

232/3
PHYSICS
PAPER 3
PRACTICAL
JULY/AUGUST 2014

KILUNGU DISTRICT FORM IV EXAMINATION 2014
Kenya Certificate of Secondary Education
PHYSICS
PAPER 3
CONFIDENTIAL

1. **Each candidate will require the following apparatus**

1. Complete stand
2. Metre rule
3. Half metre rule
4. Spring with a pointer (spring constant 10N/M)
5. 100g mass
6. 30cm of masking tape
7. 2 strings 10cm each

2. **Each candidate will require the following apparatus**

1. A new 1.5v dry cell and a cell holder
2. Voltmeter(Range 0.2v or 0- 3.0v)
3. Ammeter (Range 0 – 1.0A)
4. Constantan wire labelled W (SWG 30) mounted on a millimeter scale on a wooden plank or Plastic
5. 7 connecting wires with at least 1 with a crocodile clip at one end
6. Micrometer screw gauge
7. Switch

Name _____ Index No. _____

Candidates signature _____

Date _____

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2 ½ HOURS

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INSTRUCTIONS TO CANDIDATES

- ❖ Answer **ALL** the questions in the spaces provided in the question paper.
- ❖ You are supposed to spend the first **15 min** of the time given to go through the whole paper carefully before commencing your work
- ❖ Marks are given for a clear record of the observations actually made, their suitability and accuracy and the use made of them
- ❖ Record the observations as soon as they are made, mathematics tables, scientific calculators may be used

FOR EXAMINER'S USE ONLY

Question	Total marks	Candidate's score
1	17	
2	23	

This paper consists of 7 printed pages

Turn Over

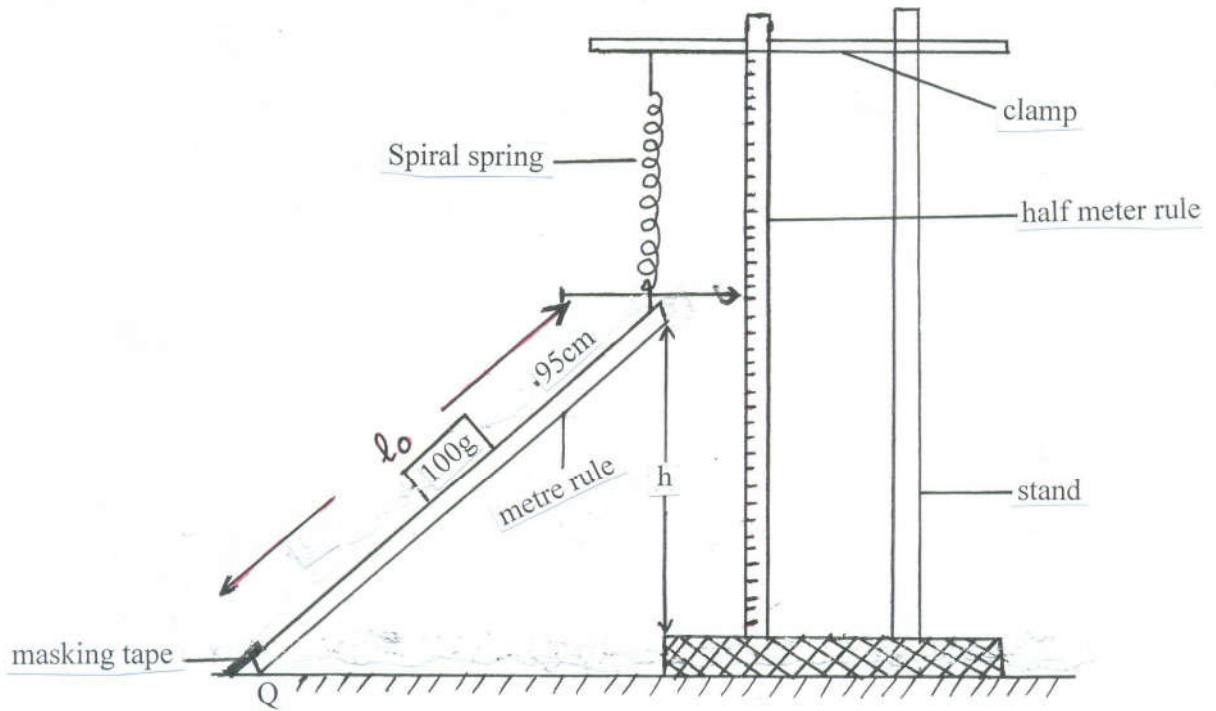
Question 1

You are provided with the following:

- ❖ Complete stand
- ❖ Meter rule
- ❖ Half meter rule
- ❖ Spring with a pointer
- ❖ 100g mass
- ❖ 30cm of masking tape
- ❖ 2 strings 10cm each

Proceed as follows.

(a) Set up the apparatus as shown below



- (b) Suspend the spring with its pointer against the mm scale of the half metre rule as shown above
- (c) Place one end of the metre rule against the table and fix a masking tape to hold it in place
- (d) Suspend the other end of the metre rule to a spring with the help of a string to the clamp as shown in the diagram above
- (e) Measure and record the distance $L_0 = 95\text{cm}$
- (f) Note and record the position of the pointer when no mass is added to the metre rule
- (g) Place the mass M with the help of a masking tape at distance 20cm from the end Q . Read and record the new position of the pointer reading
- (h) Find the extension, e , of the spring and enter its value in the table

(i) Repeat for other values of d and record the corresponding values of extension, and fill in the table

Distance, d (cm)	0	20	30	40	50	60	70
Pointer reading							
Extension, e, (cm)							

(7mks)

(j) Plot a graph of extension, e, (y-axis) against distance, d,

(5mks)

(k) Determine the slope, S, of the graph

(3mks)

(l) Determine the value of constant, K, from the equation

(3mks)

$$K = \frac{0.98}{S \times L_0}$$

Question 2

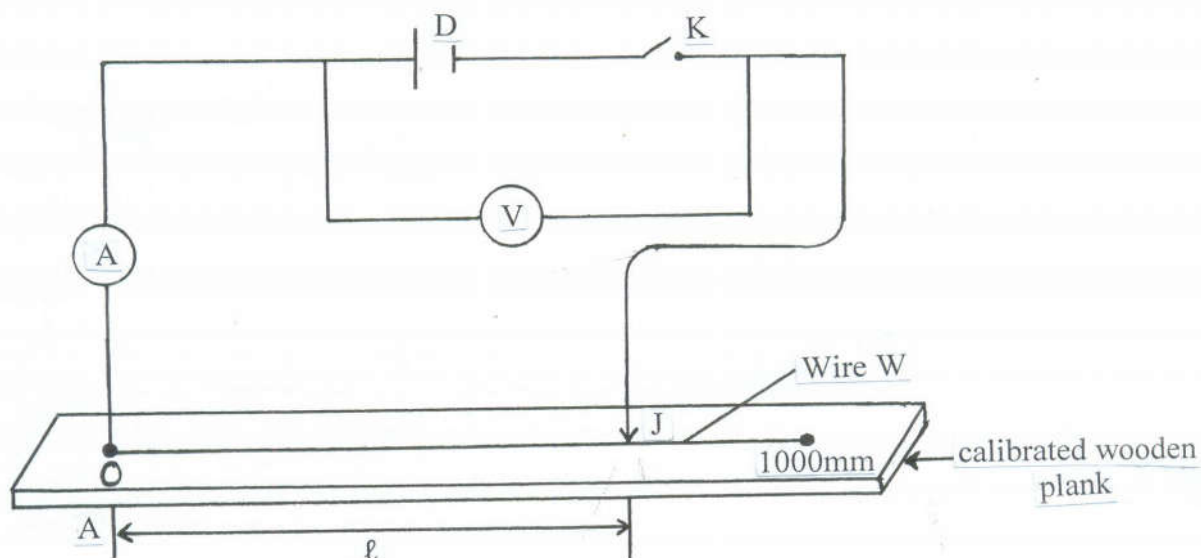
You are provided with the following.

- A dry cell 1.5V, new and in a cell holder
- A voltmeter (Range 0 – 2.5V or 0 – 3.0V)
- An ammeter (Range 0 – 1.0A)
- A constantan wire, W, (SWG 30) mounted on a millimeter scale on a wooden plank
- 7 connecting wires with at least one with a crocodile clip at one end
- A micrometer screw gauge
- A switch

Proceed as follows:

(a) (I) connect the circuit as shown in the diagram below.

NB: Ensure the circuit is complete before commencing the experiment. The switch K should control both circuits.



(b) Starting with the crocodile clip, J, at $L = 200\text{mm}$ from A, close the switch K and read and record the voltmeter reading V and record the corresponding ammeter reading I.

(i) Voltmeter reading, $v =$ _____ (1mk)

(ii) Ammeter reading, $I =$ _____ (1mk)

IMPORTANT

Open the switch, K, when not taking the readings

(c) (i) Repeat the procedure in (b) above for values of $l = 300, 400, 500, 600$ and 800mm .

(ii) Record your results in the table below

Length (AJ) $L(\text{mm})$	200	300	400	500	600	700
Voltmeter reading $V(\text{V})$						
Ammeter reading $I(\text{A})$						
V/I						

(d) Plot the graph of the voltmeter reading, v , (vertical axis) against ammeter reading I .

(Use the scale 1cm to represent 0.1V along y-axis and 1cm to represent 0.05A along x-axis (4mks)

(e) From your graph;

(i) Determine the slope, S , of your graph (3mks)

(ii) Determine emf of the cell (1mk)

(iii) Measure the thickness, t , in meters of the wire, W ,

$t =$ _____ (1mk)

(g) Now connect the voltmeter across the wire, W , to enable you obtain a potential drop across any part length, AJ , of the wire, AB

(I) Using the length, $AJ, = L = 550\text{mm}$, close the switch and then read the voltmeter and corresponding ammeter readings.

Voltmeter reading, $V =$ _____ (1mk)

Ammeter reading, $I =$ _____ (1mk)

(ii) Calculate the value of P from

$$P = \frac{11Vt^2}{14IL}$$

Where L, V, t and I are quantities obtained in their SI units. (2mks)

(iii) What does the quantity P represent (1mk)

(iv) Sketch the diagram for the set up you have used in (g) above (2mks)

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MARKING SCHEME

1. Lo = 95cm

(i)

Distance, d (cm)	0	20	30	40	50	60	70
Pointer reading							
Extension, e, (cm)	0.0	2.1	4.8	6.1	7.5	9.5	11.0

$\pm 0.5\text{cm}$

1 mark each for a pair of correct values = 7mks)

(j) Graph

- Labelling axes correctly 1mk

- Appropriate scale 1mk

- Plotting

- 6 or more correctly plotted 2mks

- 4 correctly plotted points 1mk

- Less than 4 correctly plotted points – 0

* Line – straight line passing through at least 4 correctly plotted points 1mk

Total for graph = 5mks

(k) Correct extraction of points from own graph 1mk

Correct evaluation to 2 d.p 1mk

Accuracy of slope (0.110 – 0.150) 1mk

(l) Correct substitution of S and Lo 1mk

Correct evaluation to 2dp 1mk

2. (b) Correct values of voltmeter and ammeter

Voltmeter = 0.8V 1mk

Ammeter = 0.3A 1mk

(c)

Length A(AJ) (mm)	200	300	400	500	600	700
Voltmeter reading V(v)	0.8	0.9	1.0	1.05	1.1	1.15
Ammeter reading I(A)	0.32	0.25	0.22	0.18	0.16	0.15
V/I						

Voltmeter reading $\pm 0.2V$
Ammeter reading $\pm 0.1A$

Upto 3 correct sets 1mk for V and I – 2mks each
V/I – correct evaluation to 2dp – 1mk

(d) Graph

- Labelled axes 1mk
- Plotting – $\frac{1}{2}$ mk each for a max of 4 points – 2mks
- Line - Best straight line through the points – 1mk
- The line must have a negative slope

(e) (i) Slope

Correct reading off from graph 1mk
Correct evaluation 1mk
Correct answer 2dp (0.16 – 0.20) 1mk

(ii) Correct reading off the v intercept + 0.5v – 1mk

(iii) Correct reading of thickness in metres – 1mk
(0.30mm \pm 0.01mm)

(g) (i) Correct reading of V and I

V = 0.55V 1mk

I = 0.10A 1mk

(ii) Correct substitution of the values 1mk

Correct evaluation and in standard form 1mk

(iii) Proper explanation that ρ represents resistivity of the wire 1mk

(iv) Correct sketch of the set up 2mks

