Name…………………………………………………Index No……………………………

School………………………………Candidate's sign……………….Date……………...

232/3
PHYSICS
PAPER 3
(PRACTICALS)
TIME: 2 ½ HRS

SUKELLEMO JET

Kenya Certificate of Secondary Education (K.C.S.E)

INSTRUCTIONS TO CANDIDATES.

1. Write your name and Index number in the spaces provided at the top of this page
2. Sign and write the date of examination in the spaces provided above.
3. Answer all questions in the spaces provided
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 your work.
5. Marks are given for a clear record of the observations actually made, their suitability, accuracy and the use made 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 **TOTAL**

Question 1

	a	h	i	b	c	d	e	f	
Maximum score	5	2	2	3	2	1	3	2	20
Candidate score									

Question 2

	b	c	d	g	h	i	j	
Maximum score	1	2	2	6	5	2	2	20
Candidates score								

This paper consists of 10 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

QUESTION ONE

PART A (9 Marks)

You are provided with the following

- A glass block
- Soft board
- Five optical pins
- Four thumb tacks
- Plain paper
- Vernier calliper **(to be shared)**

Proceed as follows

a) Using the vernier calliper provided, measure the length l , width w and thickness T of the rectangular glass block **.** **(3marks)**

l = ……………………………………………………….

w = ………………………………………………………..

T= ………………………………………………………..

Determine the volume **V** of the rectangular glass block in SI units given that

$V = lwT$ **(2marks)**

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b) Place the glass block on the plain piece of paper. Draw its outline

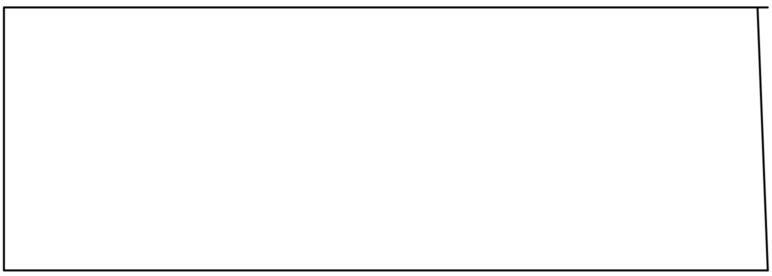

FIGURE 1

c) Remove the glass block. Mark a point x on one of the longest sides of the outline around the mid – way point. Push a pin P_1 on this point.**(P_1 is at point x)**

d) Replace the glass block to sit perfectly on it's outline.

e) On the opposite side push two pins P_2 and P_3 on the right of x so that they appear to be in line with P_1.

f) **Repeat step (e)** but with P_4 and P_5 on the left 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 $P_2 P_3$ and P_4P_5 to intersect at y as shown in **figure 2 .**

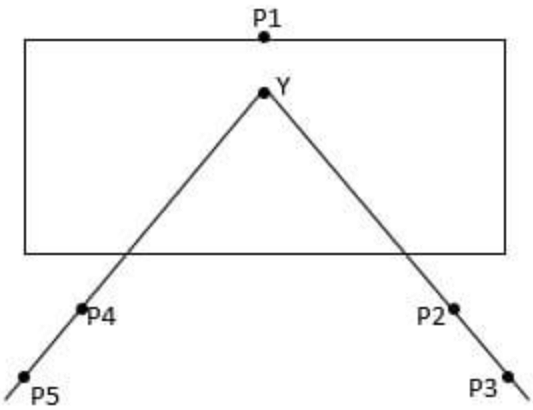

FIGURE 2

h) Measure the distance xy. **(2marks)**

xy =……………………….cm

=………………………..m

i) Calculate the value η given that **(2marks)**

$$\eta = \frac{w}{(w - xy)}$$

……………………………………………………………………………………………

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PART B (11marks)

You are provided with the following:

- a pendulum bob
- a metre rule
- a 50 g mass
- some hot water **(at 80 ± 10^{0}C)**
- some cold water **(at 25 ± 10^{0}C)**
- some thread
- a thermometer
- a complete stand
- 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 as O **(This position must be maintained throughout the experiment).**

(b) Using another piece of thread suspend the pendulum bob from the metre rule at a point 30 cm from O. Suspend the 50 g mass on the opposite side of O using another piece of thread. Adjust the position of the thread attached to the 50 g mass until the metre rule balances once more. **See figure 3.**

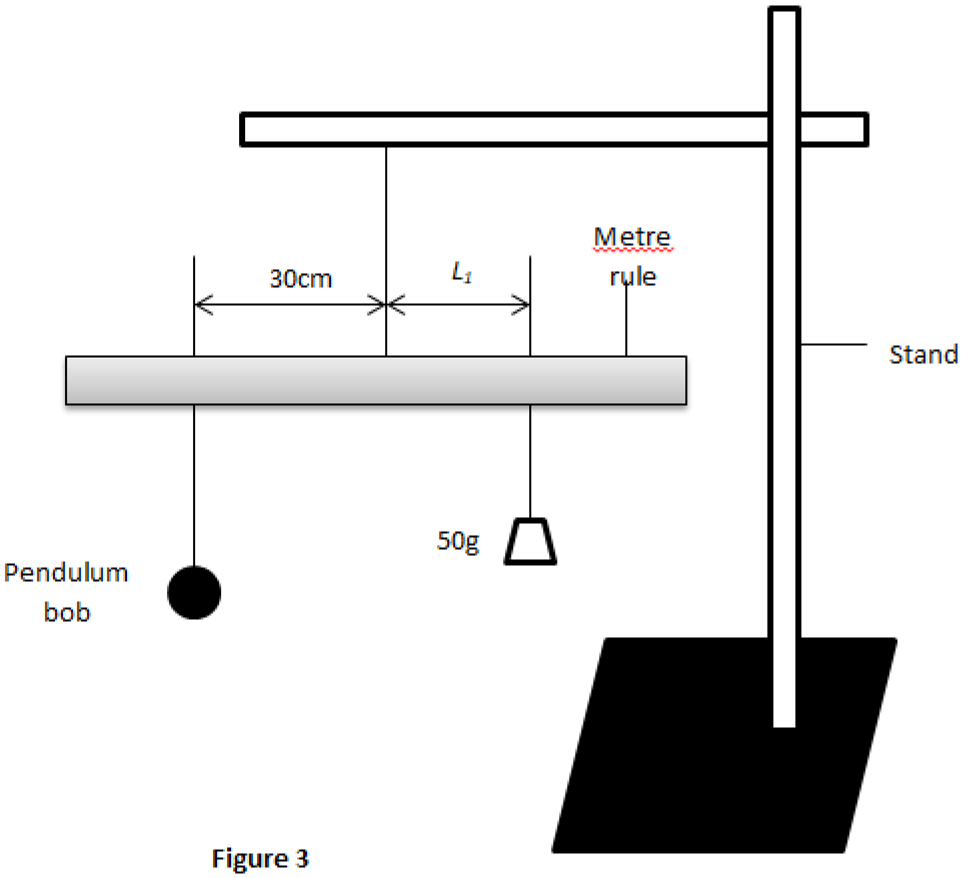

Figure 3

(I) Determine the distance $\mathbf{l_1}$ between O and the point of support of the 50 g mass.

l_1 = ……………………………………………….. cm

(1mark)

(ii) Determine the weight $\mathbf{W_1}$ of the pendulum bob in air. ***(Take g = 10 N kg^{-1})*** **(2marks)**

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(c) Put cold water into the beaker (approximately three quarter ($^3/_4$ full). With the pendulum bob still at 30 cm from O, determine the distance $\mathbf{l_2}$ of the 50 g mass at which the metre rule balances when the pendulum bob is fully submerged in the cold water. **See figure 4.**

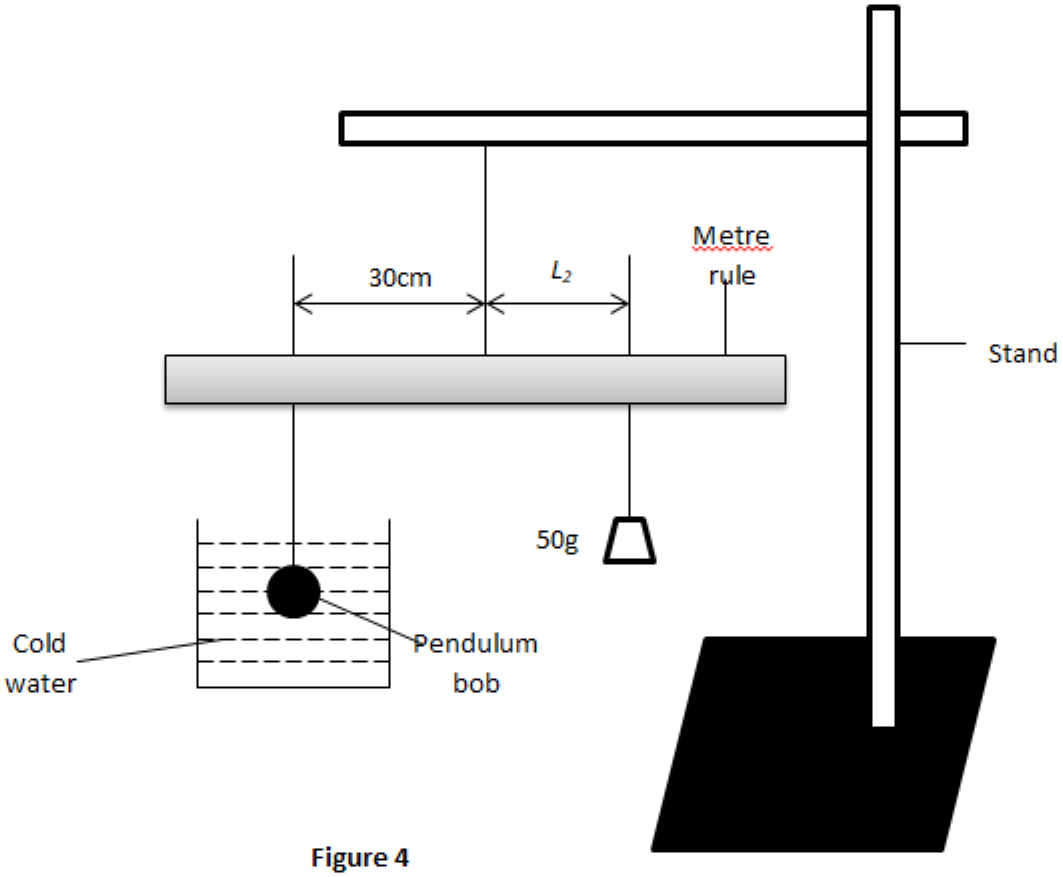

Figure 4

(I) l_2 = ……………………………………………………….. cm **(1mark)**

(II) Determine the weight W_2
of the prism in the cold water **(1mark)**

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………………………………………………………………………………………

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

T_1 = ……………………………………………… **(1mark)**

(e) Now pour out the cold water and replace it with hot water. Balance the metre rule with the pendulum bob fully submerged in hot water. **Ensure that the pendulum bob is still supported at 30 cm from 0.**

i. Determine the distance $\mathbf{l_3}$ of the point of support of the 50 g mass when the pendulum bob is submerged in hot water.

l_3 = ... cm

(1mark)

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

T_2 = ...

(1mark)

iii. Determine the weight $\mathbf{W_3}$ of the prism in hot water

(1mark)

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(f) Determine the constant **k** for the water given **(2marks)**

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

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QUESTION TWO

You are provided with the following

- A voltmeter
- An ammeter
- A galvanometer
- Two new dry cells and a cell holder
- A switch S
- 8 connecting wires each with a crocodile clip at one end properly soldered or tightly fixed
- A resistance wire labeled **X**
- A resistance wire labeled **AB** mounted on a millimetre scale
- Six 10 ohm carbon resistors
- A jockey

Proceed as follows:

(a) Set up the circuit, with the cells in **parallel** as shown in **figure 5**.

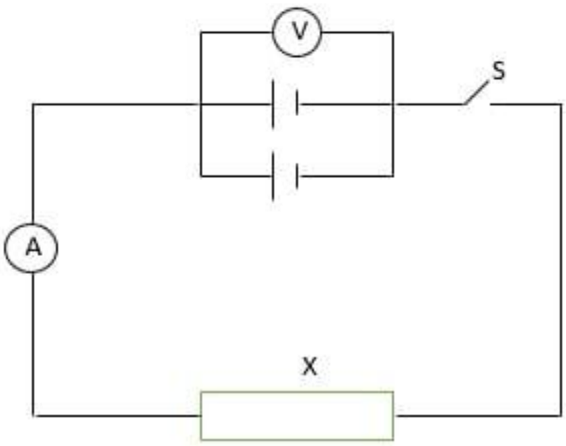

FIGURE 5

(b) With the switch open, record the reading E of the voltmeter.

E = ……………………………………………………… **(1mark)**

(c) Close the switch. Record the current **I** flowing in the circuit and the potential difference V across the cells.

I = ... **(1mark)**

V= .... **(1mark)**

(d) Given that **E = V + Ir** and **V = IX**

Determine the internal resistance **r** of the combined cells and the resistance of the wire labeled **X.**

r = ...Ohms **(1mark)**

X = ... Ohms **(1mark)**

(e) Now set up the circuit as shown in **figure 6.** Z is one of the 10 ohms carbon resistors.

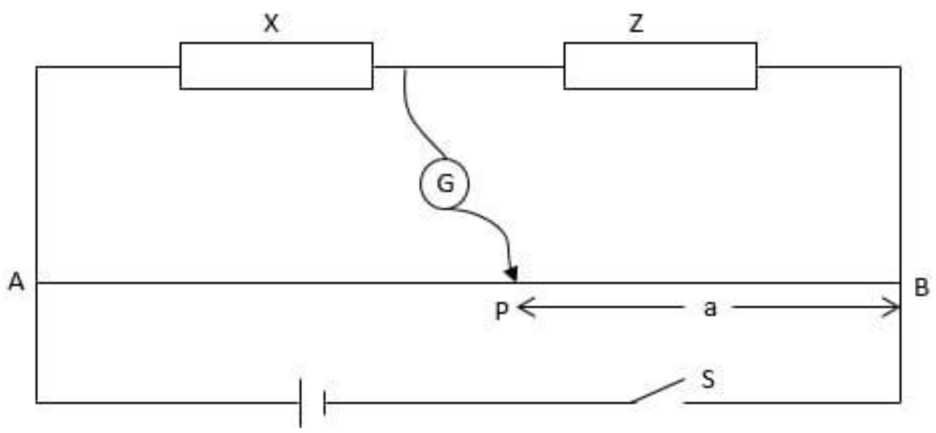

FIGURE 6

(f) Close the switch. Tap the jockey at various points on the wire AB and locate a point P at which the galvanometer shows zero deflection. Measure and record in **table 2** the length **a, where a = PB.**

(g) Repeat the procedure in (f) using **two** resistors in parallel, **three** resistors in parallel, **four** resistors in parallel, **five** resistors in parallel and **six** resistors in parallel. Record your readings in **table 2**. Complete the table**. R is the effective resistance for the parallel combination.**

Number of 10Ω carbon resistors	one	two	three	four	five	six
a (cm)						
$\frac{1}{R}$ (Ω^{-1})						
$\frac{1}{a}$ (cm^{-1})						

(6marks)

(h)Plot a graph of $\frac{1}{a}$ (y-axis) against $\frac{1}{R}$ **(5marks)**

(i)Determine the slope**, m**, of the graph. **(2marks)**

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(j)Given that $\frac{1}{a} = \frac{X}{kR} + \frac{1}{k}$, where k = 100cm.

Use the graph to determine X. **(2marks)**

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