MANGU HIGH SCHOOL

NAME: .....CLASS:.....

ADM NO..... INDEX NO.....

232/3
PHYSICS
PAPER 3
JULY 2015
TIME: 2 ½ HOURS
Physics Practical

INSTRUCTIONS TO CANDIDATES:

- *Answer ALL the questions in the spaces provided in the question paper.*
- *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.*
- *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.*
- *Mathematical table and electronic calculators may be used.*

This paper consists 8 printed pages.

For Examiners' Use Only

Question 1	a (ii)	a(iii)	a(iv)	a(v)	a(vi)	b(i)	b(ii)	b(iii)	b(iv)
Maximum Score	4	1	5	3	1	1	2	1	2
Candidate's score									

Total

Question 2	a (i)	a (ii)	b	c	d	f	g	h	i	j
Maximum Score	½	1	1	1	2	5	5	2	½	2
Candidate's score										

Total

Grand Total

Question 1

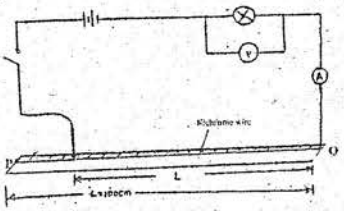
You are provided with the following apparatus:

- Two dry cells and a cell holder
- A bulb (2.5V)
- A voltmeter (0 – 3V or 0 – 5v)
- An ammeter (0 – 2.5A)
- A mounted nichrome wire on millimeter scale
- A switch
- Seven connecting wires at least two with crocodiles clips
- A micrometer screw gauge

Proceed as follows

a) i) Ste up the circuit as shown in figure 1 below

Figure 1



ii) With the crocodile clip at P take the voltmeter reading, V and the ammeter reading, I. Record V and I. Repeat the reading for L = 80, 60, 40, 20 and 0 cm respectively. Complete the table 1 below

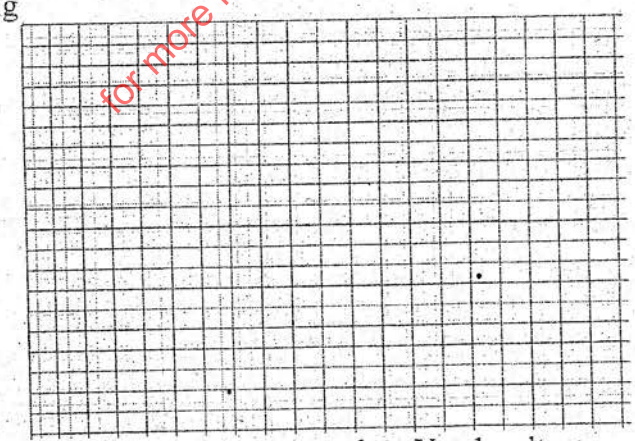
TABLE 1

Length L (cm)	100	80	60	40	20	0
Voltage V (V)						
Current I (A)						

(4 mks)

iii) What changes do you observe on the bulb as L decreases from P? (1 mk)

iv) On the grid provided below, plot a graph of the ammeter reading (y-axis) against voltmeter reading (5 mks)



v) Determine the slope of your graph at V = 1 volt (3 mks)

vi) What physical quantity is represented by the slope of the graph at any given point? (1 mk)

b) i) Given the apparatus in (a) (i) above, draw a diagram of the circuit you would use to determine the current through the resistance wire and the potential difference across it. (1 mk)

ii) Set up the circuit you have drawn. Record the ammeter reading, I and the voltmeter reading V, when L = 100cm

V = _____ V

I = _____ A (2 mks)

iii) Using a micrometer screw gauge, measure the diameter, d of the wire.

d = _____ m

(1 mk)

iv) Calculate the quantity, $p = 0.785 \left(\frac{V}{I}\right)\left(\frac{d^2}{L}\right)$ where L is one metre (2 mks)

Question 2

This question has two parts A and B. Answer both parts

PART A

You are provided with the following apparatus

- A clean boiling tube
- Some sand in a container
- Half metre rule
- Vernier calipers (to be shared)
- 200ml beaker with clean water
- Top pan balance
- Tissue to wipe off water

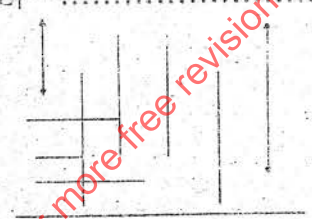
Proceed as follows:

a) i) Measure and record the external diameter, d, of the boiling tube (½ mk)

d = ...cm

ii) Measure and record the length, L_1, of the tube, from the concave base to the edge of the tube (figure 2) (1 mk)

L_1 = ...cm



b) Holding the boiling tube upright, place it in water in the 200ml beaker. Add some sand, a little at a time until the tube floats freely upright in water. Measure and record the length L_2 of the tube above the water level, as shown in figure 2 (2 mks)

L_2 = ...cm

c) Remove the tube from the beaker and carefully wipe off the water from the outside of the tube. Measure and record the mass, m, of the tube with its contents (1 mk)

m = ...g

d) Given that $p = \frac{4m}{\pi d^2(L_1 - L_2)}$ find the value of p, the density of water. Express your answer in kgm^{-3} (2 mks)

PART B

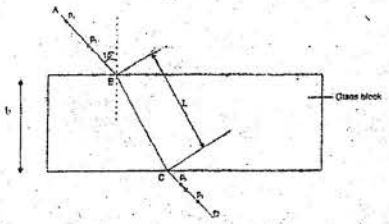
You are provided with the following apparatus

- A soft board
- 6 office pins
- A rectangular glass block
- Plain white paper

Proceed as follows:

a) Fix a white sheet of paper on the soft board using the thumb pins

b) Place the glass block, the largest face down, on the paper. Trace the outline of the glass block as shown in Figure 3



c) Remove the glass block and construct a normal line at B. Construct an incident ray AB of an angle of incident = 15^0. Stick two pins P_1 and P_2 on the line AB

d) View the pins P_1 and P_2 through the glass block. Stick two other pins P_3 and P_4 on the other side of the block so that they appear to be in line with the images of object pins P_1 and P_2 in the slab as shown on the diagram

e) Remove the glass block and draw the path of the ray ABCD. Measure the length, L (in mm), of the refracted ray BC

f) Repeat for other values of the angles incident. Enter your results in the table 2 below

TABLE 2

i	L (mm)	L2 (mm^2)	1/L2 (mm^{-2})	Sin^2i
15^0				
25^0				
35^0				
45^0				
55^0				

(5 mks)

g) Plot a graph of $^1/_{L^2}$ (y-axis) against Sin^2i (x-axis) (5 mks)

h) Determine the slope of the graph (2 mks)

i) Measure and record the breadth, b, (in mm) of the uppermost face of the block (½ mk)

b = ...mm

j) Given that $\frac{1}{L^2} = \frac{1}{b^2} - \frac{1}{n^2 b^2} sin^2 i$, use the graph to find the value for n, the refractive index of the material of the glass block (2 mks)