

Name: ..... Adm No: .....  
School: ..... Class: .....  
Signature: ..... Date: .....

PHYSICS (232/3)  
FORM FOUR (4)  
Time:  $2\frac{1}{2}$  Hours

## KCSE TOP PREDICTION MASTER CYCLE 5

### INSTRUCTIONS:

- Answer all the questions in this paper
- You are supposed to spend the first 15 minutes of the  $2\frac{1}{2}$  hours allowed for this paper reading the whole paper carefully before starting your work.
- Marks are given for clear record of the observations made, their suitability and accuracy and the use made of them.
- Candidates are advised to record observations as soon as they are made
- Mathematical table and electronic calculators may be used.
- **The earth's gravitational pull,  $g = 10Nkg^{-1}$**

For Examiner's use only:

QUESTION	TOTAL MARKS	CANDIDATE'S SCORE
1	20	
2	20	
GRAND TOTAL	40	

*This paper consists of 7 printed pages. Candidates should check the question paper to ensure that all the pages are printed as indicated and no questions are missing.*

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### QUESTION ONE

You are provided with the following apparatus:

- Two new size ‘D’ dry-cells
- switch
- milli-ammeter
- voltmeter (0-3V)
- two enameled copper rods
- rheostat (0 – 100 $\Omega$ )
- eight connecting wires with at-least 4 fitted with crocodile clips
- Micrometer screw-gauge (to be shared)
- 50 ml beaker (labelled, A)
- 75 ml of distilled water (labelled, B)
- solid X
- Measuring cylinder
- Thermometer
- Glass-rod for stirrer
- Sand-paper

#### Proceed as follows:

a) Measure the temperature of the distilled water in beaker, B

Temperature,  $\theta$  = ..... (1 mark)

b) Place the provided solid X into the beaker labelled, A. measure 50 ml of the distilled water and gently pour it into beaker A and stir gently until all the solid X is dissolved to form solution, C.

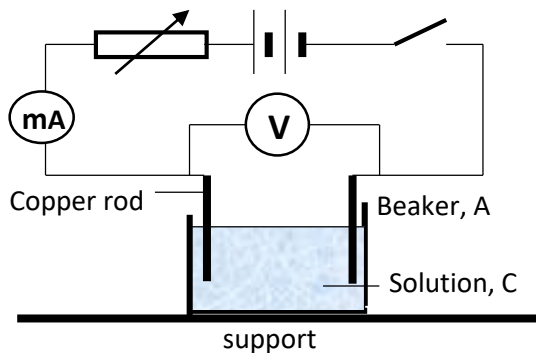
c) Measure the diameter, d of one of the copper rods.

i. diameter, d = ..... m (1 mark)

ii. determine the cross-section area, A of the copper rod (2 marks)  
A =

.....  
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- d) Using the sand paper, remove the insulating coating at the both ends of each of the copper rods. Now set-up the apparatus as shown in figure 1 below.



**Figure 1**

- e) With the help of the rheostat, set the current value to 30 mA and measure its corresponding voltage, V.

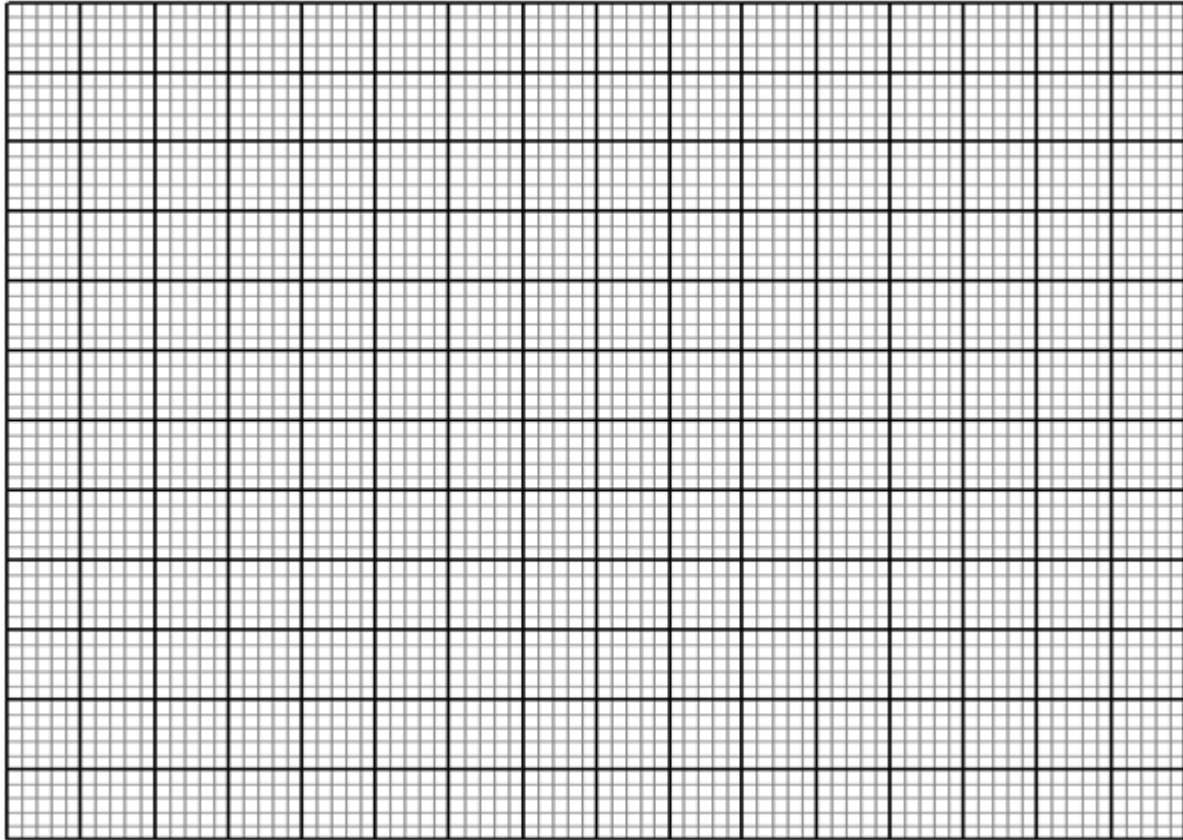
V = ..... (1 mark)

- f) Repeat the above procedure for the values of current indicated in the table, 1 below and note their corresponding voltages. Complete the table. (5 marks)

**Table 1**

Current, I (mA)	30	40	50	60	70
Current, (A)					
Voltage, V					

- g) In the grid provided, plot a graph of voltage (y-axis) against current (A) (X-axis) (5 marks)



h) Determine the slope,  $S$  of the graph

(3 marks)

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i) The voltage and current are related by the equation:  $V - \frac{bI}{A} = 0$

Determine the value of  $b$ .

(2 marks)

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$b =$  .....

## QUESTION TWO

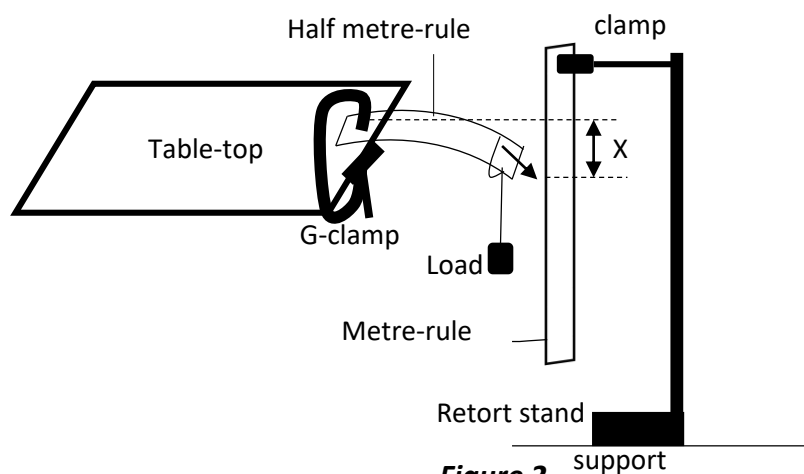
You are provided with the following apparatus:

- Complete retort-stand (clamp, boss and stand)
- Half metre-rule
- Metre-rule
- G-clamp
- Office pin
- Four 100g masses (or its equivalent)
- Some celotape
- Vernier calipers (to be shared)
- String/thread (about 30 cm long)
- One 50g mass
- Knife-edge

## PART A

### Proceed as follows:

- a) Arrange the apparatus as shown in figure 2, below. Ensure the 10 cm mark of the half metre-rule is at the edge of the table and firmly held by the G-clamp while the pin (pointer) is at the 90 cm mark on the scale of the metre-rule. (The clamp should not be removed for the entire duration of carrying-out this experiment)



**Figure 2**

- b) Suspend one 100 g mass at the 49.5 cm mark and record the new pointer reading,  $P_1$

$P_1 = \dots\dots\dots$

**(1 mark)**

- c) Continue adding the load in 100 g steps, each time recording the pointer position. Ensure that the half metre-rule is not overloaded.

d) Determine the amount of sagging, X and complete the table, 2 below.

(6 marks)

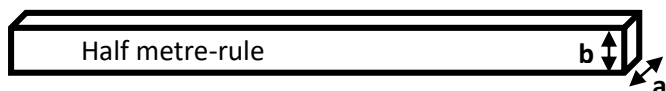
**Table 2**

Mass (g)	Load (N)	Pointer position (cm)	Amount of sagging, X (m)
100			
200			
300			
400			

**PART B**

**Procedure**

e) Use the Vernier calipers to determine the width, a and breadth, b of the half metre-rule

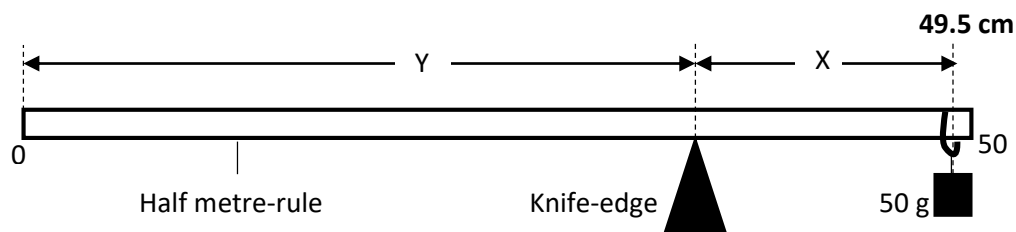


**Figure 3**

Width, a = ..... cm (1 mark)

breadth, b = ..... cm (1 mark)

- f) Using a loop of thread suspend the 50g mass at the 49.5cm mark on the half-metre rule.  
g) With the 50g mass fixed at that position adjust the position of the half-metre rule on the knife edge until it balances horizontally as shown in figure 4.



**Figure 4**

- h) At the balance position, read off the length  $x$  and  $y$  and record in table 3.
- i) Using the values of  $x$  and  $y$  obtained in 'h' above, determine the weight,  $W$  of the half metre-rule  
(3 marks)

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$W =$  .....

- j) Move the suspended mass 2cm towards the centre of the rule and repeat parts (g) and (h) to obtain other values of  $x$  and  $y$  so as to complete table 3.  
(4 marks)

**Table 3**

Position of the mass of 50g	X (cm)	Y (cm)
49.5 cm mark		
47.5 cm mark		
45.5 cm mark		
43.5 cm mark		
41.5 cm mark		



k) Given that quantity, P is given by:  $p = \frac{W}{g (5ab \times 10^{-5})}$ ; determine the value of P (3 marks)

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l) State the significance of the quantity, P (1 mark)

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