232/3
PHYSICS
PAPER 3
PRACTICAL
JULY/AUGUST 2014

KANGUNDO DISTRICT FORM IV MULTILATERAL EXAM 2014
Kenya Certificate of Secondary Education
PHYSICS
PAPER 3

CONFIDENTIAL INSTRUCTIONS TO SCHOOLS – PHYSICS PAPER 3 (232/3)

Question 1

Each student must have the following apparatus

- A white screen
- A metre rule
- A beaker glass of 250ml
- A measuring cylinder 250ml
- Water
- Some plasticine

Question 2

- Voltmeter (0 - 5V) or (0 – 2.5V)
- Centre zero galvanometer
- Ammeter 0.2.5A or 0 – 1A
- A resistant wire labeled X (7.6 ohms) (Nichrome wire $R = {}^{PL}/_{A}$)
- A resistance wire labeled AB mounted on a millimeter scale
- 8 connecting wires each with crocodile clip at one end
- A switch
- A jockey/crocodile clip
- Six 10 ohms carbon resistors
- Two dry cells, Eveready size D

This paper consists of 1 printed page

Name_____ **Index No.** _____

Candidates signature _____

Date _____

232/3
PHYSICS
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PRACTICAL
JULY/AUGUST 2014
2 ½ HOURS

KANGUNDO DISTRICT FORM IV MULTILATERAL EXAM 2014
Kenya Certificate of Secondary Education
PHYSICS
PAPER 3
2 ½ HOURS

INSTRUCTIONS TO CANDIDATES

Answer all questions in both sections in the spaces provided in this paper
You are supposed to spend the first 15 minutes of the 2 ½ hours allowed for this paper reading the whole paper carefully before commencing your work.
Marks are given for clear record of the observations actually made, their suitability and accuracy and the use of them .
Mathematical tables and electronic calculators may be used

FOR EXAMINER'S USE ONLY

Question 1

Maximum score	(b) 1mk	(c) 2mks	(f) 1mk	(h) 1mk	(i) 5mks	(j) 5mks	(k) 2mks	(m) 3mks	20
Candidate score									

Question 2

Maximum score	(b) 1mk	(c) 2mks	(d) 2mks	(g) 6mks	(h) 5mks	(i) 2mks	(j) 2mks	20
Candidate score								

This paper consists of 7 printed pages

Turn over

Question 1. (20 marks)

1. You are provided with the following apparatus
   - A white screen
   - A piece of candle
   - A metre rule
   - A glass beaker – 250ml
   - A measuring cylinder
   - Water
   - Some plasticine

(a) Add a volume V of 200ml of water into a beaker

(b) Measure the value of h1, the height of water in a beaker

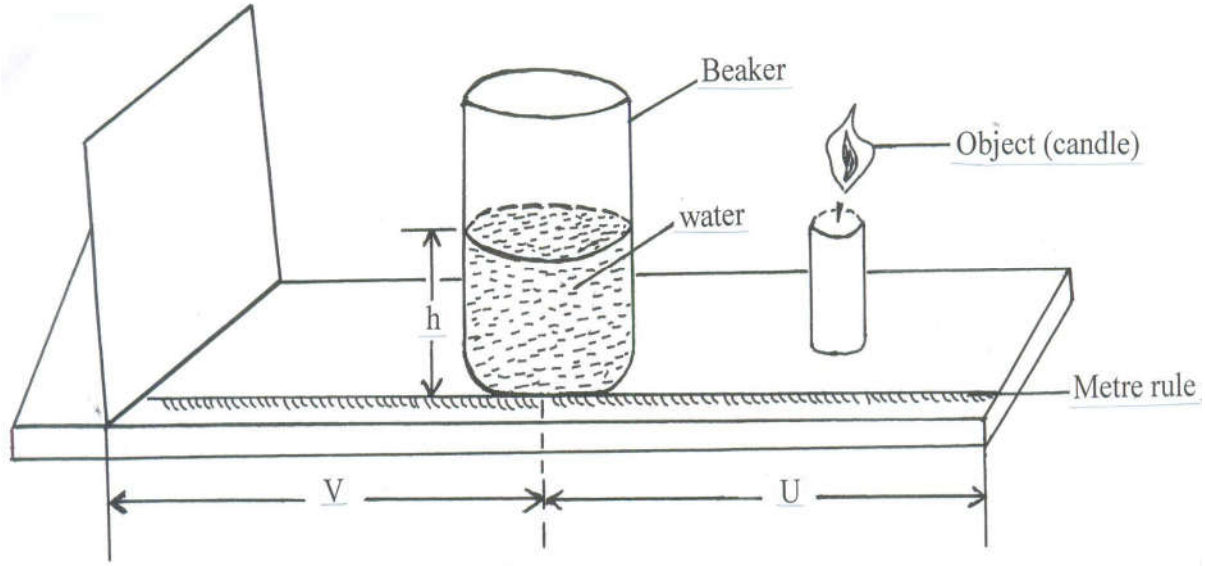
h = _____ (1mk)

(c) Calculate the value of the internal radius R of the beaker from the formula

$$R = \sqrt{\frac{V}{\pi h}}$$

R _____ (2 d.p) (2mks)

(d) Fill the beaker with water and set your apparatus as shown below. Use plasticine to make the beaker level



(e) Position the candle which acts as an object above the metre rule and 10Rcm away from the centre of the water lens

(f) Measure the object distance U

U = _____cm (1mk)

(g) Move the screen towards or away from the water lens to obtain a sharp and focused bright image

(h) Measure the value of the image distance V

V = _____ cm (1mk)

(i) Repeat the experiment for different values of U shown in the table below and record corresponding measurements of the image distance V. (5mks)

Beaker position	10R	9R	8R	7R	6R	5R	4R
V (cm)							
U (cm)							

(j) Plot a graph of U against V (5mks)

(k) Obtain from the graph the values of S where S is the value of V for which V = U

S = _____ (1mk)

(l) Calculate the value of f, the effective focal length of the water lens from the formula

$$F = \frac{S + X}{5}$$ (3mks)

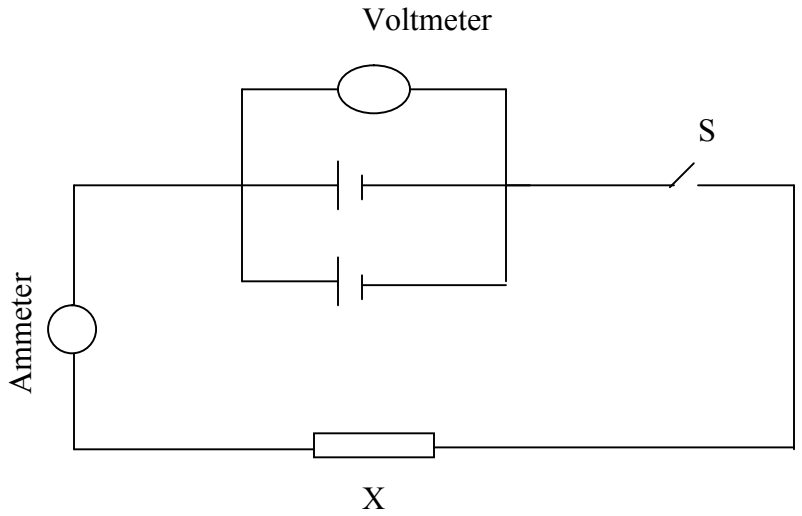
Question 2 (20 marks)

You are provided with the following

- A voltmeter, a galvanometer and an ammeter
- Two dry cells and a cell holder
- A switch
- Eight connecting wires each with a crocodile clip at one end
- A resistance wire labelled X
- A resistance wire labelled AB mounted on a millimeter scale
- Six 10 carbon resistors
- A jockey/crocodile

Proceed as follows

(a) Set up the circuit with the cells in parallel as shown in the figure below



(b) With the switch open, record the reading E of the voltmeter

E = _____ (1mk)

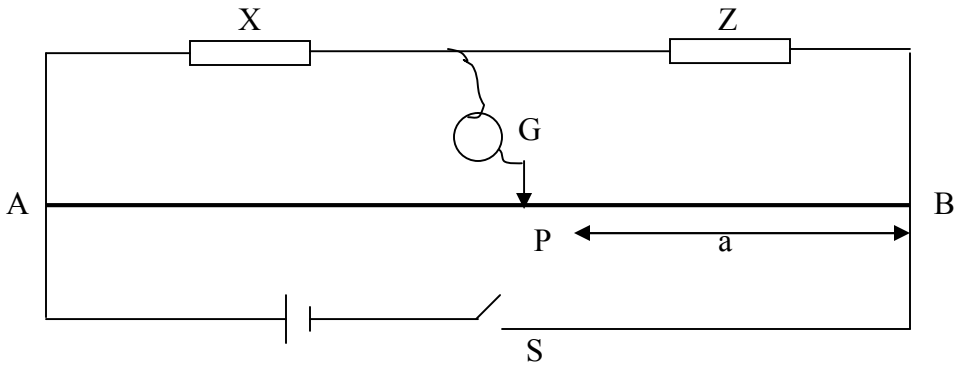
(c)Close the switch and record the current I flowing through the circuit and the potential difference V across the cells

I = _____ (1mk)

V = _____ (1mk)

(d) Given that E = V + Ir and V = IX, determine the internal resistance r of the combined cells and the resistance of the wire labelled X (2mks)

(e) Now set up the circuit as shown in the figure below. Z is one of the 10 carbon resistors.



(f) Close the switch. Tap the jockey at various points along the wire AB and locate a point P at which the galvanometer shows zero deflection. Measure and record in the table below the length 'a' where a = PB

(g) Repeat the procedure in (f) using two resistors in parallel, three resistors in parallel, four resistors in parallel, five resistors in parallel, and six resistors in parallel. Record your readings in the table below. R is the effective resistance for the parallel combination.

Number of 10Ω resistors	One	Two	Three	Four	Five	Six
$^{1}/_{R}(\Omega^{-1})$						
$^{1}/_{a}$ (cm^{-1})						

(6mks)

(h) Plot a graph of $^{I}/_{a}$ (y-axis) against $^{I}/_{R}$ (5mks)

(i) Determine the slope m, of the graph (2mks)

(j) Given that $I/a = \omega/kR + 1/k$, where k = 100cm, Use the graph to determine ω (2mks)

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MARKING SCHEME

Question 1

(b) $h = 6.5\text{cm} \pm 0.1\text{cm}$ √1mk

(c) $R = \sqrt{\frac{200}{3.142 \times 6.5}}$ √1mk
$= 3.129\text{cm} \pm 0.02$ √1mk

(f) $U = 11.0 \pm 0.1$ √1mk

(h) = $V = 39.2 \pm 0.1$ √1mk

(i)

Beaker position	10R	9R	8R	7R	6R	5R	4R
V (cm)	39.2	31.6	28.6	25.2	23.5	19.6	15.68
U (cm)	11.0	12.0	12.8	13.0	13.1	14.5	17.2

5mks
- V = 2 ½ marks for correct 5points and above
  2 marks for 4 correct points each point ½ mk
- U = 2 ½ marks for 5 correct points and above
  2 marks for 4 correct points each point ½ mk

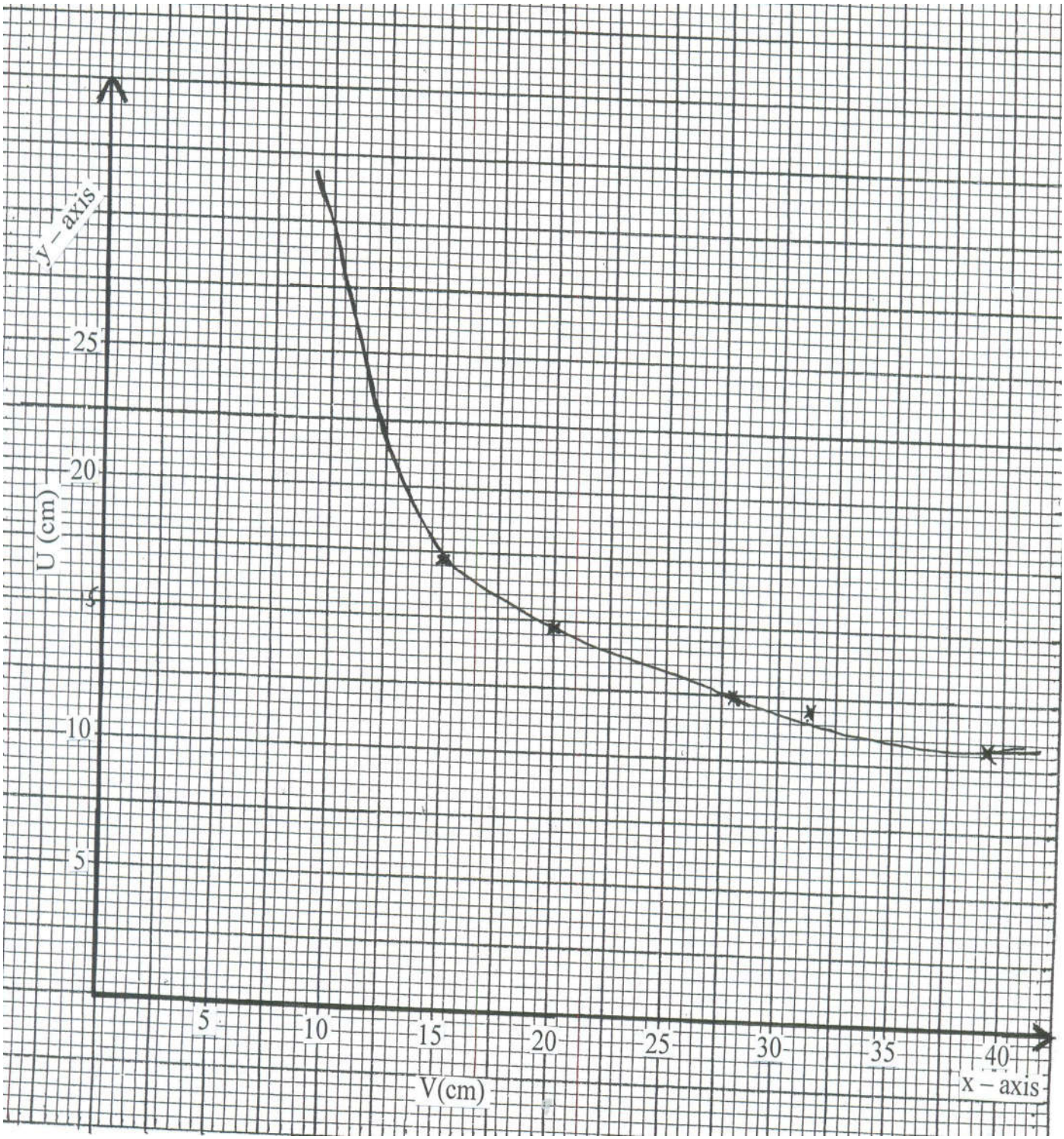
(j) Graph is an isothermal curve

U (cm) y – axis V(cm) x – axis 5 10 15 20 25 30 35 40 5 10 20 25
S – 1√mk
A – 1√mk
P – 2√mks 5 – 6 pts
L – 1√mk

(k) $S = 16.5\text{cm} \pm 0.1$ 1√mk
(l) $X = 26\text{cm} \pm 1$ √mk
(m) $\frac{26 + 16.5}{5}$√ = $\frac{52.5}{5}$ √ $= 10.1\text{cm} \pm 0.1$ √

This paper consists of 4 printed pages

Turn Over


y – axis
25
20
U (cm)
5
10
5
5
10
15
20
25
30
35
40
V(cm)
x – axis

Question 2

(b) E = 1.50V $\pm$ 0.1V

(c) I = 0.2A $\pm$ 0.05A

V = 1.50V $\pm$ 0.1V

(d) 1.54 = 1.52 $\pm$ 0.2r - correct substitution of E, V and A – ½ mk

r = 0.02/0.2

r = 0.1 ohms - correct evaluation – ½ mk

(candidates values)

1.52 = 0.2 x - correct substitution of V and I in the equation V = IX – ½ mk

$X = \frac{1.52}{0.2}$

= 7.6 ohms - correct evaluation of X – ½ mk

Number of 10Ω resistors	One	Two	Three	Four	Five	Six	
a(cm)1mk each for 4 correct pts	42	60	70	76	81	83 $\pm$ 2cm	4mks
$^1/_R\Omega^{-1}$ All correct $^1/_R$ (1mk) at least 2d.p	0.1	0.05	0.03	0.025	0.02	0.0167	1mk
$^1/_a$ (cm^{-1}) All correct $^1/_a$ (1mk) 3d.p	0.024	0.0167	0.014	0.013	0.012	0.012	1mk

(i) Determining the slope m.

Slope = $\frac{(2.14 - 1.7)}{(8.20 - 5.20)}$ – correct $\frac{\Delta y}{\Delta x}$ – ½ mk

$= \frac{0.44}{3.0}$ - correct evaluation – ½ mk

= 0.147 cm - Accuracy: (0.140 – 0.150)cm – 1mk

(j) Slope = $^w/_k$

$0.147 = {}^w/_{100}$ - Correct substitution – 1mk

w = 14.7Ω - Correct evaluation – 1mk

(student's value)

- Axes – correct labeled with units – 1mk
- Scale – simple and uniform – 1mk
- Plotting at least 4 points correctly – 2mks within 1 small square @ ½ mk
- A straight line of best fit – 1mk

(5mks)