MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education

THE MOCK EXAMINATIONS, 2025

232/3 **PHYSICS** **PAPER 3**

May/June, 2025 **TIME: 2½ Hrs**

Name: MARKING GUIDE Admission No: .....

Stream: ..... Signature: ..... **Thursday, 5th June, 2025; 7:00-1:30pm**

INSTRUCTIONS TO CANDIDATES

- *Write your name and admission 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 2 ½ 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

	c	d	e	f	c	e	f	g	i	j	k	TOTAL
Maximum Score	2	2	2	2	1	1	2	2	2	2	2	20
Candidate's Score												

QUESTION 2

	b	c	d	e	f	g	h	TOTAL
Maximum score	6	5	3	1	2	2	1	20
Candidate's score								

TOTAL SCORE

Peter Andango

Question 1

You are provided with the following apparatus:

- Wire mounted on a millimeter scale labelled **AB**
- A component labelled **X**
- Source of boiling water
- 9 connecting wires at least 4 with crocodile clips
- A resistor labelled R_1
- A resistor labelled R_2
- 250ml beaker
- Thermometer
- Galvanometer
- Two dry cells in a cell holder
- Jockey

Proceed as follows:

a) Record the room temperature θ_R using the thermometer provided.

θ_R = 25 ✓1 °C students value (Whole number) (1 mark)

b) Set the apparatus as shown in **figure 1.**

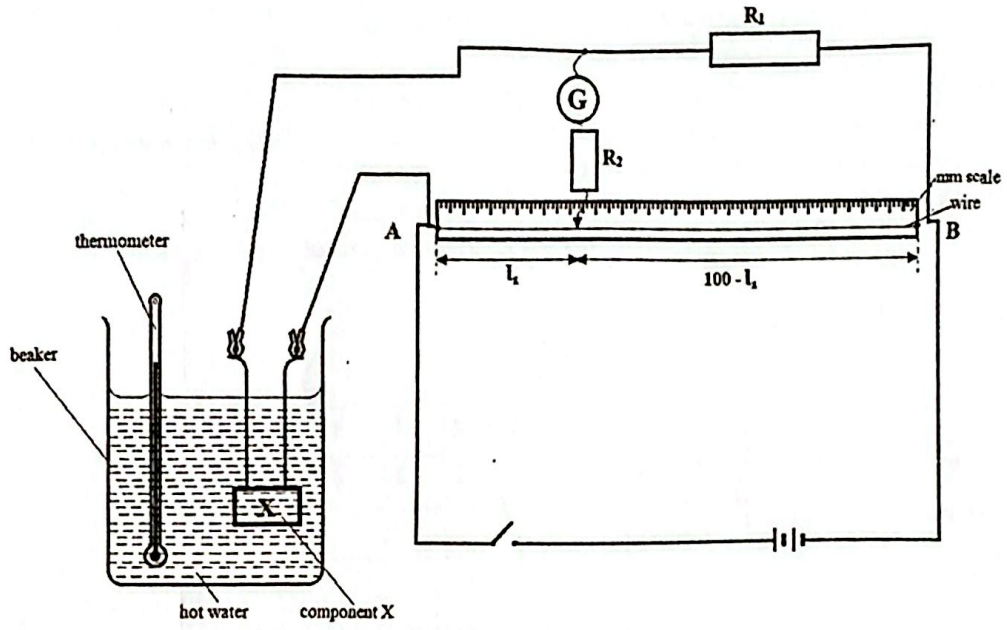

Figure 1

c) Find and record the balance point l_R by sliding the jockey on the wire before pouring the hot water in the beaker. ***(Note the galvanometer should deflect on opposite direction when jockey is at A and When at B)***

l_R = 45.0 cm ± 5.0cm ✓1 (1 mark)

(1 dp. a must)

02

Rev. Peter Okoth.

d) Calculate R_X given that $R_X = \frac{4.7l_R}{(100-l_R)}$ (2 marks)

$R_x = \frac{4.7 \times 45.0}{(100-45.0)}$ ✓1 Correct substitution

3.8455Ω ✓1 (ignore units) 4 s.f.

e) Pour hot water in the beaker.

Wait till the temperature drops to $75^{\circ}C$, find the balance point by sliding the Jockey on the wire till the galvanometer records Zero. *(Note the galvanometer should deflect on opposite direction when jockey is at A and When at B)*

Record the length l in table 1.

Temperature, $\theta(^{\circ})$	75	70	65	60	55	
Length l_1 (cm) ±5.0 (1 d.p.)	22.0	23.5	26.0	30.0	31.0	each 1mark
Length $(100-l_1)(cm)$ (1 dp.)	78.0	76.5	74.0	70.0	69.0	All Correct 1mark
$\beta = \frac{l_1(cm)}{(100-l_1)cm}$ (4 sf.)	0.2821	0.3072	0.3514	0.4286	0.4493	All Correct 1mark

(7 marks)

f) Repeat step (b) for temperatures of $70^{\circ}C$, $65^{\circ}C$, $60^{\circ}C$ *and* $55^{\circ}C$ and complete **table 1.**

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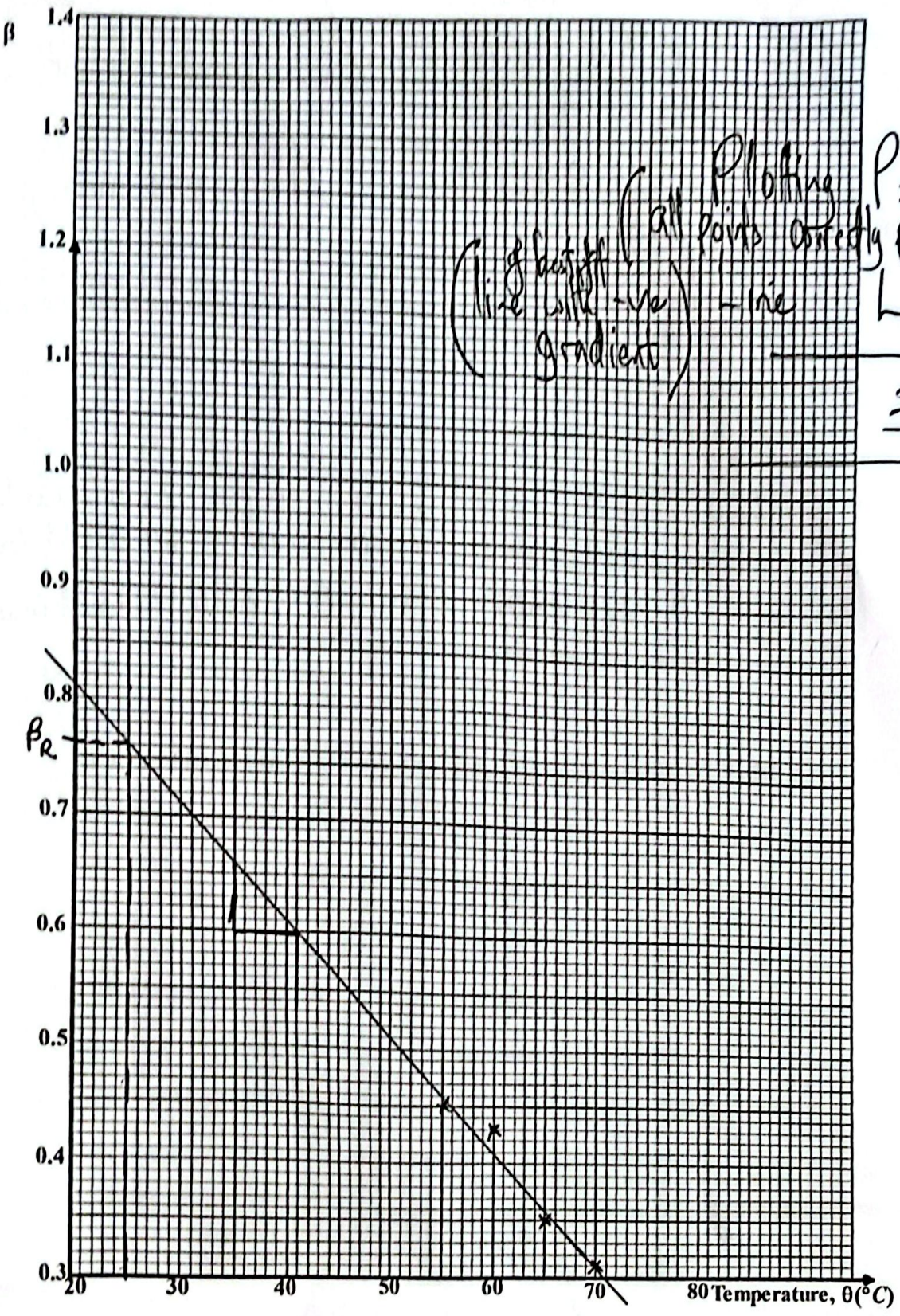
g) On the grid provided, plot a graph of β against temperature, $\theta\,(^{\circ}C)$ *(3 marks)*



(Line of best fit -ve gradient) (all points correctly plotted) Plotting P2 L1

3

03

Duncan Onya / Austine Oduor.

h) Find the slope S of the graph (2 marks)

$S = \frac{\Delta\beta}{\Delta\theta(^\circ C)}$ ✓1 Correct read offs from graph

$\frac{0.66 - 0.6}{(35 - 41)^\circ C}$ ✓1

$-0.01/^\circ C$ ✓1 -ve gradient with units. 4sf or exact

i) Use the graph to find, β_R , the value of β when the temperature is $\theta_R{}^\circ C$ (2 marks)

Evidence from graph ✓1

Correct value from graph $\beta_R = 0.76$ ✓1 Student value read from his graph.

j) Find the quantity α , given that $\alpha = \frac{S}{\beta_R}$ (2 marks)

$\alpha = \frac{-0.01/^\circ C}{0.76}$ ✓1 Correct Substitution

$= -0.01316/^\circ C$ ✓1 accuracy 4sf or exact (students values)

Question 2

PART A

You are provided with the following apparatus:

- Triangular glass prism
- Four optical pins
- Four thumb pins
- Soft board
- A4 plain paper

Proceed as follows;

a) Place the triangular glass prism on a plain paper and draw its outline ABC. Remove the prism.

b) Measure the size of angle ABC using a protractor

B 60° ✓1 (Whole number) (1 mark)

c) Draw a normal to the line AB at N. (Midway of AB)

d) Draw a line at an angle $i = 55^0$ and fix two optical pins P_1 and P_2 on the line 4 cm apart.

e) Replace the prism and fix two other pins P_3 and P_4 such that the pins appear to be in a straight line with the images of P_1 and P_2 when viewed from side BC.

f) Remove the prism and join points P_3 and P_4 producing the line to meet the incident line produced at M as

07

Kennedy Odero

shown in figure 2.

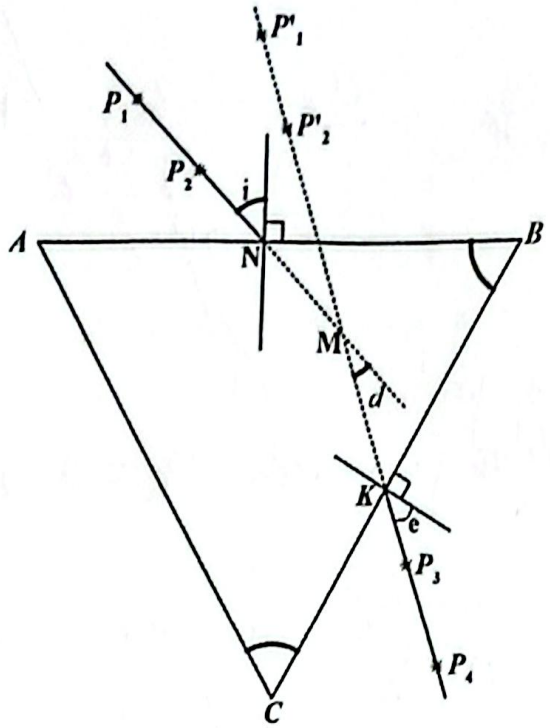


Figure 2

g) Draw another normal along BC at K as shown;

h) Measure and record the angle of emergence, *e* and angle of deviation *d*. in table 2 (1 mark)

	angle of incidence, i (°)	55	50	45
±5	*angle of emergence, e* (°)	55	50	45
±5	*angle of deviation, d* (°)	50	40	30
	angle $\delta = i + e - B$ (°)	50	40	30

} each ½ mark — All 1 mark.

i) Repeat the experiment with $i = 50^0$ and 45^0 and complete table 2 (3 marks)

From your table:

j) State the minimum angle of deviation d_{min}. (1 mark)

d_{min} = ... 30° ..... ✓1 (students minimum angle stated from graph)

k) Determine the constant μ_1 and μ_2, given that:

I. $\mu_1 = \dfrac{\sin\left(\frac{A+d_{min}}{2}\right)}{\sin\left(\frac{A}{2}\right)}$ (2 marks)

$\mu_1 = \dfrac{\sin\left(\frac{60+30}{2}\right)}{\sin\left(\frac{60}{2}\right)}$ ✓1 Correct substitution

$= 1.414$ ✓1 Accuracy 4 s.f.

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ii. $\mu_2 = \frac{d_{new}}{B} + 1$ (2 marks)

$\mu_2 = \frac{30}{60} + 1$ ✓1 Correct substitution

$= 1.5$ ✓1 accuracy 4 s.f or exact

PART B

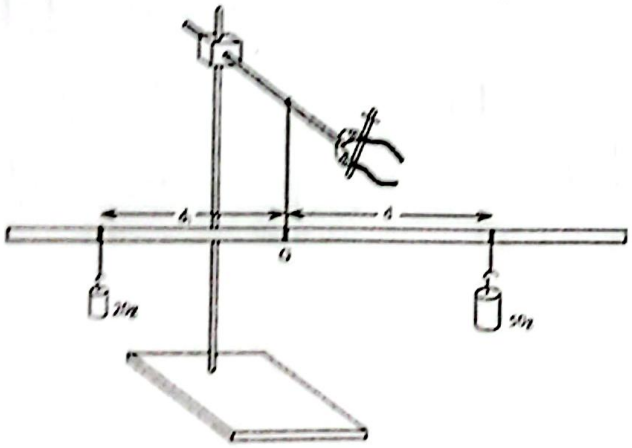
You are provided with the following apparatus:

- Metre rule
- Thread
- A complete retort stand
- Two masses, a 50g and 20g mass
- Water in a beaker
- Liquid X in a beaker

a) Suspend the metre rule so that it balances at its centre of gravity G. Read and record the value of G.

$G =$ 50.0 ± 1.0 cm ✓1 1dp a must (1 mark)

b) Suspend the 50g mass at a distance $d = 10cm$, then suspend the 20g mass and adjust its position such that the metre rule is balanced as shown in the figure 2



c) Record the distance d_1

$d_1 =$ 26.5 ± 2.0 cm ✓1 1 d.p a must (1 mark)

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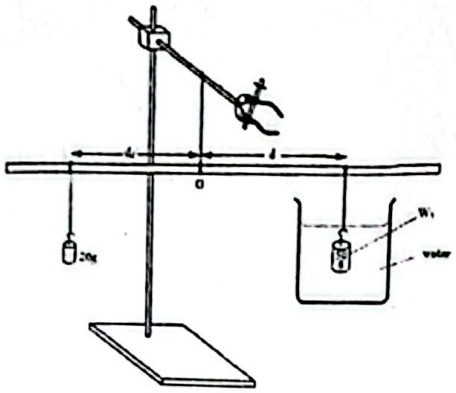
Maurice Asoro

d) While maintaining the distance d, immerse the the 50g mass completely in water, as shown in the figure 3.



e) Adjust the position of the 20g mass to balance the metre rule again. Record the new distance d_2

d_2 = 20.5 ± 2.0 cm ✓1 1 dp a must (1 mark)

f) Using the results obtained above, calculate the value of W_1, weight of the 50g mass in water. (2 marks)

$F_1 d_1 = F_2 d_2$

$\frac{W_1 \times 10}{100} = \frac{20}{1000} \times 10 \times \frac{20.5}{100}$ ✓1 substitution

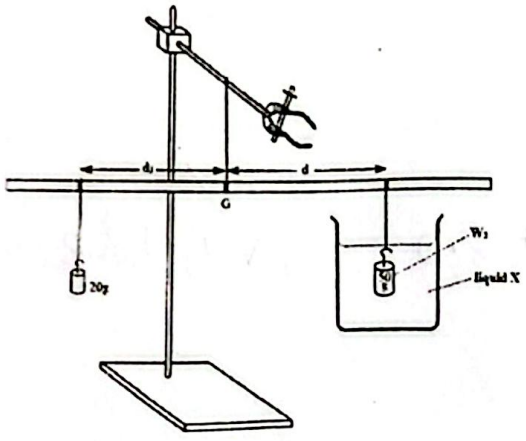
$W_1 = 0.41N$ ✓1 accuracy

g) Determine the upthrust U_1 on the 50g mass in water. (1 mark)

$U_1 = 0.50 - 0.41N$ $(0.5 - W_1)$

$= 0.09N$ ✓1 student's value

h) Repeat steps (d), (e) and (f) but now the 50g is totally immersed in liquid X as shown in the figure 4



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Victor Odundo

i) Using the results obtained above, calculate the value of W_2, weight of the 50g mass in liquid X. (2 marks)

$d_2 = 21.5 \pm 2.0$ cm. (Used) ✓

Use students value.

$\frac{W_2 \times 10}{100} = \frac{20}{1000} \times 10 \times \frac{21.5}{100}$ ✓1

$W_2 = 0.43N$ ✓1

i) Determine the upthrust U_2 on the 50g mass in liquid X. (1 mark)

$U_2 = 0.50 - 0.43$

$0.07N$ ✓1 students value

j) Given that $\frac{\rho_L}{U_2} = \frac{\rho_W}{U_1}$ where $\rho_W = 1000 kgm^{-3}$. Calculate ρ_l (1 mark)

$\frac{\rho_L}{0.07} = \frac{1000}{0.09}$

$\rho_L = 777.8 kgm^{-3}$ ✓1 students value.

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