Name ............................................................................ Index Number .................... / ....................

School ........................................................................ Candidate's Signature ................................

Date ..........................................................

232/3
PHYSICS
PAPER 3 (PRACTICAL)
JULY/AUGUST 2013
TIME: $2^1/_2$ HOURS

# LENOCET EVALUATION TEST

## KENYA CERTIFICATE OF SECONDARY EDUCATION

232/3
PHYSICS
PAPER 3 (PRACTICAL)
TIME: $2^1/_2$ HOURS

**Instructions to candidates**

1. Write your **Name** and **Index Number** in the spaces provided above.
2. **Sign** and **write** the date of examination in the spaces provided above.
3. Answer **ALL** the questions in the spaces provided in the question paper.
4. You are supposed to spend the first **15** minutes of the **$2^1/_2$ hours** allowed for this paper reading the whole paper carefully before commencing your work.
5. Marks are given for a 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. Mathematical tables and recommended electronic calculators may be used.
8. This paper consists of **6** printed pages.

**For Examiner's use only**

**Question 1**

| | a | b | c | d |
|---|---|---|---|---|
| **Maximum Score** | 7 | 5 | 5 | 3 |
| **Candidate's Score** | | | | |

**Total**

**Question 2**

| | a | b | c | d | e | f |
|---|---|---|---|---|---|---|
| **Maximum Score** | 2 | 2 | 6 | 2 | 2 | 6 |
| **Candidate's Score** | | | | | | |

**Total**

**GRAND TOTAL**

**Question 1**.

You are provided with the following

- One half meter rule.
- One retort stand.
- A boss and a clamp.
- One 10g mass.
- Six cylindrical masses with hooks labelled $M_1$, $M_2$, $M_3$, $M_4$, $M_5$ and $M_6$.
- One 100ml measuring cylinder.
- Three pieces of cotton thread.
- One 400ml beaker.
- Water in a 500ml beaker.

**Proceed as follow.**

(a) (i) Suspend the half metre rule on the clamp using one of the pieces of thread. Balance the ruler and note the position of its centre of gravity. ***This point of suspension should be maintained throughout the experiment:***

(ii) Suspend the cylindrical mass $M_1$ at a distance of 3.5cm from the center of gravity of the ruler using a looped thread. suspend the 10g mass to balance the mass. (See figure 1). Record in table 1, $L_1$, the distance between the centre of gravity of the rule and the balance point for the 10g mass.

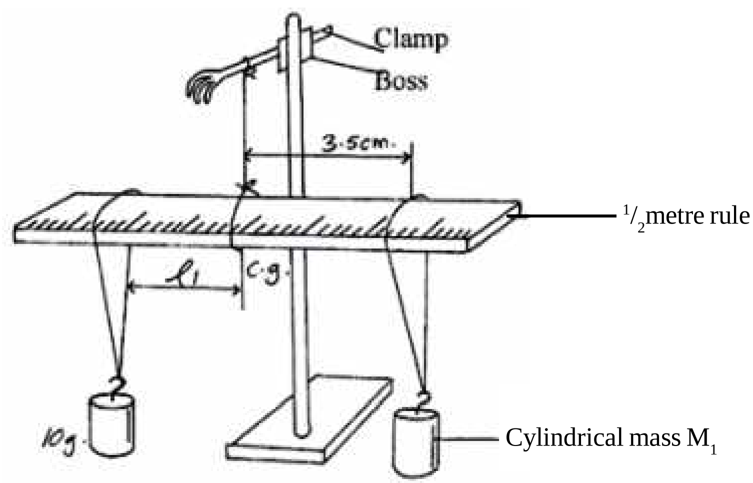


**Figure 1**

(iii) Suspend $M_1$ in water contained in the 400ml beaker. Adjust the position of the 10g mass to balance $M_1$ (see figure2). Record the distance $L_2$, the distance between the centre of gravity of the rule and the balance point of the 10g mass when $M_1$ is suspended in water.

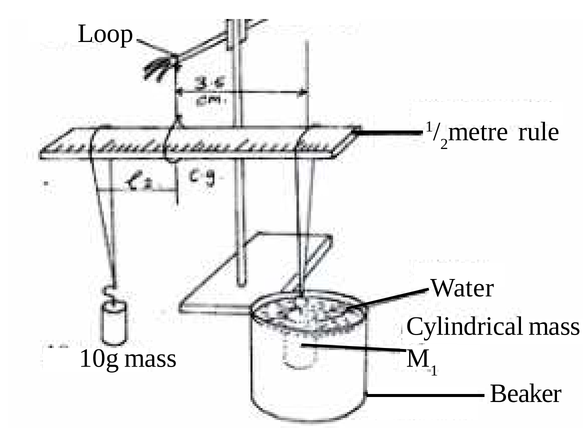


**Figure 2**

(iv) Remove $M_1$ with the loop of thread and determine its volume using the 100ml measuring cylinder. Record this volume, V in table 1.

| | $M_1$ | $M_2$ | $M_3$ | $M_4$ | $M_5$ | $M_6$ |
|---|---|---|---|---|---|---|
| Vol. V ($cm^3$) | | | | | | |
| $L_1$ (cm) | | | | | | |
| $L_2$ (cm) | | | | | | |
| $(L_1 - L_2)$ (cm) | | | | | | |

**Table 1**

(v) Repeat the procedure a(ii) to a(iv) for the other cylindrical masses and complete the table. (7 marks)

(b) On the grid provided, plot the graph of volume (y - axis) against $(L_1 - L_2)$ (5 marks)

(i) Determine the slope of the graph. (2 marks)

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(ii) Given that the equation of the graph is:

$$V = \frac{21}{5k} L_1 - L_2$$

Where k is a constant, determine the value of k. (3 marks)

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(d) Design a set up and use it to determine the mass of the half metre rule using the l0g cylindrical mass. Draw the setup and show your working. (3 marks)

Mass of the half metre rule = ....................................................... g

**Question 2.**

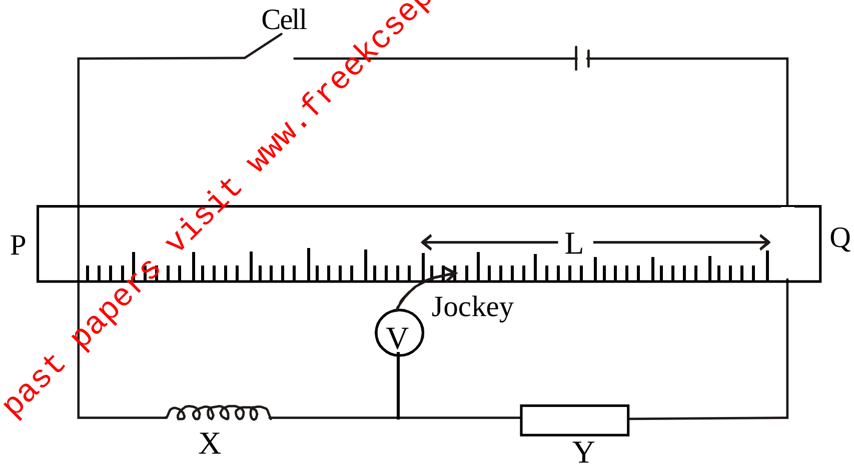
**Part A**

You are provided with;-

- A nichrome wire, 1m long, mounted on mm scale and labelled PQ at the ends.
- A nichrome wire of length 15cm labelled X
- A 10 ohm resistor labelled Y
- A dry cell (New)
- A switch
- A voltmeter (0-2.5V) and
- 8 connecting wires (4 with crocodile clips)

Proceed as follows

(a) (i) Set up your apparatus as shown




(ii) Close the switch, place the jockey at P and then at Q (The voltmeter deflects in opposite directions)

(iii) Place the contact J, 5cm from Q and record the voltmeter reading.

(iv) Repeat this for values of L indicated in table 2. Record the corresponding values of V.

| Length (cm) | 5 | 15 | 25 | 35 | 45 |
|---|---|---|---|---|---|
| V (volts) | | | | | |

**Table 2** (2 marks)

(b) (i) Interchange the voltmeter terminals. Place jockey at P and make sure the voltmeter pointer deflects to the right.

(ii) Place the jockey on the wire 95cm from Q and record the voltmeter reading.

(iii) Repeat this for values of L given in the table 3.

| Length (cm) | 95 | 90 | 85 | 80 | 75 |
|---|---|---|---|---|---|
| V (volts) | | | | | |

**Table 3**

(2 marks)

(c) On the same axes plot two graphs of V(y - axis) against L using the values in table 1 and table 2 (6 marks)

(d) From your graphs determine.

(i) The value of V when L = 0 (1mark)

(ii) The value of L where the two graphs intersect. (1 mark)

(e) Work out the value of the unknown resistance of wire X, $R_x$ using the expression. (2 marks)

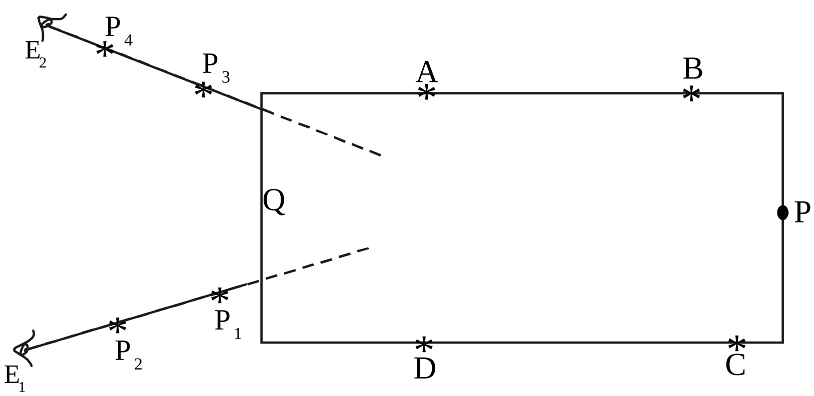
$$R_X = \frac{R_Y(100 - L)}{L}$$ where $Ry$ is the resistance of resistor $y$.

**Part B.**

(f) You are provided with the apparatus below.

- Three optical pins and four office pin
- A plain white A4 piece of paper
- Soft board
- Class slab

Place the glass slab on the white piece of paper and trace its outline. Secure it in place (In its position) by the office pins A, B, C, D as shown in the diagram below.




(g) (i) Fix the pin P firmly at the end of the slab and with your eye $E_1$ at the opposite of the slab fix pin $P_1$ and then $P_2$ in line with the image I of the pin (see diagram) (1 mark)

Remove the pins $P_1$ and $P_2$ and mark their positions $P_1$ and $P_2$ respectively.

(ii) Similarly fix $P_3$ and then $P_4$ so that they are in line with the image I of P. (1 mark)

Again remove the pins $P_3$ and $P_4$ and mark their positions respectively.
Remove the glass slab and pins ABCD.

(h) Join $P_1P_2$ produced with the tracing of the slab outline. Join $P_3P_4$ produced to intersect line $P_1P_2$.

Label this point of intersection I, the supposed position of the image of pin P. (1 mark)

(i) Measure the lengths OP and OI

QP ........................................................................................................ (1 mark)

QI ........................................................................................................ (1 mark)

(ii) Determine the ratio QP/QI. (1 mark)

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