FORM FOUR CLUSTER KCSE MODEL9

PHYSICS PAPER 3 QUESTIONS

1. You are provided with the following:
   - A flexible metre rule labelled P.

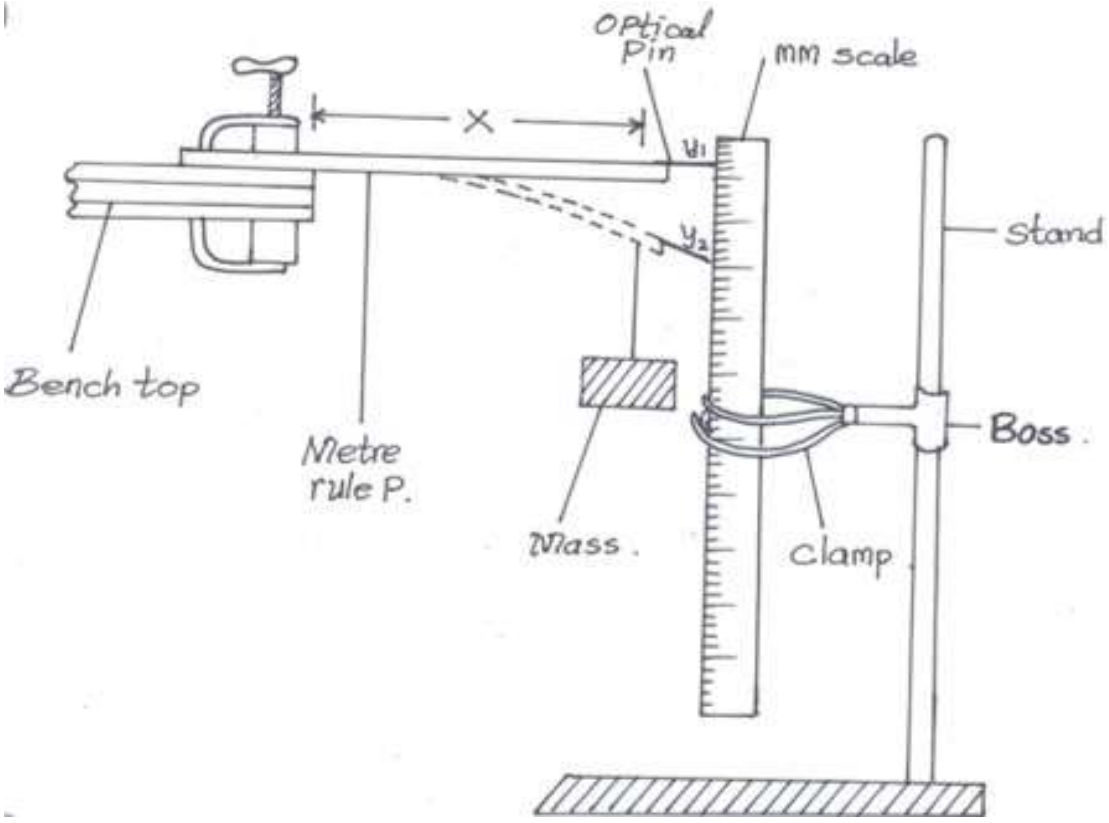
   - An optical pin.

   - A metre rule or half metre rule
   - One stand, one boss and one clamp.
   - A stop watch
   - A G clamp
   - A 100g mass (hooked)
   - A 30g mass (hooked)
   - Some thread(cotton) approximately 30cm long
   - Some cellotape

   Proceed as follows:

   a) Using the clamp provided hold the metre rule labelled P firmly on the bench such that 90cm of the rule projects from the edge of the bench. The metre rule should be perpendicular to the edge of the bench and should remain in this position throughout the experiment. Use a piece of cellotape to fix a pin at the other end of the metre rule. This will act as a pointer.

   b) Clamp the half metre rule or metre rule such that the millimeter scale is close to the tip of the pin. See figure 1. Note the reading y1, the initial position of the pointer.



   c) Hang with a loop of thread, a 100g mass at a point 5cm from the end of the metre rule P. Note y2, the reading on the scale corresponding to the new position of the pointer. Determine the

depression d = y1-y2 (always taken as positive). The distance X between the edge of the bench and the position of the string supporting the mass is now 85cm =90cm-5cm.

Record these values in Table 1

d) Repeat the procedure in(c) for other values of X shown in table 1. Complete the table.

x (cm)	y_1(cm)	y_2(cm)	d(cm)
85.0			
80.0			
75.0			
70.0			
65.0			
60.0			
55.0			
50.0			

Table 1

e) Remove the mass and note the pointer reading. Hand the 100g mass at end of the metre rule. Determine the depression D. D=……..

Remove the 100g mass.

f) Now hang the 130g (100g+30g) mass on the rule using a loop of thread and adjust its position along the metre rule until the depression is equal to D. Record the value of X, X1 at this point.

X1=……..

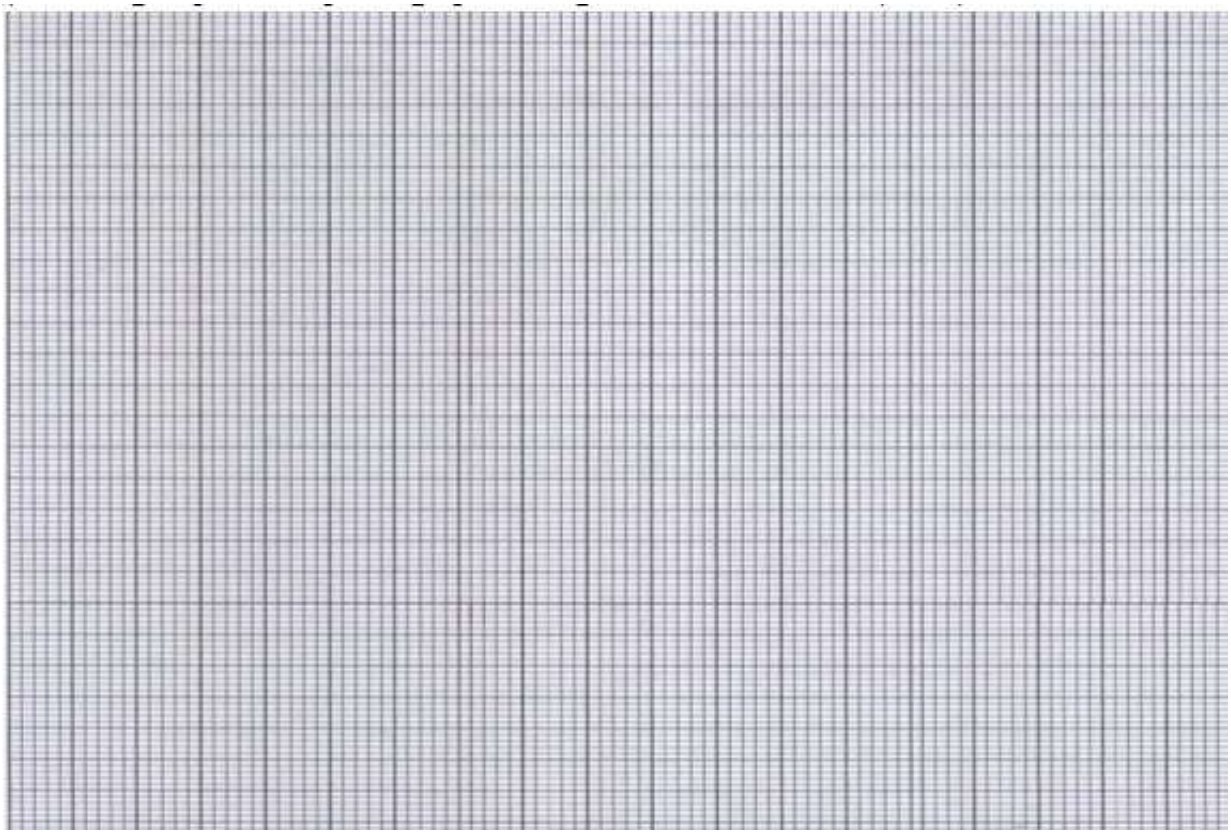
g) With the 130g mass still on, displace the end of the rule slightly and release it so that it makes vertical oscillations. Time 20 oscillations and determine periodic time, T.

Time (t) for 20 oscillations = ……..

Periodic time T= ……

h)

i) On the grid provided plot a graph of d against X.



ii) Determine the slope S of the graph.

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iii) Determine the constant K given by

$$K = \left(\frac{T^2}{4\pi^2 S}\right)\frac{D}{X_1}$$

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2. QUESTION TWO

PART A

You are provided with the following:

- Soft board

- A4 photocopying paper

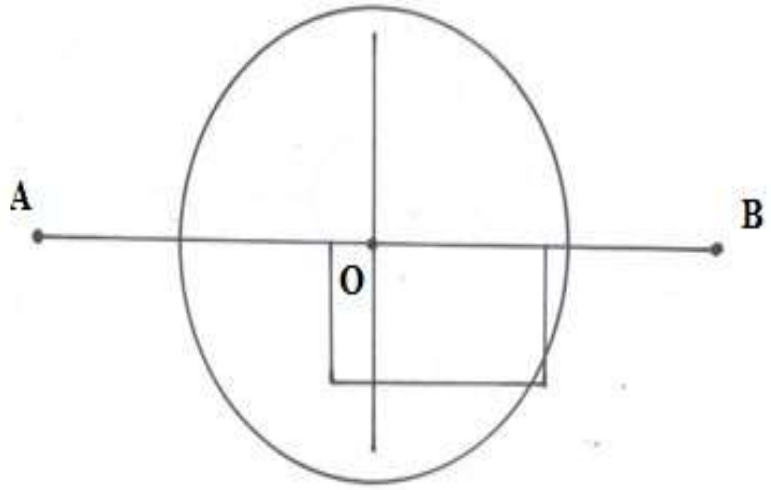
- Some cellotape

- One rectangular glass block.

- Four optical pins. Proceed as follows:

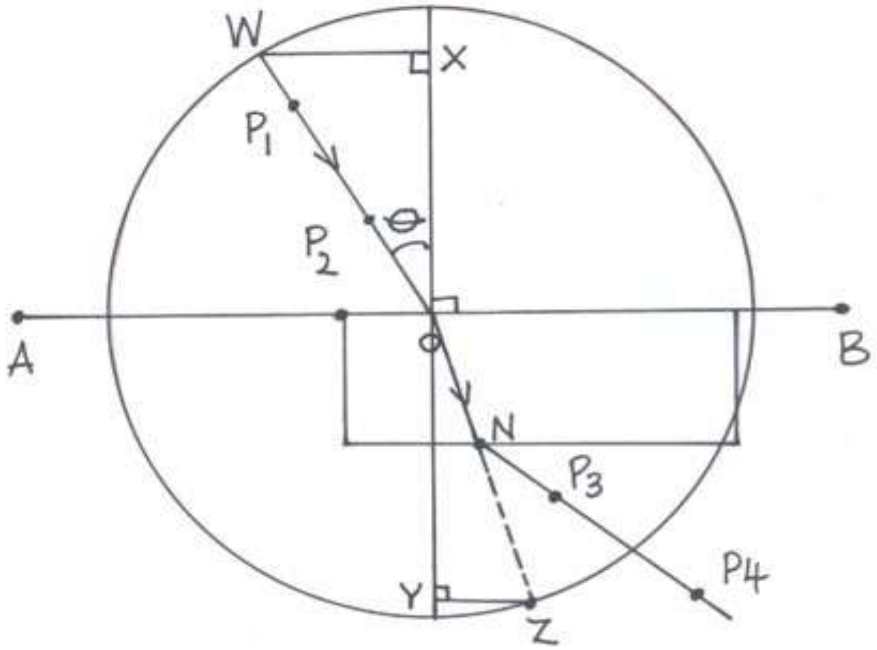
a) Fix the plain paper on soft board using cellotape. Mark a point O at the centre of the paper. Using O as the centre draw a circle of radius 9cm.

b) Draw a line AB passing through the centre O and parallel to the longer side of the paper. Place the rectangular glass block on the paper as shown in Figure 2 and trace line to AB through O and extend it to cut the circle on both sides of AB.



c) Draw line OW such that θ =200. Fix pins P1 and P2 on line OW and place back the glass block in its outline.

d) By viewing through the glass block from the opposite side of P1 and P2, fix pins P3 and P4 appears to be in a straight line with the images of P1 and P2. Remove the glass block and draw line P3P4 to meet the outline of the glass block at N, as shown in figure 2 (b).



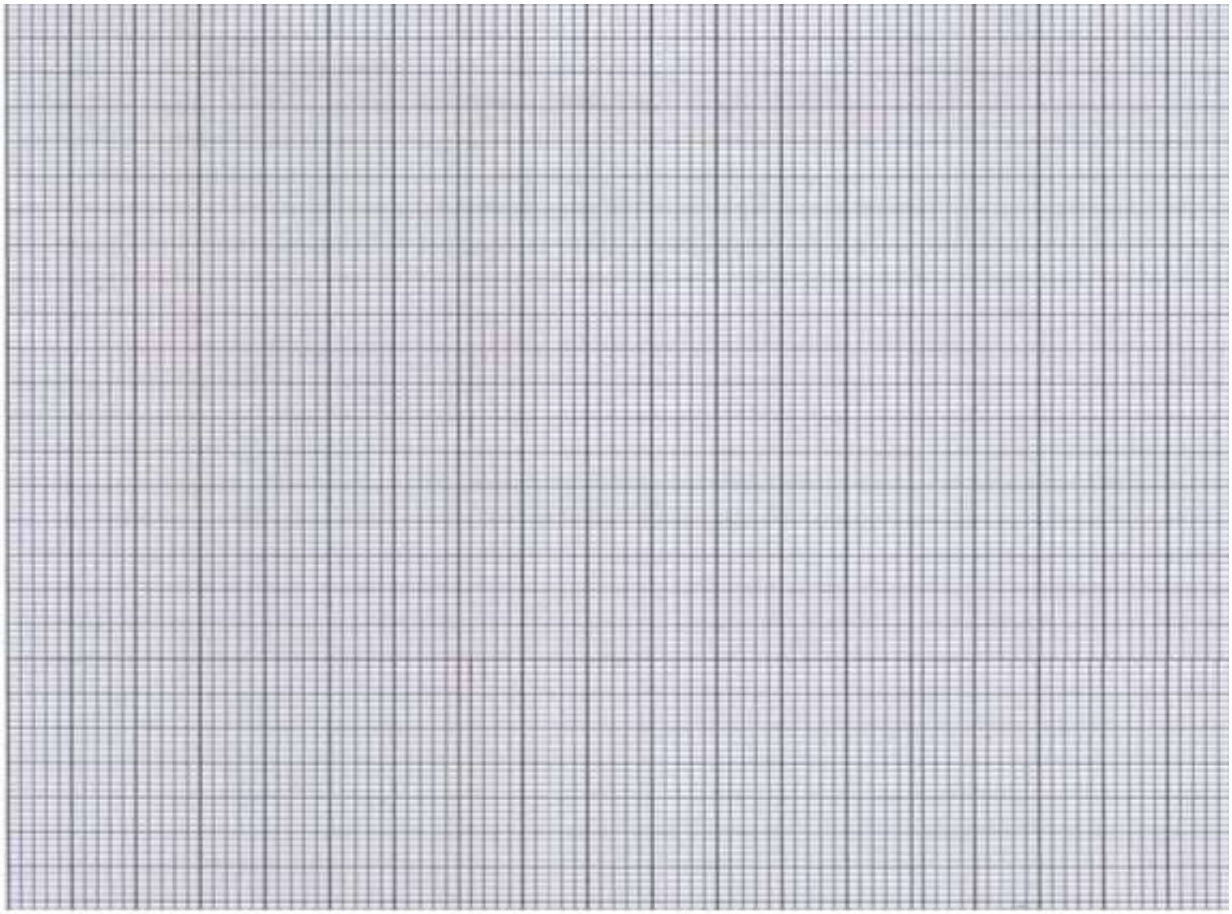
e) Draw line ON and extend it to meet the circle at Z.Draw line WX and Yz, measure and record their lengths Lwx and Lyz.

f) Repeat procedure in (c), (d) and (e) for other values of θ and complete table 2 below.

(NOTE: Plain paper used should be collected alongside the answer scripts).

$\theta(^0)$	L_{wx} (cm)	L_{yz} (cm)
20^0		
30^0		
40^0		
50^0		
60^0		
70^0		

g) i) Plot a graph of Lwx against Lyz



ii) Find the value of P given that

$L_{wx} = PLyz+K$

PART B

You are provided with the following:

- 2 new dry cells.

- A cell holder for 2 dry cells

- A switch - A votmetre (0-5v)

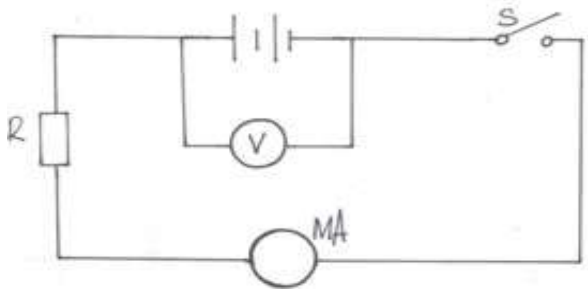
- A milliameter.

- A resistor labelled R=4.7K$_{t\,\theta}$

- atleast 8 connecting wires with atleast 4 of them with crocodile clips at one end

Proceed as follows:

h) Set up the circuit as follows:



i) With S open, record the values of V and I.

V=V1=.....V

j) Now close S, and again record the values of V and I

V = V2= ..... I = I2= .....

k) Using the values obtained in (i) and (j) determine the values of the;

i) Electromotive force of one cell.

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ii) Internal resistance, r of one cell.

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