KCSE 2023 TOP PREDICTION MASTER CYCLE 6

PHYICS (232/3)
PAPER 3 (PRACTICAL)
Time: 2 ½ Hours

Name: …… **Adm No**: …….

School: …….. **Class**: ……..

Signature: ……..**Date**: …… …..

INSTRUCTIONS TO CANDIDATES

a) Answer all questions in the spaces provided in the question paper.
b) You are supposed to spend the first 15 minutes reading the whole paper carefully before commencing your work.
c) Candidates are advised to record their observations as soon as they are made.
d) Marks are given for observation actually made, their suitability, accuracy and the use made of them.

FOR EXAMINER'S USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1	**20**	
2	**20**	
TOTAL	**40**	

This paper consists of 9 printed pages. Candidates should check the question paper to ensure that all the pages are printed as indicated and no questions are missing.

QUESTION ONE

PART A

You are provided with the following:

- Copper wire
- A retort-stand, boss and clamp
- An optical pin mounted on a cork
- A stop watch
- Wire cutters (to be shared)
- A metre-rule or half-metre rule

(a) Clamp the cork so that the optical pin is horizontal. Hang the copper wire from the pin by the loop as shown in figure 1. Ensure the wire is straight and the length X between the lower tip and the optical pin is 32 cm. If the length exceeds 32 cm reduce by cutting at the lower tip using the wire cutters provided.

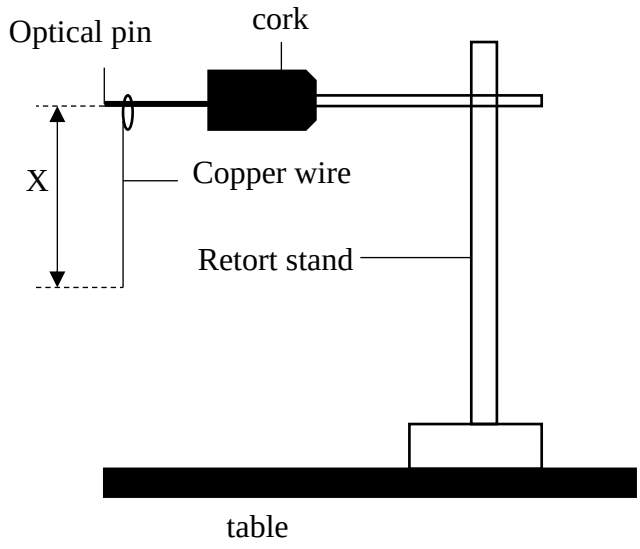


Figure 1

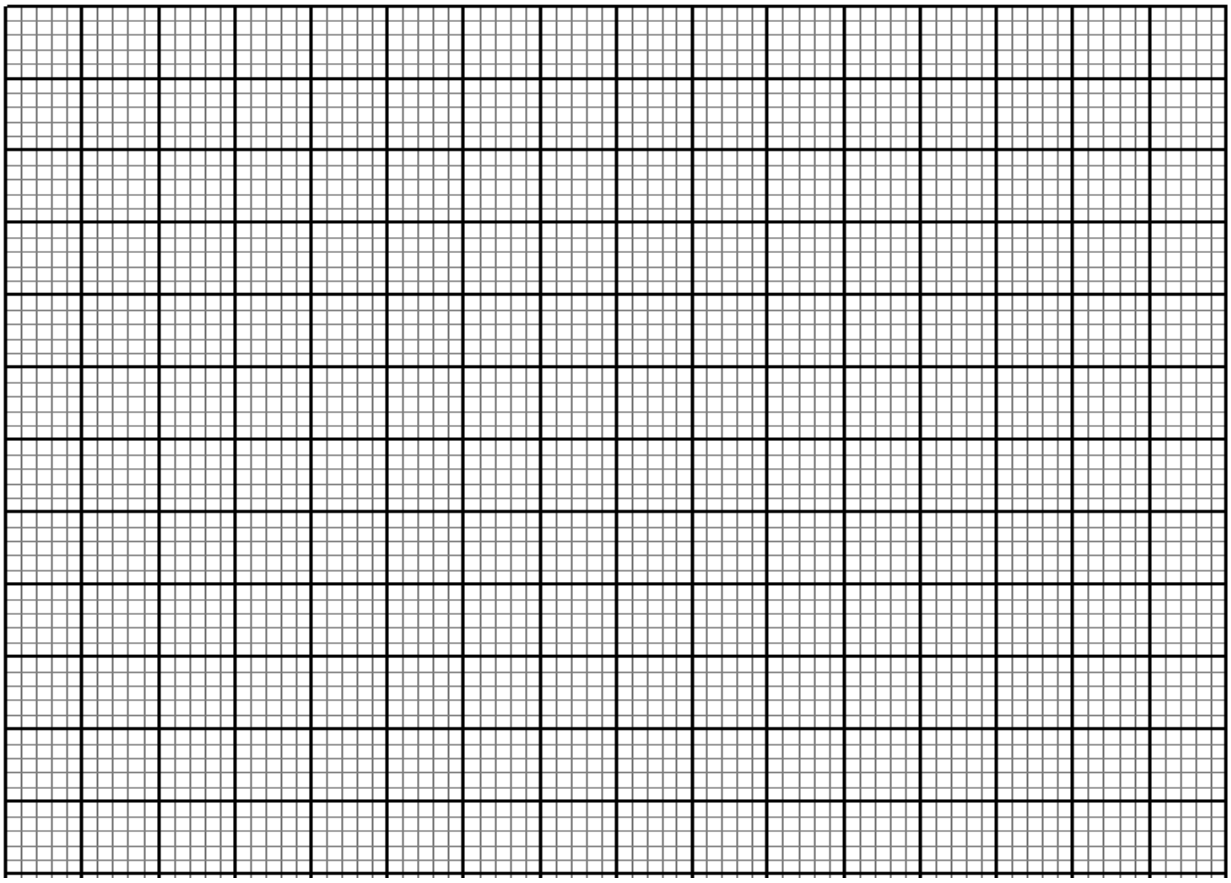
(b) Displace the lower tip of the wire slightly in a plane perpendicular to the optical pin and then release it. Measure the time t for 20 oscillations of the wire and record the value in table.

(c) Repeat the procedure in (b) above for other values of X shown in the table. (Note that each length X is obtained by cutting off an appropriate length from the lower tip of the wire. For example, to get X= 28cm cut off 4 cm from the lower end). Complete the table. (6 marks)

Table 1

Length X (cm)	32	28	24	20	16	12
Time t for 20 oscillations (S)						
Period (T = $\frac{t}{20}$ (S)						
T^2 (S^2)						

(d) Plot a graph of T^2 (y- axis) against X (5 marks)



(e) (i) Determine the slope, S, of the graph (3 marks)

(ii) Obtain the value of k in the equation: $S = \frac{8\pi}{3K}$ (2 marks)

PART B

You are provided with the following:

- A cylindrical container
- Some water
- A stop watch
- A metre ruler or half metre rule
- A boiling tube
- Some sand
- A rubber band

Proceed as follows:

(f) Tie the rubber band round the boiling tube so that it is at a distance L= 12 cm from the bottom of the tube (see fig 2. a). Pour water into cylindrical container until the level is about 2.0 cm from the top of the beaker. Float the boiling tube in the water in the container. Add sand gradually into the boiling tube until the tube sinks to the 12 cm mark. See figure 2 (b).

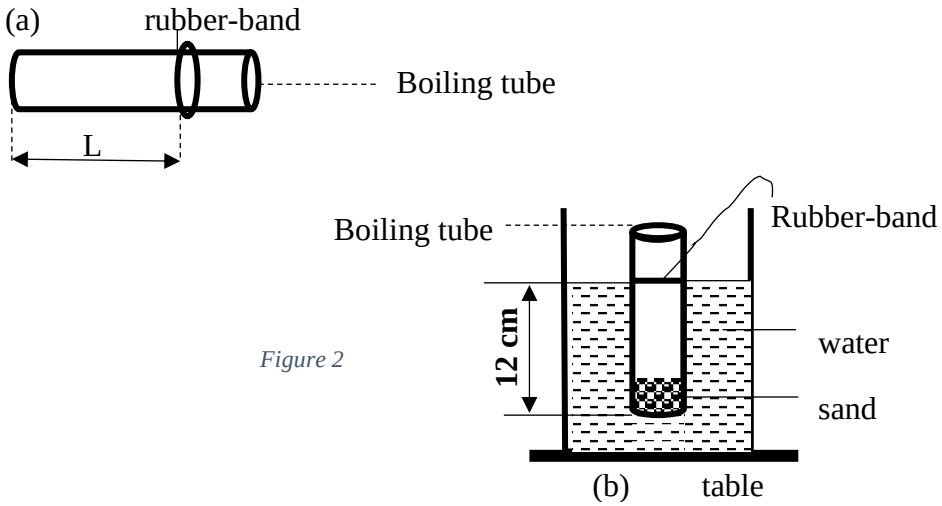


Figure 2

(g) Depress the boiling tube slightly and release so that is oscillates vertically without touching the sides of the container. Measure and record in table 2 the time t_1, for five oscillations of the boiling tube, Repeat the procedure two more times to obtain t_2, and t_3 and record the values in table 2. Complete the table. (3 marks)

Table 2

t_1 (S)	t_2 (S)	t_3 (S)	Average, t (S) $t = \frac{t_1+t_2+t_3}{3}$	$T = \frac{t}{5}\ (s)$

(h) Evaluate PT = 40L given that L is the length of the tube up to the rubber band in (f) and T is the value obtained in (g) above. (1 mark)

P = _____

QUESTION TWO

You are provided with the following apparatus:

PART A

- Constantan wire SWG 28 mounted on a mm scale
- Ammeter (0 – 1) A
- Voltmeter (0 –2.5) V
- A jockey
- 6 connecting wires with crocodile clips
- A switch
- A new dry cell and a cell holder
- Micrometer screw gauge to be shared

Proceed as follows:

(a) Connect the apparatus provided as shown in the circuit below. Measure the voltmeter reading, E when the switch is open.

E = …… (1 mark)

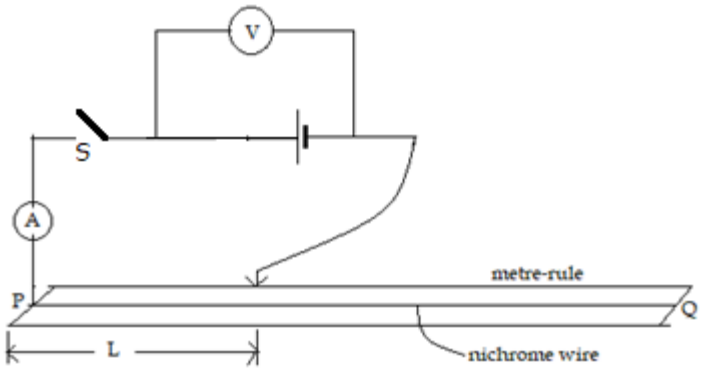


Figure 3

(b) With the crocodile clip at L = 10 cm, close the switch S and record the ammeter and voltmeter reading.

A = ……. (1 mark)

V = ……. (1 mark)

(c) Repeat the procedure in (b) for other values of l = 15cm, 20cm, 25cm, 30cm, 35cm and record the readings in the table below. (5 marks)

Table 3

Length. L. (cm)	10	15	20	25	30	35
Voltmeter reading, V (volts)						
Ammeter reading, I(A)						

(d) Given that V = X – 0.3.I, determine the value of X when L is 20cm (2 marks)

(e) Measure the diameter d of the wire x using the micrometer screw gauge.

d = _____ m (1mark)

(f) Dismantle the apparatus and set up the circuit as shown below

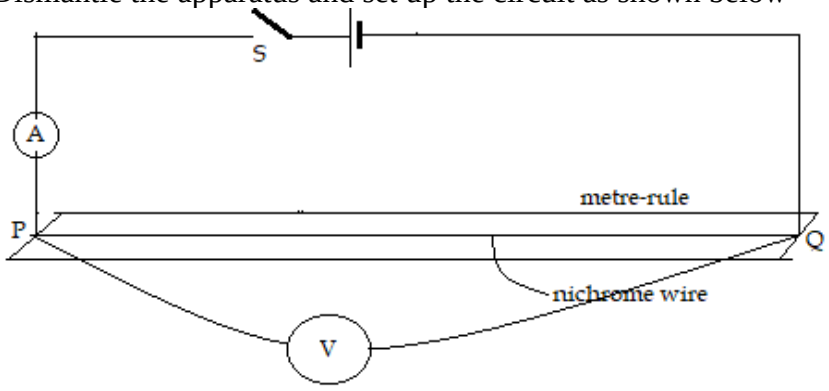


Figure 4

(i) Close the switch S and record the ammeter and the voltmeter readings

I = _____ A (1 mark)

V = _____ V (1mark)

Hence find R, the resistance of the wire.

R = _____ (1mark)

(ii) Given that: $R = \frac{4\rho}{\pi d^2}$, determine ρ (2 marks)

PART B

You are provided with the following apparatus.

- Rectangular glass block
- 3 optical pins
- A soft board.
- A plane paper
- 4 paper pins.
- Four tuck pins

Proceed as follows:

(g) Using the tuck pins, fix the plane paper on the soft board.

Place the rectangular glass block in the middle of the plane paper and trace its outline (as shown in figure 5). Using a pencil. Remove the block.

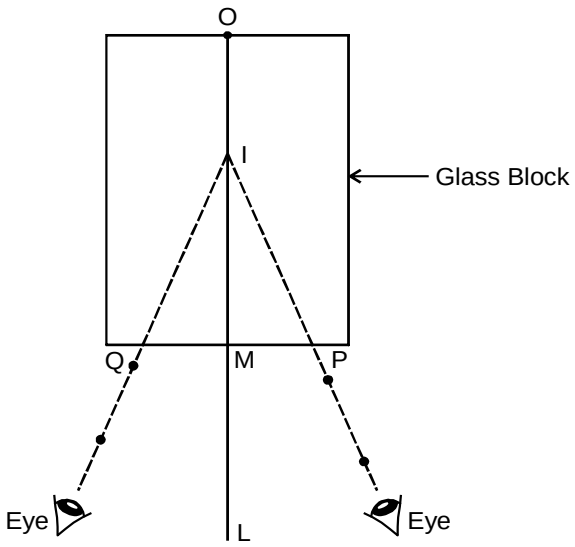


Figure 5

(h) Construct a perpendicular line LMO bisecting the shorter sides of M and O.

Mark points P and Q such that PM = MQ = 2cm.

Measure OM..... **($\frac{1}{2}$ mark)**

(i) Place the plane paper on the soft board and carefully replace the glass block so that it fit the outline. Press the object pin on O such that it is upright and touching glass block and the second pin on P also upright and touching the block.

(j) Press the third pin P_1 a short distance from the block such that P_1, P and I lie on a straight line when viewed through the block with one eye. I is the image of the object pin O.

(k) Repeat the experiment with now on Q. Press the third pin P_2 a short distance from the block such that when viewed P_2, Q and I lie in a straight line.

(l) Remove the pins and glass block; draw the lines P_1PI (PI dotted) and P_2 QI (QI) doted meeting OM at I.

IM = ...cm **($\frac{1}{2}$ mark)**

(m) Using the above information, determine, k, given that: $A = \frac{l}{k}$, where l *is the length OM* and A is the length IM **(1 mark)**

(n) State the significance of k (1 mark)

NB - Hand in your work on the plane paper as proof of having done the experiment.

(1 mark)

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