

Name:Adm No.....Class.....

232/3

Candidate's Signature:

PAPER 3

SEPTEMBER, 2022.

Date:

 $2\frac{1}{2}$ hours

**THE MURANG'A EXTRA COUNTY SCHOOLS JOINT EXAMINATIONS
(MECS)**

PHYSICS PRACTICAL FORM 4**PAPER 3** $2\frac{1}{2}$ hours**Instructions to Candidates**

- (a) Write your name and admission number in the spaces provided.
 (b) Answer **ALL** questions in the spaces provided in the question paper.
 (c) You are supposed to spend the first **15 minutes** of the $2\frac{1}{2}$ hours allowed for this paper reading the whole paper carefully before commencing the work.
 (d) Marks are given for a clear record of the observations actually made, their suitability, accuracy and the use made of them.
 (e) Candidates are advised to record their observation as soon as they are made.
 (f) Non programmable silent electronic calculators may be used.
 (g) **This paper consists of 7 printed pages.**
 (h) **Candidates should check the questions to ascertain that all the pages are printed as indicated and that no questions are missing.**
 (i) **Candidates should answer the questions in English.**

For Examiner's Use Only**Question 1**

	B	d	e	f	g	h
Maximum Score	1	5	5	3	3	3
Candidate's Score						

TOTAL **Question 2**

	b	d	e	f	g	h	i	j	k
Maximum Score	1	3	1	3	2	1	3	4	2
Candidate's Score									

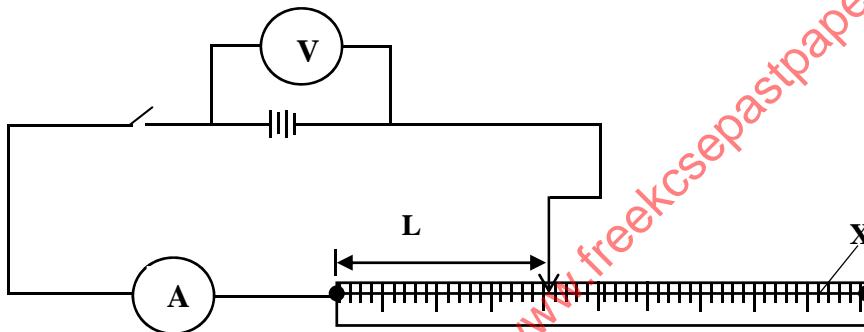
TOTAL GRAND
TOTAL

You are provided with the following:

- 2 new dry cells size D.
- A cell holder.
- A switch.
- An ammeter (0 – 1A)
- A voltmeter (0 – 5V)
- 6 connecting wires, 3 with crocodile clips.
- Nichrome wire mounted on the metre rule labelled X.
- A micrometer screw gauge (to be shared).

Proceed as follows:

- (a) Connect the circuit as shown in the figure below.



- (b) Measure the voltage, E before closing the switch.

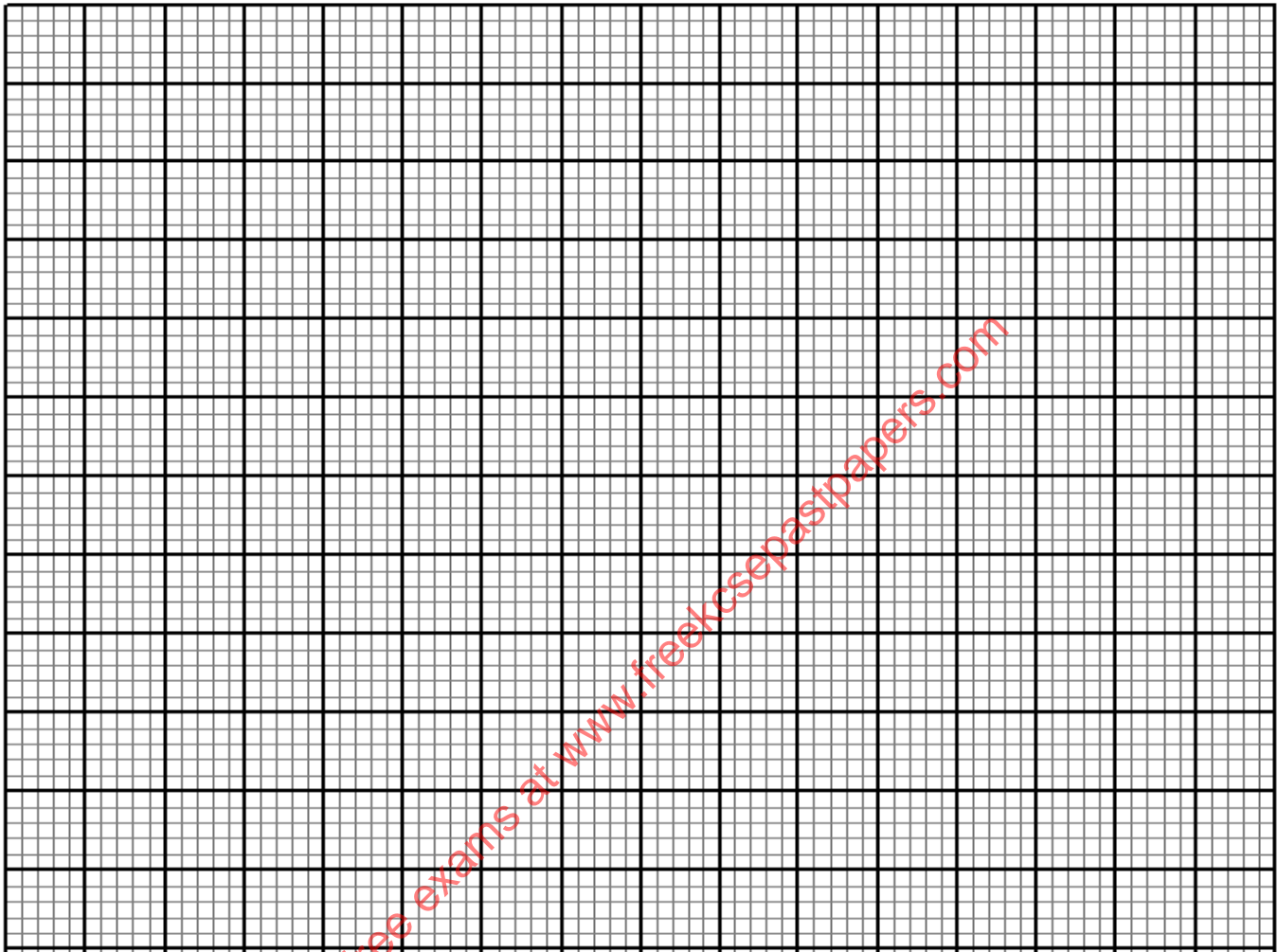
$E = \dots\dots\dots$ (1mk)

- (c) Adjust the length L of the wire 0.2m, close the switch S and read the value of current and record in the table below.

- (d) Repeat the procedure in (c) above for the value of length, L and fill the table for $\frac{1}{I}$. (5mks)

Length (m)	0.2	0.3	0.4	0.5	0.6	0.7
Current I (A)						
$\frac{1}{I}$ (A^{-1})						

- (e) On the grid provided plot a graph of $\frac{1}{I}$ (y axis) against L. (5mks)



- (f) Determine the gradient of the graph. (3mks)

- (g) (i) Measure the diameter of the wire in three points using micrometer screw gauge. (1mk)

$d_1 = \dots\dots\dots$ $d_2 = \dots\dots\dots$ $d_3 = \dots\dots\dots$

Averaged $d = \dots\dots\dots$ (1mk)

(ii) Determine the cross-section area, A of the wire. (1mk)

(h) From the equation $\frac{1}{I} = \frac{KL}{AE} + \frac{Q}{E}$ determine;

(i) the value of K. (2mks)

(ii) the value of Q. (1mk)

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QUESTION 2**PART A**

a) *You are provided with the following:*

Triangular glass prism

Four optical pins

250 ml beaker

Soft board

source of boiling water

Thermometer

Plain paper

Stopwatch

Four office pins

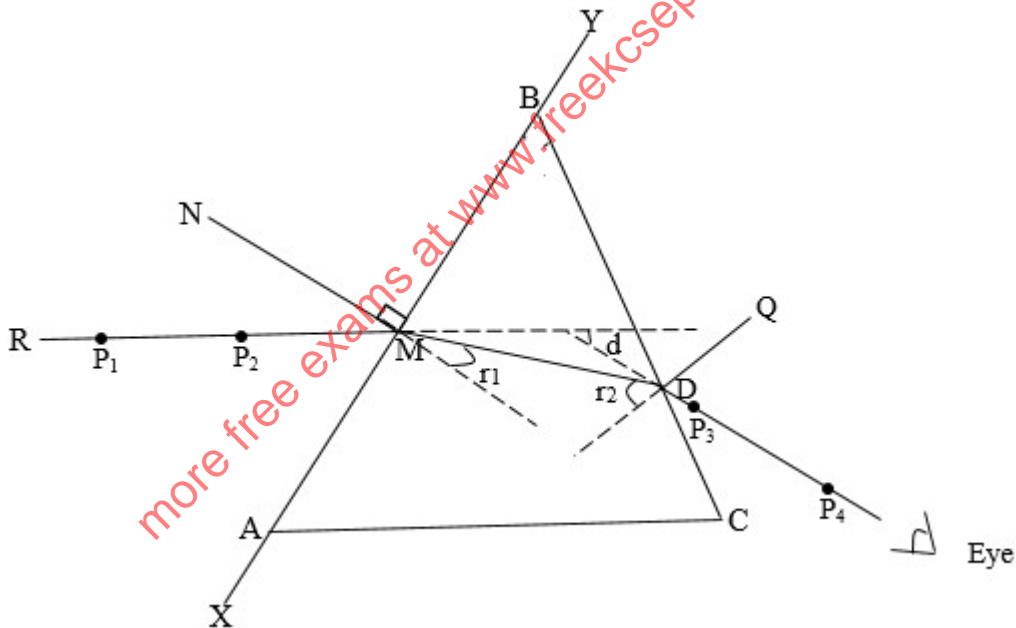
Proceed as follows

a) Fix the plain paper on the soft board using the office pins.

b) On the plain paper, draw line XY. Mark a point M on its midpoint. Draw a normal N at M to XY. Draw line RM such that angle RMN = 50°.

(This paper will be collected at the end of the experiment)

(1mk)



c) Place the glass prism such that one edge AB of the prism is in line with XY. Accurately draw the outline ABC of the prism

d) Place optical pins **P₁** and **P₂** on the line RM

c) Through edge BC observe the images of **P₁** and **P₂**. Fix **P₃** and **P₄** so that **P₁**, **P₂**, **P₃** and **P₄** lie on straight line.

- d) Remove the pins; construct straight line from P_4 through P_3 to meet side BC at D, join M to D.
 i) Measure angle r_1 . (1mk)

$$r_1 = \dots\dots\dots$$

- ii) Produce P_4P_3 to meet RM produced. Measure angle d . (1mk)

$$d \dots\dots\dots$$

- iii) Draw the normal at D and measure the angle r_2 . (1mk)

$$r_2 \dots\dots\dots$$

- e) Given that $R = r_1 + r_2$. Calculate R (1mk)

- f) Given that $n = \frac{\sin\left(\frac{R+d}{2}\right)}{\sin\left(\frac{R}{2}\right)}$, find the value of n . (3mks)

- g) Given that $n \sin k = 1$, find the value of k (2mks)

- h) What Physical property does n represent? (1mk)

PART B**(Read all the instruction before starting this part)**

- i) (I) Using the thermometer, measure and record the temperature of the room, θ .

θ °C. (1mk)

- (II) Using the 250 ml beaker, collect 200 ml of hot water from the boiling source. Place the thermometer into the hot water and wait until it cools to **80** °C the start the stopwatch and record time t_1 it takes to cool to **75** °C.

t_1 seconds. (1mk)

- (III) Wait until the water cools to **70** °C and then start the stopwatch and record the time t_2 it takes the water to cool to **65** °C

t_2 seconds. (1mk)

- j) Determine the rate of temperature change ρ and β in the two intervals.

(i) $\rho = \frac{77.5 - \theta}{t_1}$ (2mks)

(ii) $\beta = \frac{67.5 - \theta}{t_2}$ (2mks)

- k) State with reason how the rate of change of temperature between **50** °C and **45** °C compares with ρ (2mks)