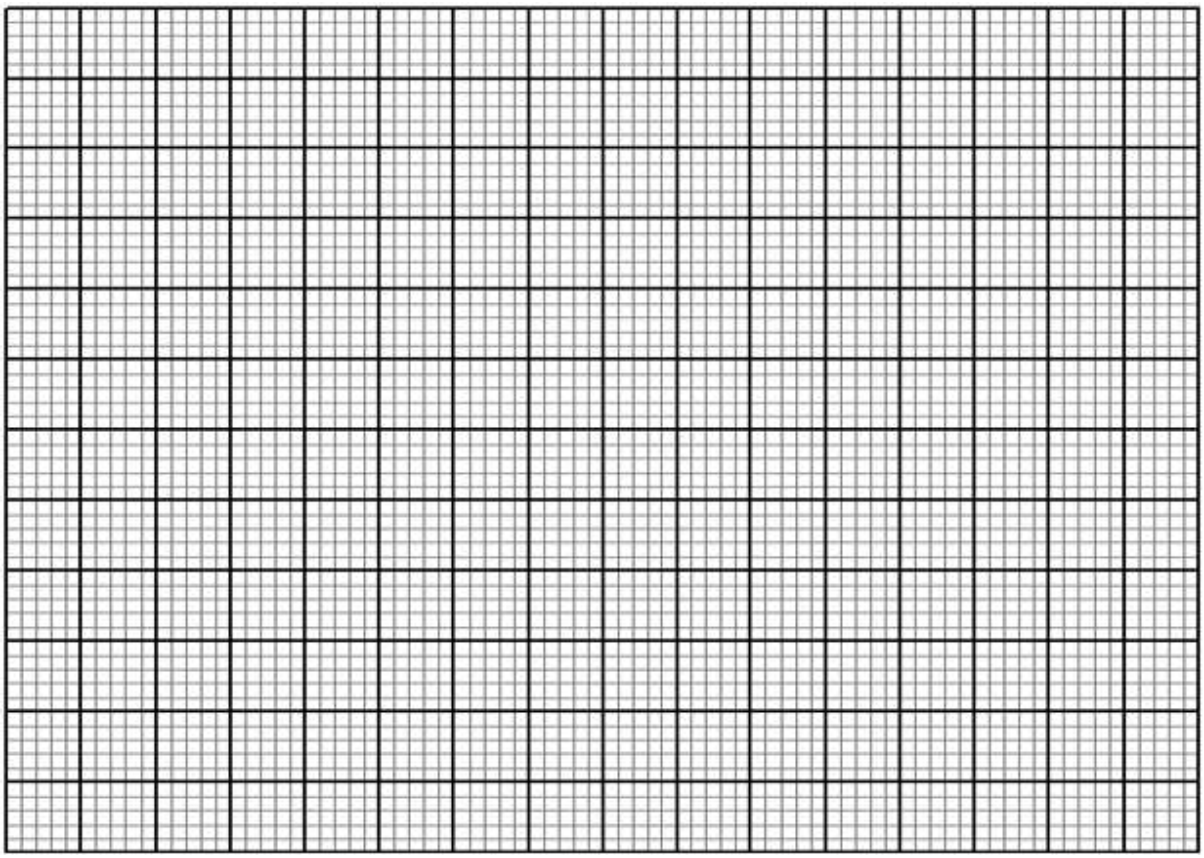
b) Close the switch and adjust the variable resistor until the voltmeter reads 0.9V. Record this value of voltage V and the corresponding value of current I in the table below.

Table 1

Voltage (V)	0.9	0.6	0.3	0.1
Current (A)				

c) Repeat procedure (b) above for the other values of V and complete the table 1 above. **(4 marks)**

d) Plot a graph of current (y-axis) against voltage (x-axis) **(5marks)**



e) Determine the gradient of your graph when $v = 0.25V$ **(2 marks)**

SECTION B

Proceed as follows:

f) Hang the spring vertically by clamping one end as shown in figure 2 (the small pieces of wood to clamp the spring)

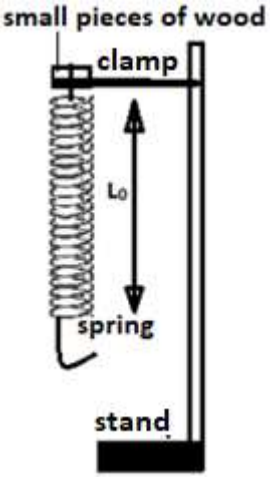


Figure 2

g) Measure the length L_0, of the unloaded spring and record below.

L_0 = ……..mm **(1mark)**

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

L_1 = ……..mm **(1 mark)**

i) Find the value of (L_1- L_0) = ……..cm **(1mark)**

j)

i. Using the balance given find the mass of the object M

Mass of M= ……..g **(1mark)**

ii. Determine k such that: $k = \frac{W}{(L_1 - L_0)}$, where W is the weight of the object **(2 marks)**

k) Hang the mass M from the lower end of the spring. Displace it by small vertical distance and release so that the spring makes vertical oscillations. Record the time taken for the given number of oscillations **(3 marks)**

Table 2

Number of Oscillations (N)	10	15	20
Time in seconds			

QUESTION TWO

You are provided with the following apparatus:

- A rectangular glass block (about 10cm by 6.5cm by 2 cm)
- 4 optical pins
- A soft board
- A plain paper.
- 30 cm ruler (to be provided by the candidate)
- A 250 ml glass beaker
- A Bunsen burner
- A thermometer
- A stop watch
- A tripod stand
- Measuring cylinder

Proceed as follows:

a) Place the glass block on a sheet of paper fixed on the soft board with one of its longest face uppermost. Mark the outline ABCD as shown below.
Remove the glass block and draw a line EF to represent a ray of light making an angle of incidence I = 30° with the longest side BC of the block.

b) Fix pins P1 and P2 on the line EF. Replace the glass block and mark the emergent ray GH by viewing from side AD. Place pins P3 and P4 in line with images of P1 and P2.
Remove the glass block and the pins and draw the ray EFGH.

c) Draw the normal at G.

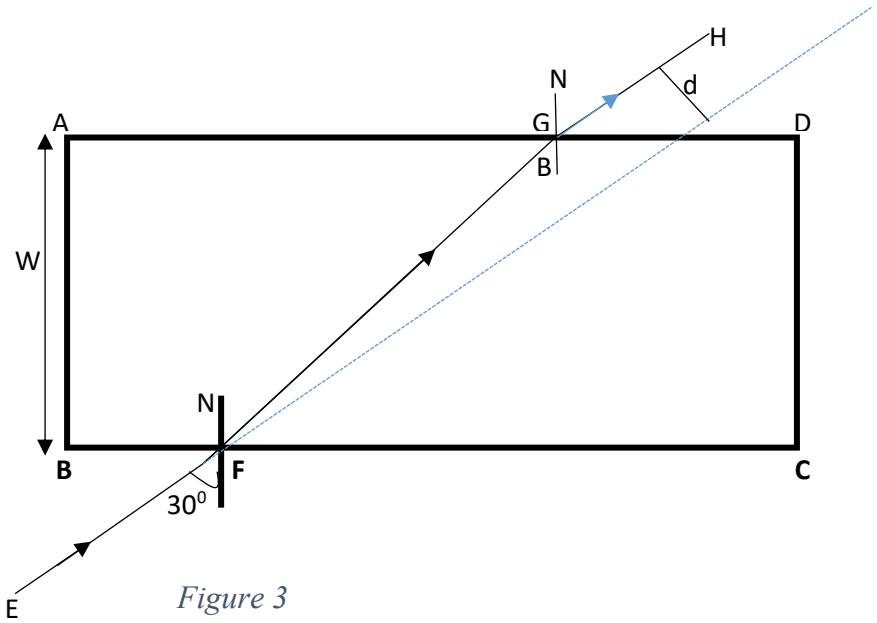


Figure 3

d)

i. Measure angle B and the width, W of the glass block

B = ……. W = ……. **(2 marks)**

ii. Measure the lateral displacement d.

d = …… cm **(1 mark)**

e) Repeat the above procedure for the following angles of incidence: 35^0, 40^0, $50^0$and complete the table, 3 below: **(3 marks)**

Table 3

$angle, i^0$	35	40	50	60
Lateral displacement (cm)				

(Collect the plane paper together with the question paper as proof of having done the experiment) **(1 mark)**

f) Given that: $k = \frac{\sin 30^0}{\sin B}$, calculate the value of k **(2 marks)**

g) What quantity does k represent? **(1 mark)**

h)

i. Given that: $Z = \frac{W(Sin\ 30-B)}{\cos B}$, determine the value of Z **(3 marks)**

ii. State the significance of Z **(1 mark)**

PART B

Now set up the apparatus as shown in the figure, 4 below:

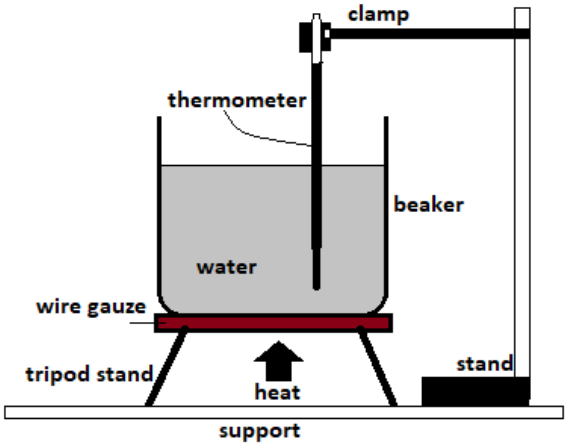


Figure 4

i) Measure 100 ml of water and pour it into the beaker. Take the initial temperature, T_0 of the water.

T_0 = ……^{0}C **(1 mark)**

j) Now heat the water to a temperature, T_1 of 80^{0}C. Switch off the heat and insert the thermometer into the beaker and start the stop-watch when the temperature is 65^{0}C. Record the temperature, T_2 of the water after 1 minute.

T_2 = ……..K **(1 mark)**

k)

i. Given that: $\gamma = \frac{mc(338-T_2)}{60}$ where; m is the mass of the water used and $specific\ heat\ capacity, c\ of\ water = 4.2\,J/gK$ (density of water is 1000kg/m^3).

Determine the value of γ **(3 marks)**

ii. State the significance of γ **(1 mark)**