MASENO SCHOOL

Kenya Certificate of Secondary Education 2021

PHYSICS – Paper 3

DEC. 2021 - 2 hours

THE MASENO SCHOOL MOCK

NAME: ……INDEX NUMBER ……

INSTRUCTIONS TO THE 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 ½ hours allowed for this paper reading the whole paper **carefully** before commencing.
5. Marks are given for **a clear record of the observation** actually made, their suitability, accuracy and the use of them.
6. Candidates are advised to **record** their observations as soon as they are made.
7. **Non-programmable silent electronic calculators** and **KNEC** mathematical tables may be used.

FOR EXAMINERS' USE ONLY

Question 1

QUESTION	a	d	e		**TOTAL**
MAXIMUM SCORE	***2***	***5***	***12***		
CANDIDATES SCORE					

Question 2

PART	A	B	**TOTAL**
MAXIMUM SCORE	***7***	***13***	***20***
CANDIDATES SCORE			

Grand Total	

This paper consists of 8 Printed pages.

Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

Question 1

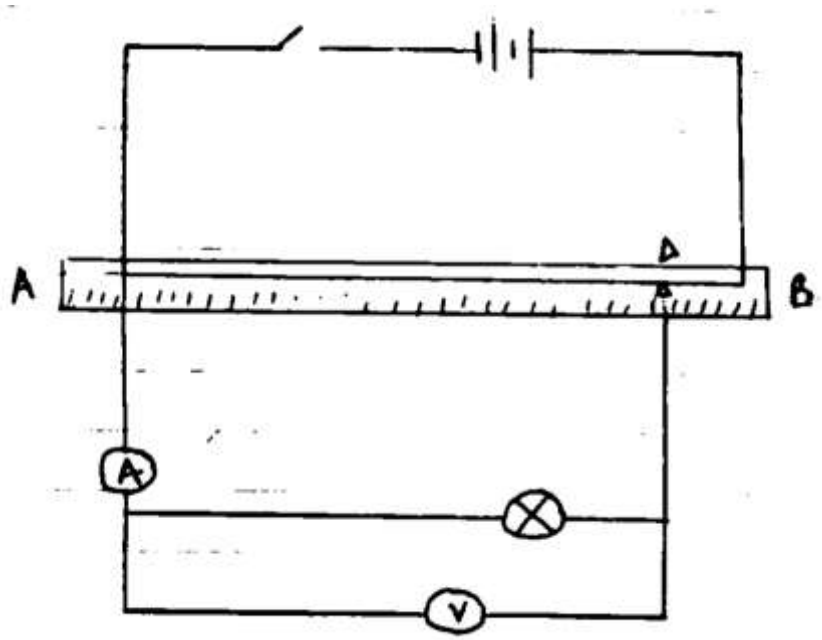
1. **You are provided with the following:**
   - 100cm nichrome wire mounted on a millimeter scale AB.
   - An ammeter
   - A voltmeter (0-5V)
   - 2 dry cells (1.5V each)
   - A cell holder
   - A torch bulb and a bulb holder
   - Eight connecting wires at least 4 with crocodile clips.
   - A switch
   - A micrometer screw gauge (to be shared)

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

d1 = _____ d2 = _____ (1mk)

Average of d1 and d2 = _____ mm (1mk)

b) Connect the apparatus as shown below.
Fig 1



c) Place the sliding contact at P = 20cm from A and then close the switch. Record the readings of both the current and voltage in the table below.

d) Repeat the above experiment by placing P at 40cm, 60cm, 70cm, 80cm and 100cm from A. Record your readings in the table below. (5 mks)

i)

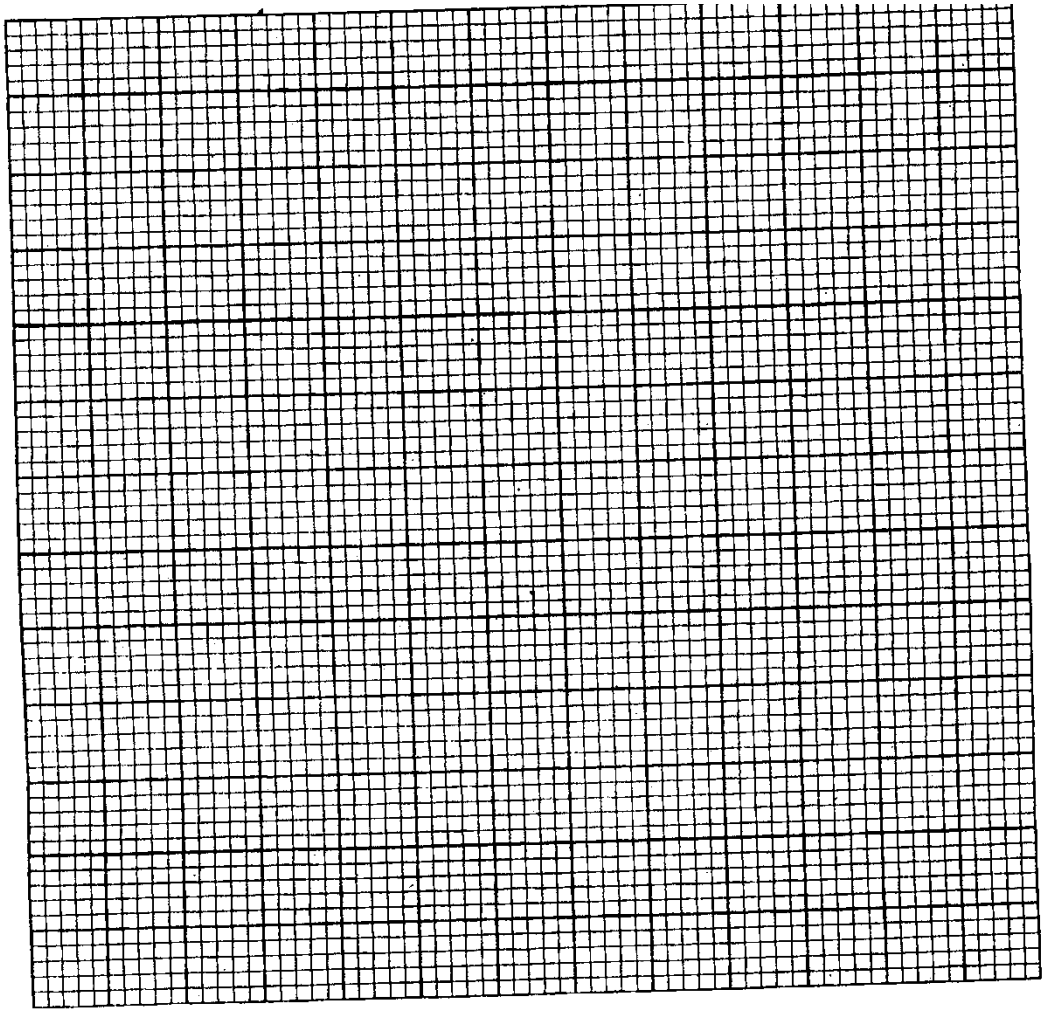
Length (cm)	Ammeter reading (I) (A)	Voltmeter reading P.d (V)
20		
40		
60		

70		
80		
100		

ii) What happens to the bulb as L increases? (1mk)

_____

e) i) Plot a graph of I(A) against P.d(V) on the grid provided. (5mks)



ii) Determine the slope of the graph at V = 0.6V, stating its SI units. (3mks)

iii) Determine the cross section area (A) of the wire in m^2. (2mks)

iv) Given that $V = \frac{eIL}{A}$ find e at L = 0.70M. (2mks)

Question 2

Part A

You are provided with the following:

- A coin (20 shilling coin)
- Metre rule (labeled with its mass)
- Knife edge
- Measuring cylinder, 100ml
- Container with water

Procedure

i) Record the mass of the rule Mr.

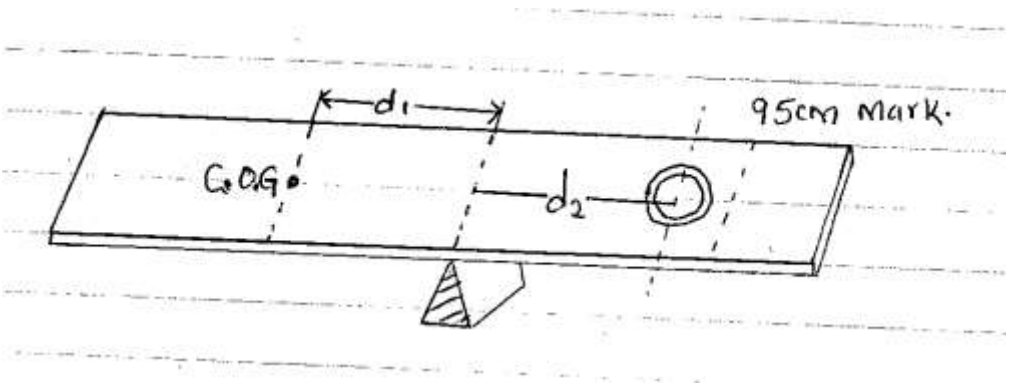
Mr = _____ g (1mk)

ii) Balance the rule on the knife edge.

C.O.G = _____ cm (1mk)

iii) Put the rule on the knife edge d1 cm from the centre of the rule.

iv) Place the coin as shown in the figure below and adjust it until it gain balances horizontally. Fig 2.



v) Measure d1 = _____ cm ($^1/_2$mk)

d2 = _____ cm ($^1/_2$mk)

vi) Determine mass of coin M_C in grams. (2mks)

$$M_C = \left(\frac{M_r \text{ x } d_1}{d_2 - 1.3} \right)$$

vii) Using the measuring cylinder, estimate the volume of the coin.

V_C = _____ cm^3 (1mk)

viii) Calculate the density of the material of the coin.

ρ_c = _____ g/cm^3 (1mk)

PART B

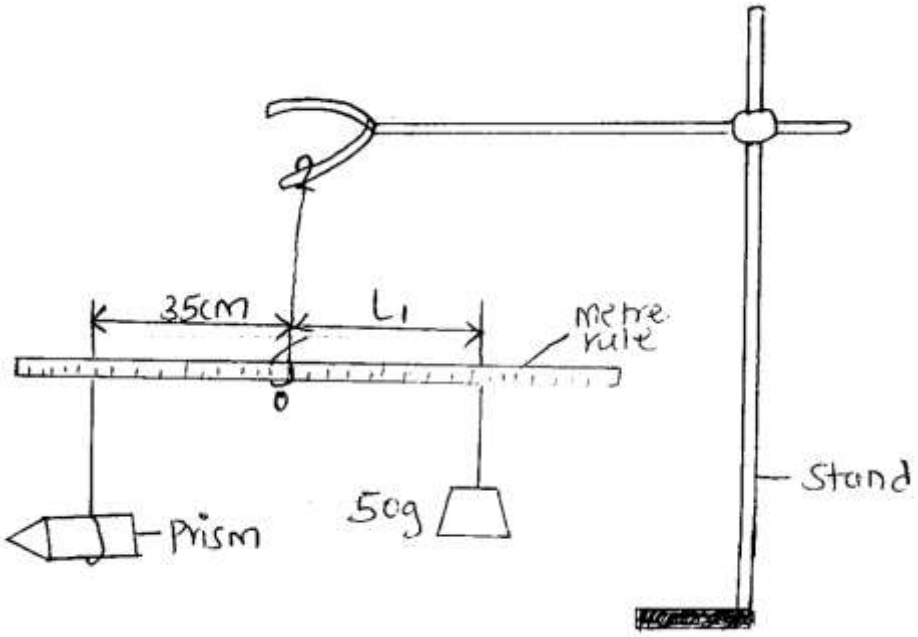
You are provided with the following

- a triangular glass prism
- a metre rule
- a 50 g mass
- some hot water
- some cold water
- some thread
- a thermometer
- one stand, one boss and clamp
- a beaker

Proceed as follows

a) Using a piece of thread suspend the metre rule from the clamp on the stand and adjust the position of the thread until the metre rule balances horizontally. Note this position, O of the thread. **(This position of the thread must be maintained throughout the experiment)**

b) Using another piece of thread suspend the glass prism from the meter rule at a point 35cm from O. Suspend the 50g mass on the opposite side of O using another piece of thread. Adjust the position of the thread attached to the 50g mass until the metre rule balances once more.

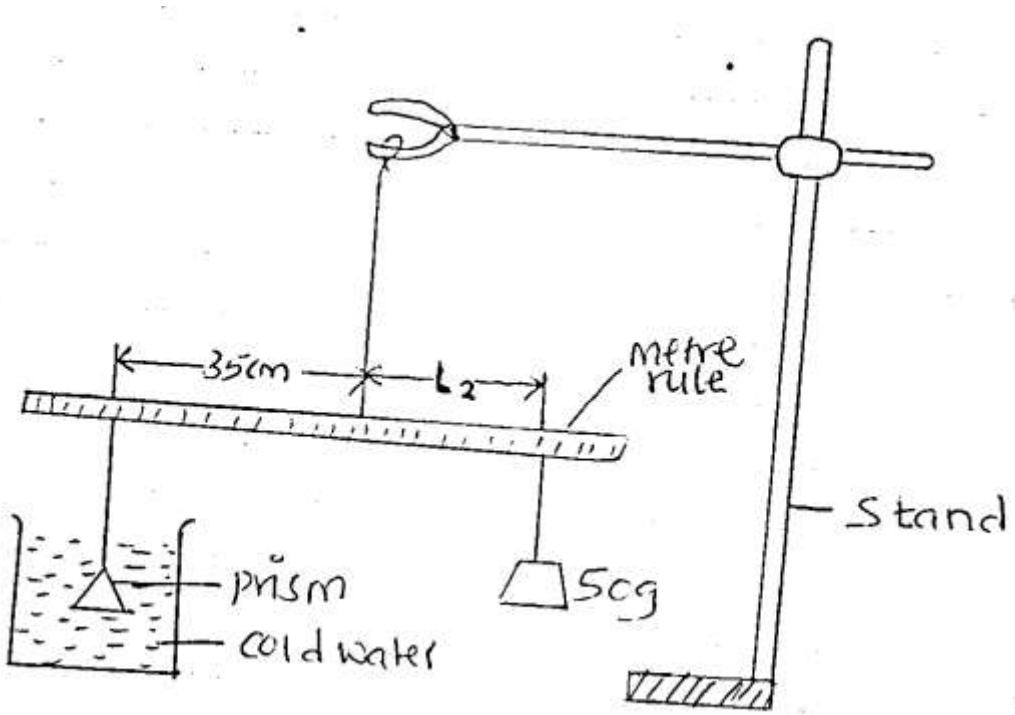


i) Determine the distance L_1 between O and the point of support of the 50g mass.

L_1 = _____ cm (1mk)

ii) Use the principle of moments to determine the weight W_1 of the prism in air.
(take g = 10N/kg) (2mks)

c. Put cold water into the beaker (approximately three quarter ¾ full). With the glass prism still at 35cm from O, determine the distance L_2 of the 50g mass at which the rule balances when the prism is fully submerged in the cold wawter.



I) L_2 = _____ cm (1mk)

II) Determine the weight W_2 of the prism in the cold water. (2mks)

d) Measure and record the temperature T_1 of the cold water when the system is balanced.

T_1 = _____ ^0C (1mk)

e) Now pour out the cold water and replace it with hot water. Balance the metre rule with the prism fully submerged in hot water. **Ensure that the prism is still supported at 35cm from O.**

i) Determine the distance L_3 of the point of support of the 50g mass when the prism is submerged in hot water.

L_3 = _____ cm (1mk)

ii) Measure and record the temperature T_2 of the hot water.

T_2 = _____ ^0C (1mk)

iii) Determine the weight W_3 of the prism in hot water. (2mks)

f) Determine the constant k for the water given that: (2mks)

$$k = \frac{(W_1 - W_2) - (W_1 - W_3)}{(W_1 - W_3)(T_2 - T_1)}$$