MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education
PRE-MOCK EXAMINATIONS 2023

232/3 **PHYSICS** Paper 3

April 2023 – 2½ Hours

Name: Marking Guide ..... Adm No: .....

Class: .....Candidate's Signature: .....Date: 7/4/2023.

INSTRUCTIONS TO CANDIDATES

- *Write your name and index number in the spaces provided above.*
- *Sign and write the date of examination in the spaces provided.*
- *Answer ALL the questions in the spaces provided in the question paper*
- *You are supposed to spend the first 15 minutes of the 2½ hours allowed for this paper reading the whole paper carefully before commencing your work.*
- *Marks are given for a clear record of the observations actually made.*
- *Non-programmable silent electronic calculators and KNEC Mathematical tables may be used except where stated otherwise.*

FOR EXAMINERS USE ONLY

QUESTION 1

	e	j	k	l	m	n	TOTAL
Maximum Score	1	7	5	3	3	1	20
Candidate's Score							

QUESTION 2

	a	b	d	f	g	h	i	j	TOTAL
Maximum score	2	1	1	6	1	4	2	3	20
Candidate's score									

TOTAL SCORE

Adongo Odongo

QUESTION 1

You are provided with the following: -

- 2 new size D dry cells
- A cell holder
- A switch
- An ammeter
- Five connecting wires
- Wire mounted on the metre rule labelled X
- A micrometer screw gauge (to be shared)
- A Voltmeter

Proceed as follows

(a) Measure the diameter of the wire three times and determine the average diameter,

d ..... 0.30 ± 0.04 ..... mm ✓1 2 d.p a must (1 mark)

d ..... $\frac{0.30}{1000}$ ½ = 3.0×10^{-4} ½ ..... m Working must be shown. (students value to be used) (1 mark)

(b) Determine the cross-section area of the wire.

A ..... $\frac{22}{7}\times(1.5\times10^{-4})^2$ ½ = 7.071×10^{-8} ½ ..... m^2 Working must be shown (1 mark)

(c) Connect the circuit as shown in the **figure 1** below.

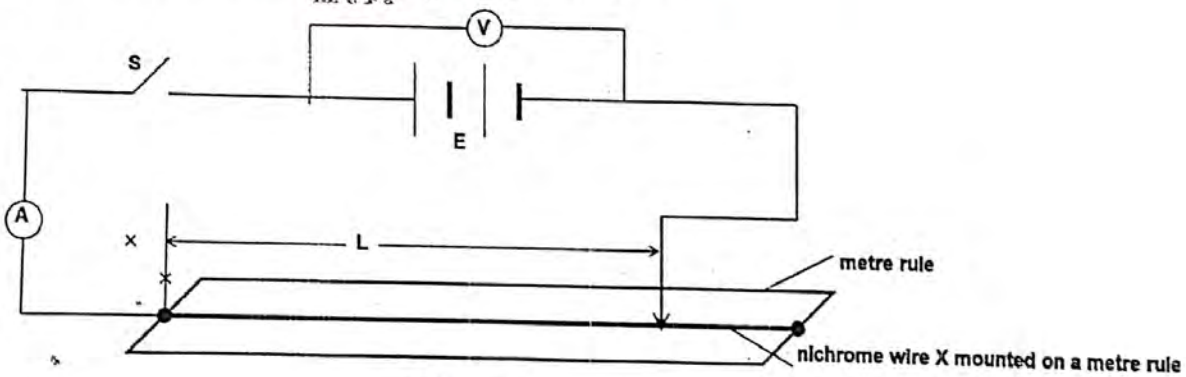


Figure 1

(d) **Measure** the voltage E from the Voltmeter, before closing the switch.

E = ... 3.0 ± 0.2 ..... V ✓ 1d.p a must (1 mark)

4

Peter Okoth / Linda Nyapola.

(e) Adjust the length, l of the wire to 0.20m, close the switch, S and read the value of current and record in the **table 1** below.

Table 1

Length, l (m)	0.20	0.30	0.40	0.50	0.60	0.70
Current, I (A) 2d.p ±0.02	0.60	0.52	0.44	0.40	0.36	0.32
$\frac{1}{I}$ (A^{-1})	1.667	1.923	2.273	2.500	2.778	3.333

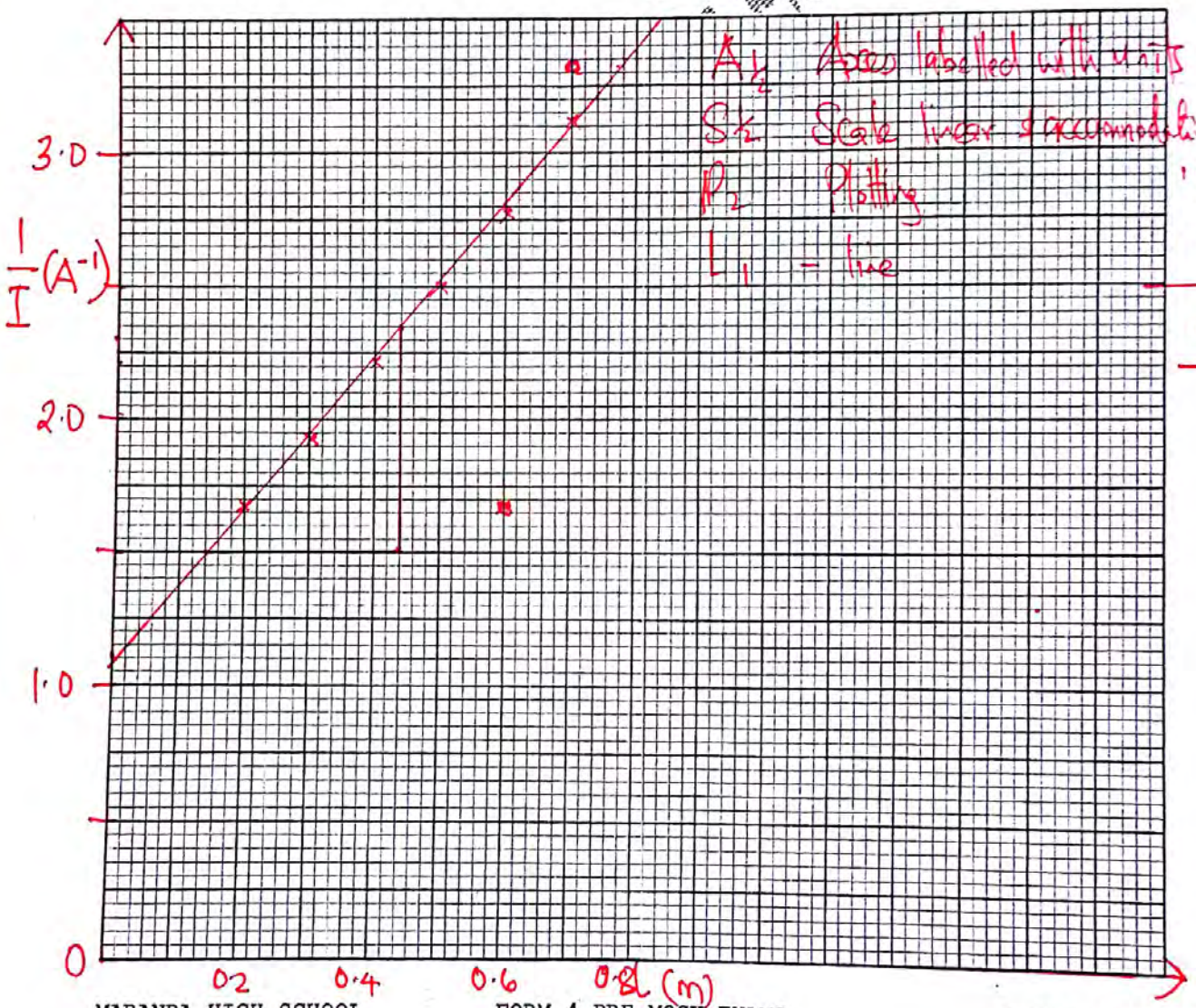
each ½ mark max 5

√ all 1mark 4 s.f.

(f) Repeat the procedure in (e) above for the values of lengths given. (6 marks)

(g) **Calculate** the value of $\frac{1}{I}$ and record in the table above. (1 mark)

(h) On the grid provided **plot** a graph of $\frac{1}{I}$ ($y-axis$) against $l(m)$ (4 marks)



A½ Axes labelled with units ½mk
S½ Scale linear & accommodative ½mk
P2 Plotting 2mk
L1 = line 1mk

4

11

Maurice A500

(i) **Determine** the gradient of the graph. (2 marks)

gradient = $\frac{\Delta \frac{1}{I}(A^{-1})}{\Delta L(m)}$ = $\frac{(2.35-1.5)\,A^{-1}}{(0.44-0.14)\,m}$ ½

= $2.833\,A^{-1}m^{-1}$ ½

OR $2.833\,(Am)^{-1}$ ✓1 with units

½ without units or wrong units

(j) Given that the equation $\frac{1}{I}=\frac{\rho}{EA}l+\frac{r}{E}$ holds for the graph, determine the value of ρ and r (3 marks)

$\frac{\rho}{EA}$ = gradient ½ (equation)

$\frac{\rho}{3.0V \times 7.071\times10^{-8}\,m^2}$ = $2.833\,(Am)^{-1}$ ½ (Substitution)

$\rho = 2.833\,A^{-1}m^{-1} \times 3.0V \times 7.071\times10^{-8}\,m^2$

$\rho = 6.00964\times10^{-7}\,\Omega m$ ½ (accuracy)

$\frac{r}{E}$ = y-intercept ½ (equation)

$\frac{r}{3.0V}$ = $1.1\,A^{-1}$ ½ (Substitution)

$r = 3.3\,\Omega$ ½ (accuracy).

Use students values.

QUESTION 2 Peter Andango

PART A

You are provided with the following:

- A lens and a lens holder.
- A screen with cross wires
- A candle
- A metre rule.

Proceed as follows:

a) Arrange the lightened candle, the lens and the screen as shown in **figure 2**. Adjust the position of the screen until a sharp inverted image of the candle is formed on the screen.

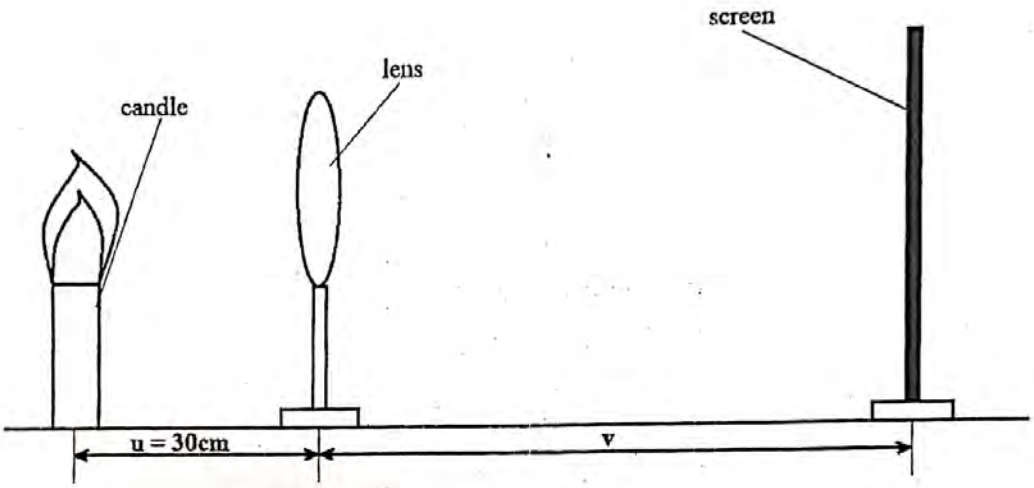


Figure 2

i) Measure the image distance v

$v =$ 15.0 ± 2.0 cm ✓1 1 d.p. a must (1 mark)

ii) Determine the focal length of the lens using the formula $f = \frac{uv}{u+v}$ (2 marks)

$\frac{30 \times 15.0}{30+15.0}$ ✓1

10 cm ✓1

Jesse Opiyo

b) Now arrange the lighted candle, the screen with cross wires and the lens as shown in **figure 3**. *Ensure that the centre of the lens, the cross-wires, and the candle flame lie on the same horizontal line.* The candle flames should be placed close to the cross-wires for better illumination.

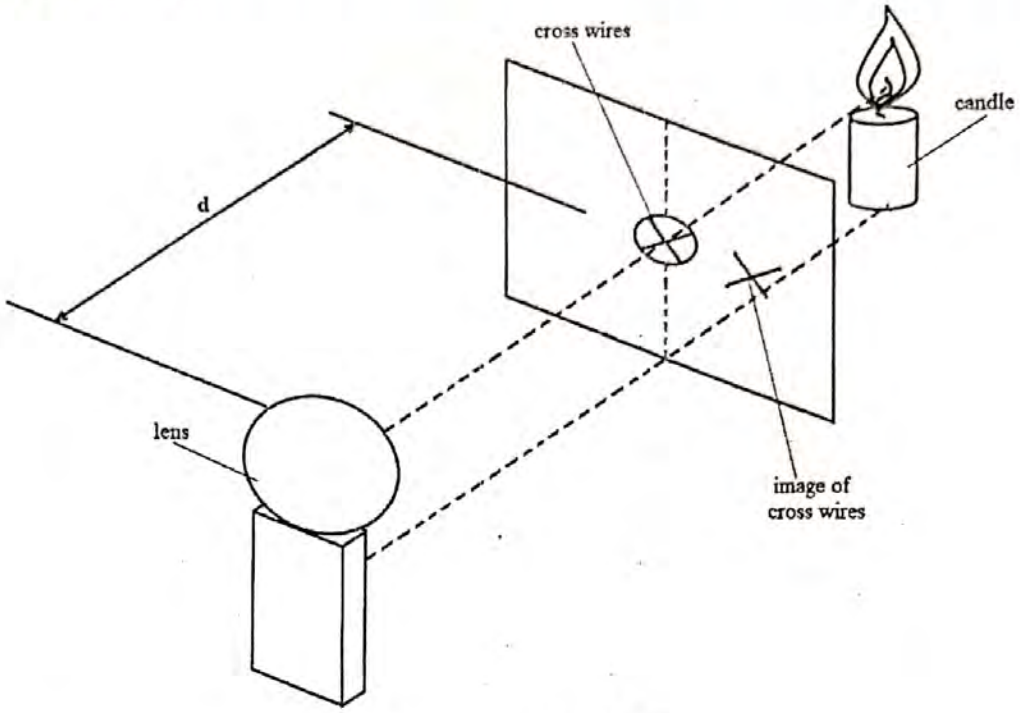


Figure 3

i) Adjust the position of the lens until a sharp image of the cross-wire is formed on the screen next to the cross-wires. (*Hint: You have to rotate the lens slightly about a vertical axis so that the image of the cross-wires falls on the screen next to the cross-wires and not on the cross-wires.*)

Measure the distance d , between the lens and the screen.

d = ~~10.0 ± 2.0~~ 5.0 ± 4.0 ..... cm ✓1 1d.p a must (1 mark)

ii) Determine the values of L and X :

I. $L = \dfrac{df}{f-d}$ Students Values (2 marks)

$L = \dfrac{5.0 \times 10}{10-5}$ ✓1

$= 10\,cm$ ✓1

Peta Ochieng.

II. $X = \frac{L}{2f} + 1$ (2 marks)

$X = \frac{10\text{ cm}}{2 \times 10\text{ cm}} + 1$ ✓1 Students values

$X = 1.5\text{ cm}$ ✓1

PART B

You are provided with the following:

- A metre rule
- A knife edge
- One 50g mass and a 100 g mass
- Two pieces of threads each 30 cm long
- Some water in a beaker
- Liquid L in a beaker
- Tissue paper

Procedure as follows

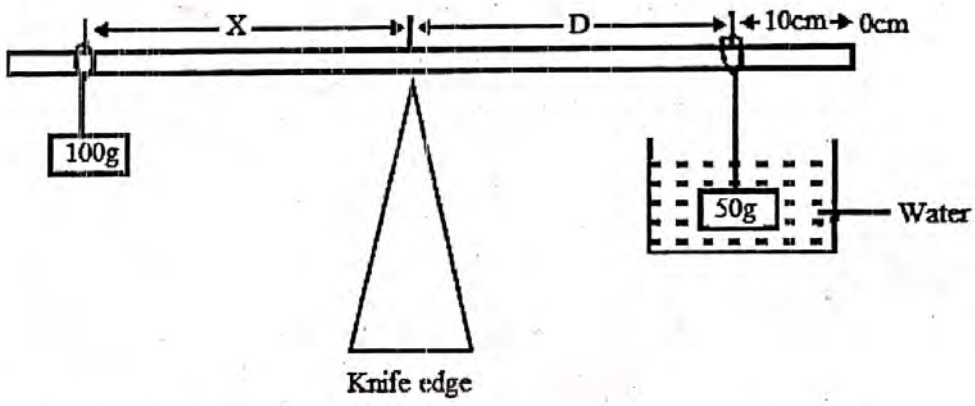
a) Balance the metre rule on the knife edge and record the reading at this point

Balance point = 50.0 ± 0.5 cm mark ✓1 1 d.p a must (1 mark)

For the rest of this experiment the knife edge must be maintained at this position.

b) Set up the apparatus as shown in the **figure 4**

Figure 4



The balance is obtained by adjusting the position of 100g mass when 50g mass is fully immersed in water. Record the values of X and D.

X = 17.5 ± 0.5 cm 1 d.p ✓1 must (1 mark)

D = 40.0 ± 1.0 cm. 1 d.p ✓1 must (1 mark)

Duncan Ouya / Victor Odundo

c) Using the principle of moments;

(i) determine the weight W_1 of the 50g mass in water (2 marks)

$W_1 = \frac{1 \times 0.175}{0.4}$ ✓1

$0.4375\,N$ ✓1

(ii) determine the Upthrust U_w in water (1 mark)

$U_W = 0.5 - 0.4375$ ½

$= 0.0625\,N$ ½

d) Remove the 50 g mass from the water and dry it using a tissue paper.

Keeping D constant, adjust the position of 100g mass until the metre rule is balanced and record the value of distance X when the 50g mass is fully immersed in liquid L.

X = 18.0 ± 0.5 cm ✓1 (1 mark)

(i) Determine the weight W_2 of the 50g mass in liquid L. (2 marks)

$W_2 = \frac{1 \times 0.18}{0.4}$ ✓1

$0.45\,N$ ✓1

(ii) Determine the Upthrust U_L in the liquid. (1 mark)

$U_L = 0.5 - 0.45$ ½

$0.05\,N$ ½

e) Determine the relative density R.D of the liquid L, given that $R.D = \frac{U_L}{U_W}$ (1 mark)

$R.D = \frac{0.05}{0.0625}$ ½

0.8 ½

f) Find the density of liquid L in S.I unit (1 mark)

$\rho_L = 0.8 \times 1000$ ½

$800\,kg/m^3$ ½