PRE-MOCK JOINT EXAMINATION

Kenya Certificate of Secondary Education

232/3 **PHYSICS** **Paper 3**

(Practical)

March/April, 2025 Exam – Time: 2 1/2 hours

Name: MARKING SCHEME **Adm no:** .....

School: ..... **Stream:** ..... **Date:** .....

INSTRUCTIONS TO CANDIDATES:

*(a) Write your **name**, **admission number** and **stream** in the spaces provided above.*
*(b) Indicate your **school** and **date of exam** in the spaces provided above.*
(c) 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.
(d) Marks are given for a clear record of the observation actually made, their suitability, accuracy and the use made of them.
(e) Candidates are advised to record their observations as soon as they are made
*(f) Non-programmable silent electronic calculators **may be** used.*
(g) Candidates should check the question paper to ascertain that all the pages are printed and that no questions are missing.

FOR EXAMINER'S USE ONLY.

Question(s)	Maximum Score	Candidate's Score
1	20	
2A	04	
2B	09	
2C	09	
TOTAL	**40**	

This paper consists of 7 printed pages. Candidates are advised to check and to make sure all pages are printed.

QUESTION 1

You are provided with the following:

- Pendulum bob.
- Thin thread.
- Complete retort stand.
- Metre rule.
- Stop watch.
- 2 pieces of wood.
- Vernier callipers.

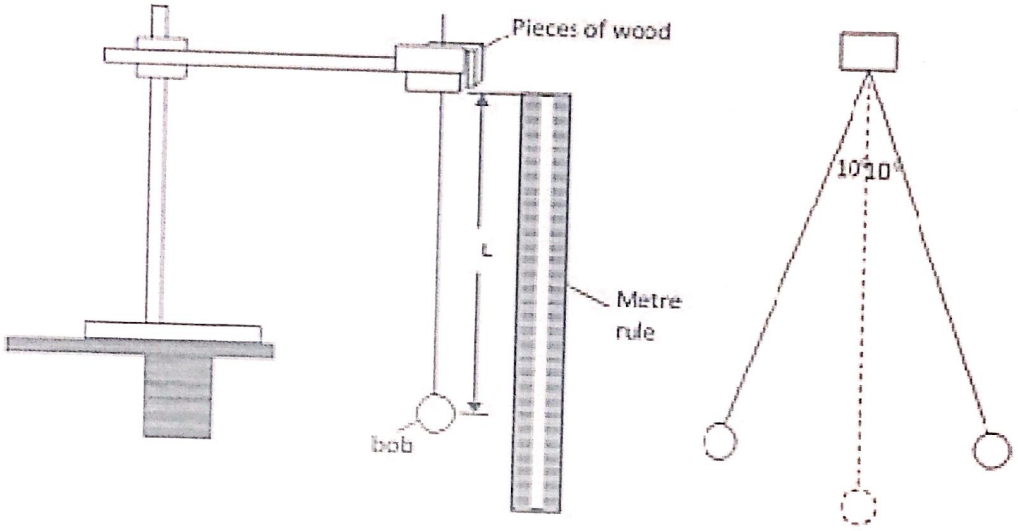
Proceed as follows:

a) Using the Vernier callipers, measure the diameter of the pendulum bob and record its value:

d = 1.85 ± 0.02 ..... cm 1.83 - 1.87cm - ✓ ½mk (½ mark)

d = ... m Correct Conversion of the student value to at least 4dp. ✓ ½mk (½ mark)

b) Set up the apparatus as shown below.



c) Starting with a length of thread of 15cm, set the pendulum bob swinging through an angle of about 10° as shown above. Ensure that the pendulum is swinging in a plane. (The length of the pendulum is the length of the thread plus the radius if the bob.)

d) Time 20 oscillations and record the value t_1.

t_1 = 15.69 ± 2 ..... s 13.69 - 17.69 ✓ ½mk At least 2dp (½ mark)

e) Repeat procedure d) above to obtain t_2 and record the value.

t_2 = 15.62 ± 2 ..... s 13.62 - 17.625 ½mk at least 2dp. (½ mark)

f) Determine the average value $t_{av} = \frac{t_1+t_2}{2}$

t_{av} = ... s Correct Subst of t_1 and t_2 students' value ✓ ½mk. Correct evaluation to 4sf or exact ✓ ½mk (1 mark)

g) Determine the periodic time $T = \frac{t_{av}}{20}$

Correct Substitution of t_{av} of students value ✓ ½mk.

T = ... s Correct evaluation to 4sf or exact ✓ ½mk. (1 mark)

h) Repeat the experiment for different lengths of the pendulum and record the results in the table below.

(5 marks)

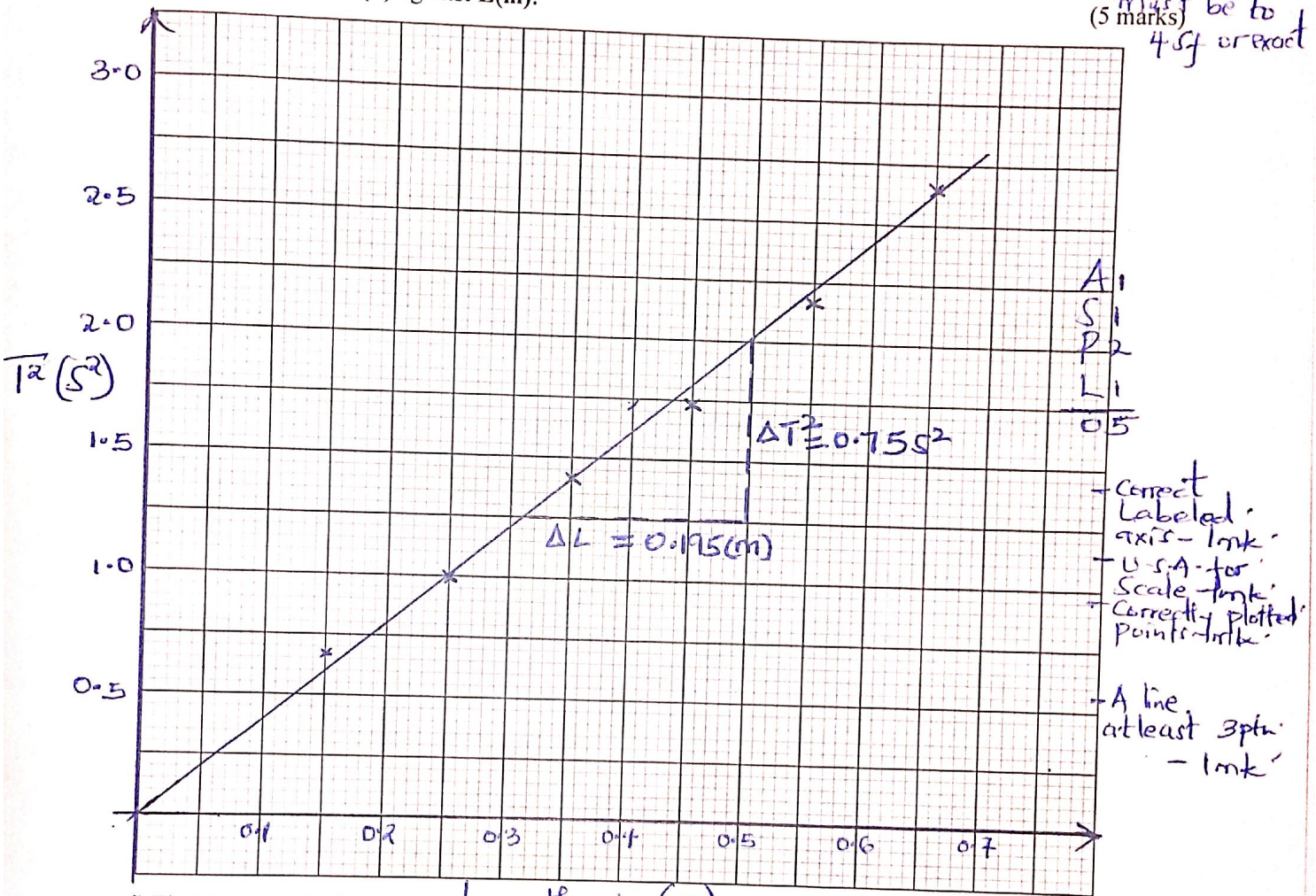
Length L of the pendulum (m)	0.15	0.25	0.35	0.45	0.55	0.65
Time for 20 oscillations. (s)	15.62	20.05	23.85	26.81	29.52	32.54
Periodic time T (s)	0.7210	1.0025	1.1925	1.3405	1.476	1.627
T^2 (s^2)	0.6099	1.005	1.4220	1.797	2.178	2.647

½mk for 6=3mks ±2 −1mk −1mk

Both T and T² must be to 4sf or exact

i) Plot a graph of T^2 (s^2) against L(m).

(5 marks)



A1
S1
P2
L1
05

−Correct Labeled axis − 1mk
−U.S.A for Scale 1mk
−Correctly plotted Points 1mk
−A line at least 3pts − 1mk

j) Find the slope S of the graph.

(3 marks)

Slope, $S = \frac{\Delta T^2}{\Delta L} = \frac{0.75s^2}{0.195m} = 3.8462s^2m^{-1}$

−X-Interval − ½mk
−Y-Interval ½mk
−Correct Subst of intervals − 1mk
−Correct evaluation with units − 1mk
−no units ½mk
−Wrong units 0mk

k). Find K given that $K = \frac{4\pi^2}{s}$ where $\pi = 3.142$. (2 marks)

$K = \frac{4 \times (3.142)^2}{3.846 \cdot 52 / m}$ - Correct Subst of π and s - 1mk

$= 10.26 m/s^2$ - Correct evaluation to 4sf with Correct units - 1mk,

no units ½mk, Wrong units 0mk

l) State the quantity represented by the value K. (1 mark)

Acceleration due to gravity ✓ 1mk.

QUESTION 2

PART A

You are provided with the following apparatus:

- A carbon resistor marked X.
- Micrometer screw gauge (to be shared)
- Voltmeter.
- Ammeter.
- One dry cell in a cell holder.
- 8 connecting wires.
- Switch.

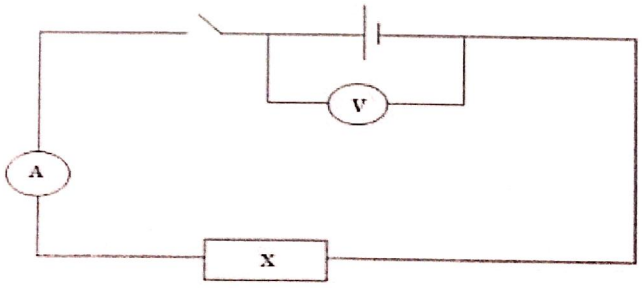
Proceed as follows.

a) Using the micrometer screw gauge, measure the diameter of the wire of the resistor X

Diameter = 0.29 ± 0.02 mm 0.27 - 0.31mm ✓ ½mk (½ mark)

Diameter = ... m - Correct Conversion of Student's value (½ mark)

b) Set up the circuit as shown below. to at least 5 dp



i. Record the voltmeter reading when the switch is open.

E = 1.5 ± 0.1 (1.4 - 1.6) V To at least 1 dp ✓ 1mk (1 mark)

ii. Close the switch and record the ammeter and voltmeter readings V and I.

V = 1.2 ± 0.2 (1.0 - 1.4) V To at least 1 dp. ✓ 1mk (½ mark)

I = 0.10 ± 0.02 A (0.08 - 0.12) To at least 2dp (½ mark) ✓ ½mk

c) Account for the difference between E and V. (1 mark)

1.5 - 1.2 = 0.3V → Lost Volt (Voltage lost due to internal resistance)

PART B

You are provided with the following:

- A glass block.
- Soft board.
- Five optical pins.
- Four thumb pins.
- Plain white paper.
- Vernier callipers (can be shared)

Proceed as follows:

a). Using the Vernier callipers provided, measure the length l, width w and thickness t of the rectangular glass block.

8.83 - 12.83cm

Length, l = $10.83 \pm 0.10 \pm 2$ cm (10.73 - 10.93) to at least 2dp (1 mark)

Width, w = 6.59 ± 0.10 cm (6.49 - 6.69) to 2dp (1 mark)

Thickness, t = 1.87 ± 0.10 cm (1.77 - 1.97) to 2dp (1 mark)

Determine the volume V of the rectangular glass block in SI units given that V = lwt (2 marks)

Vol = L x W x h — Correct Substitution of students values — 1mk

— Correct evaluation to # of sig. figs exact with

Correct units — 1mk

b). Place the plain paper on the soft board. Fix it with the thumb pins. Place the glass block on the paper and draw its outline.

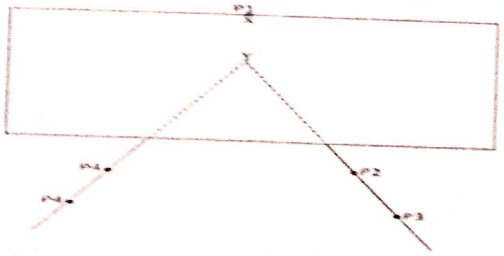
c). Remove the glass block. Mark point X on one of the longest sides of the outline about midway. Push a pin P_1 on this point. (P_1 is at point X).

d). Replace the glass block to sit perfectly on its outline.

e). By viewing from the opposite side, push two other pins P_2 and P_3 on the right side of X so that they appear to be in line with the image of P_1 as seen through the block.

f). Repeat step e) with P_4 and P_5 on the left side of X.

g) .Remove the glass block and draw a line joining P_2 and P_3 then another line joining P_4 and P_5. Extend the lines P_2P_3 and P_4P_5 to intersect at Y as shown in the diagram below.



h) Measure distance XY.

XY = 2.5 ± 0.2 (2.3 - 2.7) cm At least 1dp. (½ mark)

XY = ... m Students value to 3dp (½ mark)

i) Calculate the value of η given that $\eta = \frac{w}{w - xy}$ (2 marks)

- Correct subst. of student's own value - 1mk
- Correct evaluation to 1 d.p or exact - 1mk

NB: Attach the plain paper together with the scripts. (1 mark)

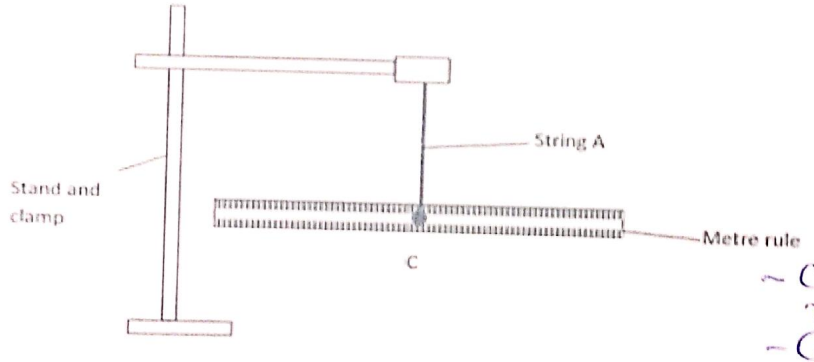
PART C.

You are provided with the following:

- A thin thread.
- A 50g mass.
- A metre rule.
- Complete stand.

Proceed as follows;

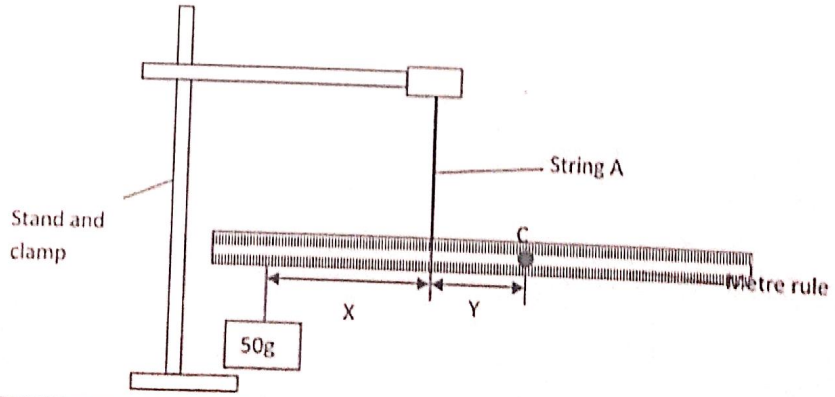
a) Using the stand and the clamp and thread, suspend the metre rule as shown and establish the position of its centre of gravity C as shown.



- Correct value within the range - ½mk
- Correct unit (½mk
- Correct value with no unit - ½mk

Position of C.O.G 5.0 ± 0.2 (4.98 - 5.02) cm (1 mark)

b) Using a thread, suspend the 50g mass at the 5cm mark and adjust the position of the string until the metre rule balances as shown.



c) Record the values of x and y in the table below.

d) Repeat b and c above for the 50g mass at 10cm mark and record the corresponding values of x and y in the table.

(2 marks)

Position of 50g mass	5cm mark	10cm mark
X cm	31.7 ✓½mk	28.2 ✓½mk
Y cm	13.3 ✓½mk	11.8 ✓½mk

±0.3 ±0.3

e). Given that $P = \frac{100x}{y}$, determine the value of P1 at 5cm and P2 at 10cm. — Correct Subst. of x and y ½mk

P (at 5cm mark) = $P = \frac{100 \times 31.7}{13.3} = 238.346$ (1 mark)

P (at 10cm mark) = $P = \frac{100 \times 28.2}{11.8} = 238.983$ — Correct eval ½mk (1 mark)

Average P = (2marks)

$P_{av} = \frac{238.346 + 238.983}{2}$ ✓1mk — Principle of averaging

$= 238.66$ — Correct evaluation to 4SF or Exact

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