Name ..... Index No. .....

School …… Adm No……Candidate's sign. ….....

Date .....

232/3

**PHYSICS**
Paper 3

**July/August 2018**
Time 2½ hours

# FORM FOUR END OF SECOND TERM EXAM

Kenya Certificate of Secondary Education

## PHYSICS

Paper - 232/3

**July/August 2018**

**Time:** 2½ hours

## INSTRUCTIONS TO CANDIDATES

- Answer ALL the questions in the spaces provided.
- You are not allowed to start working with the apparatus for the first 15 minutes of the 2½ hours allowed in this paper.
- This time is to enable you to read the questions and make sure you have all the apparatus needed.
- Marks are given for a clear record of the observations actually made, their suitability and accuracy, and the use made of them.
- Candidates are advised to record their observations as soon as they are made.
- Mathematical tables and electronic calculators may be used.

**FOR EXAMINER'S USE ONLY**

| Question | Maximum score | Candidate's score |
|---|---|---|
| 1 | 20 | |
| 2 | 20 | |
| **Total score** | **40** | |

***This paper consists of 6 printed pages***

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

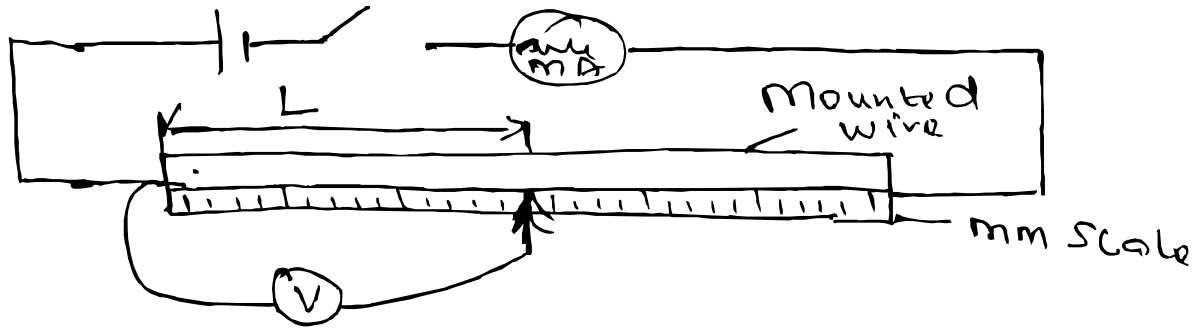
**1.** Your are provided with the following
- A milliameter
- A voltmeter
- A wire mounted on a mm scale
- A switch
- A long wire with a crocodile clip at one end (crocodile clip to be used as slider or jockey)
- A new dry cell (Size D ) and a cell holder.
- A micrometer screw gauge (to be shared)
- 5 connecting wires, two with crocodile clips at the end.

Proceed as follows:

a) Measure the diameter, d of the mounted wire at three different points.

Average diameter d = ..... mm (1 mark)

b) Set up the apparatus as shown in the circuit diagram in the figure below.



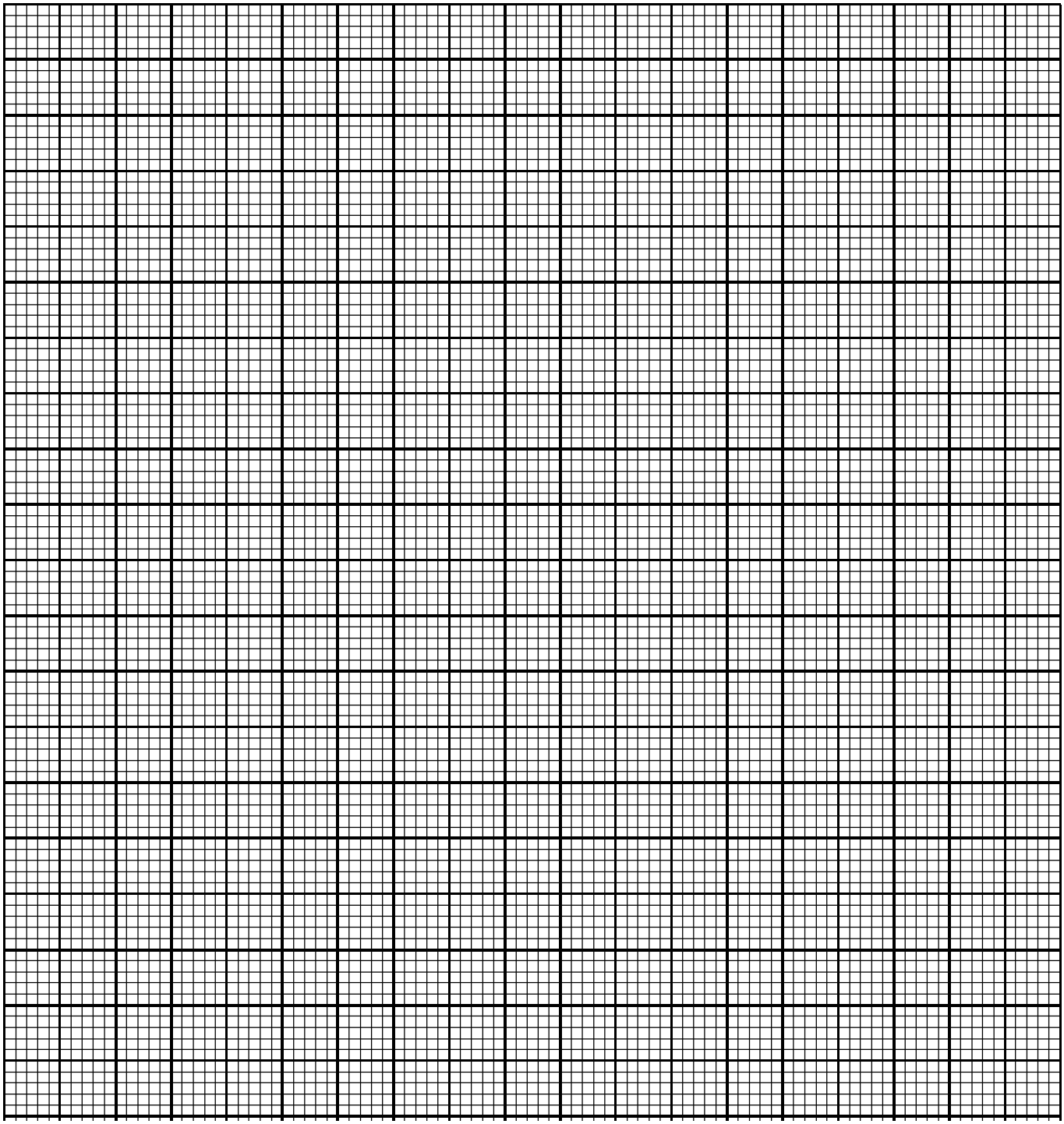

c) Close the switch and tap the mounted wire with the crocodile clip as shown in the circuit. Ensure that both meters show positive deflection. Open the switch.

d) Tap the wire at L = 20cm. Close the switch, read and record in the table provided the milliameter and voltmeter readings.

e) Repeat the procedures in (c) for other values of $L_1$ shown in the table below and complete the table. (8 marks)

| L(cm) | L (m) | V(volts) | T (mA) | I(A) | $R = {}^{V}/_{I}$ (Ω) |
|---|---|---|---|---|---|
| 20 | | | | | |
| 30 | | | | | |
| 40 | | | | | |
| 50 | | | | | |
| 60 | | | | | |
| 80 | | | | | |

ii) Plot a graph of Resistance (R) (Ω) against L (m) (5 marks)



iii) From the graph determine the slope of the graph. (3 marks)

iv) Given that from the graph $R = \rho \frac{l}{A}$ determine $\rho$ (3 marks)

**2.** You are provided with the following.
- Two metre rules
- One half metre rule.
- A pair of vernier callipers (to be shared)
- A stop watch.
- Two restort stands, two bosses and two clamps.
- Two pieces of thread
- Some cellotape.

Proceed as follows.

a) Measure the thickness, W, of the half metre rule using the vernier callipers provided.

W = .....m (1 mark)

b) Set up the apparatus as shown in figure I such that D=2P = 20cm and q = 20cm. Ensure that D is kept constant throughout the experiment (use a piece of cellotape to fix the threads). Ensure also that the loops of thread on the half metre rule are made such that they can slide along the rule. This would enable the adjustments of small q later in the experiment.

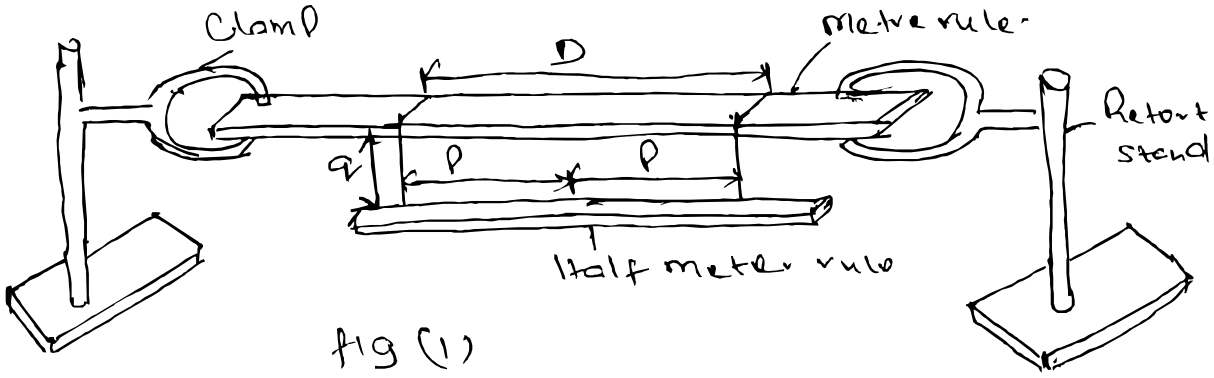


fig (1)

Note that the distance P is measured from the centre of the half metre rule.

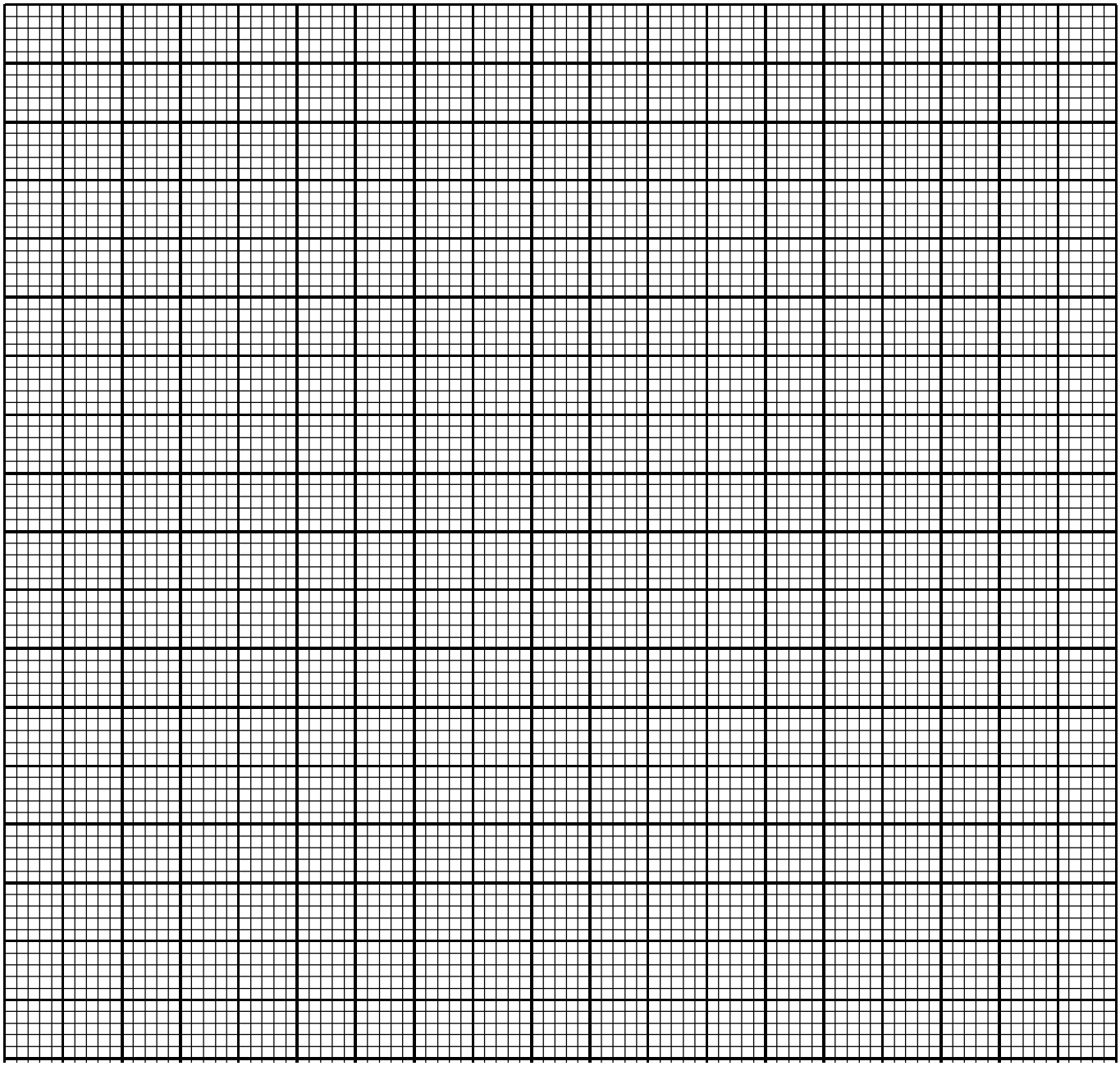
c) Adjust the position of the loops on the half metre rule so that P = 21cm (i.e. 2P = 42cm). You may use a piece of cellotape to keep the loop in position. Measure and record in table 1 the value of Q. NB q is the vertical distance between the half metre rule and the metre rule supporting it.

d) Slightly displace one end of the half metre rule towards you and the other end away from you in a horizontal plane. Measure and record in table I the time t for 10 oscillations.

e) Repeat the procedures in (c) and (d) for other values of P shown in table below I. (7 marks)

| P(cm) | 21.0 | 19.0 | 17.0 | 15.0 | 13.0 | 10.0 | 8.0 | 6.0 | 4.0 | 2.0 |
|---|---|---|---|---|---|---|---|---|---|---|
| q(cm) | | | | | | | | | | |
| Time t for 10 oscillations (s) | | | | | | | | | | |
| Periodic time (T) for 10 oscillations (S) | | | | | | | | | | |
| $\frac{q}{P}$ | | | | | | | | | | |

f) i) Plot the graph of T (y-axis) against $\frac{q}{P}$ (5 marks)



ii) Determine the slope S of the graph when $\frac{q}{P} = 2$ (3 marks)

g) Determine the constant K for the half metre rule given that

$K = \frac{S}{\pi}\sqrt{Dg}$ where g = 10m/s (2 marks)

h) Determine the constant $K_1$ given

$$K_1 = \frac{\sqrt{L^2 + W^2}}{12}$$ where L = 0.5m (2 marks)