# MARANDA HIGH SCHOOL

## Kenya Certificate of Secondary Education
## PRE-MOCK EXAMINATIONS 2022

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

**June 2022 – 2½ Hours**

Name: ..... Adm No: .....

Class: .....Candidate's Signature: .....Date: 30/6/2022.

**INSTRUCTIONS TO CANDIDATES**

- *Write your name and index 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**

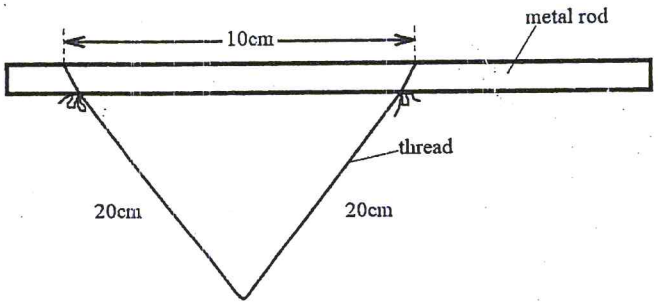
## QUESTION 1
## PART A

You are provided with the following apparatus

- A metre rule.
- Two complete stands.
- A stop watch
- Two pieces of thread (50 cm and 50 cm)
- Steel rod of diameter 5 mm and length 60 cm

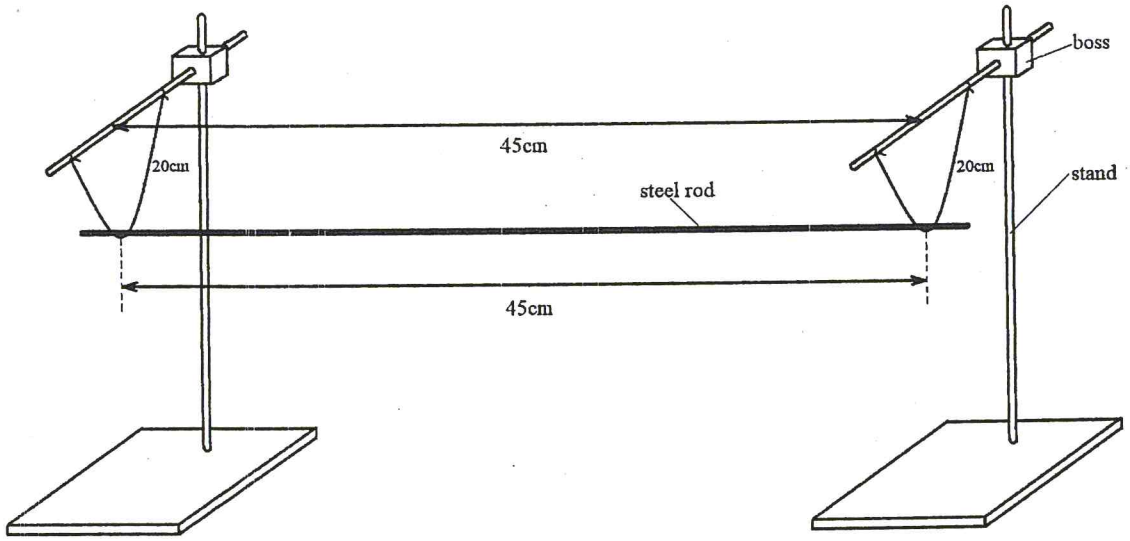
**Proceed as follows**

**a)** Use the threads to make two loops, suspend the threads on the metal rod as shown in the figure below.




Each side of the loop on the rod should be approximately 20 cm long.

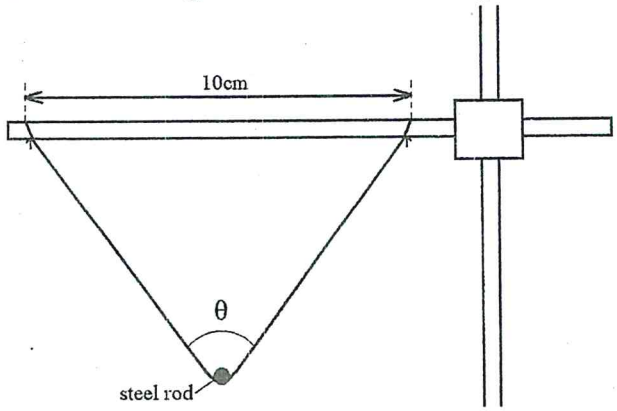
**b)** Set up the apparatus as shown below.




The two boss rods should be parallel, equal in heights above the bench and 45 cm apart. The two strings supporting the steel rod should be 45 cm apart.

c)

(i) Measure and record the angle $\theta$ as shown in the figure below



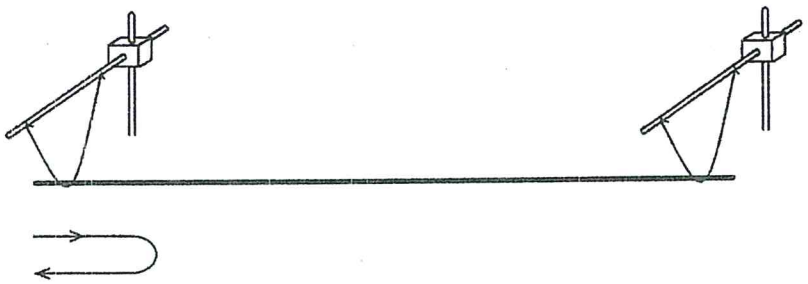

$\theta$ = ..... (1 mark)

(ii) Calculate the value of $\cos\left(\frac{\theta}{2}\right)$

$\cos\left(\frac{\theta}{2}\right)$ = ..... (1 mark)

d)

(i) Move the steel rod to the left. Release it and watch the movement. The rod will move to the right and then to the left again, completing an oscillation as shown below.



(ii) Time two complete oscillations and the time taken $t_1$

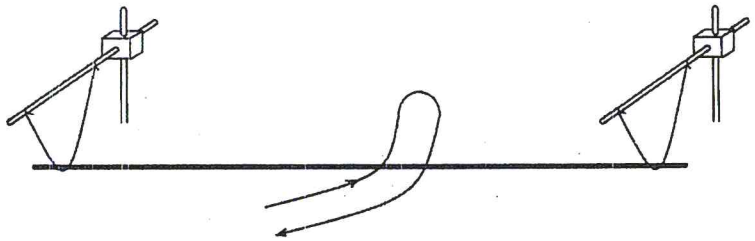
$t_1$ = ..... s (1 mark)

Determine the periodic time $T_1$

$T_1$ = ..... s (1 mark)

e)

**(i)** Move the centre of the steel rod towards you through a small distance. Release it and watch the movement. The rod will move away from you and then back towards you completing a cycle as shown below



**(ii)** Time two complete oscillations and record it as $t_2$

$t_2$ = ..... s (1 mark)

Determine the periodic time $T_2$

$T_2$ = ..... s (1 mark)

f) The relationship between $T_1$, $T_2$ and $\theta$ is given by the equation $\frac{T_1}{T_2} = k\cos\left(\frac{\theta}{2}\right)$ where $k$ is a constant. Using your data, calculate the value of $k$. (2 marks)

.....

.....

.....

**PART B**

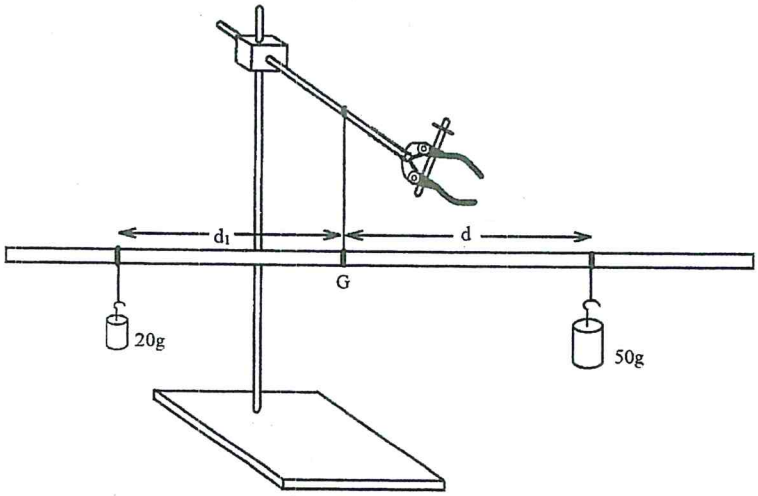
You are provided with the following apparatus:

- 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.

$G$ = .....

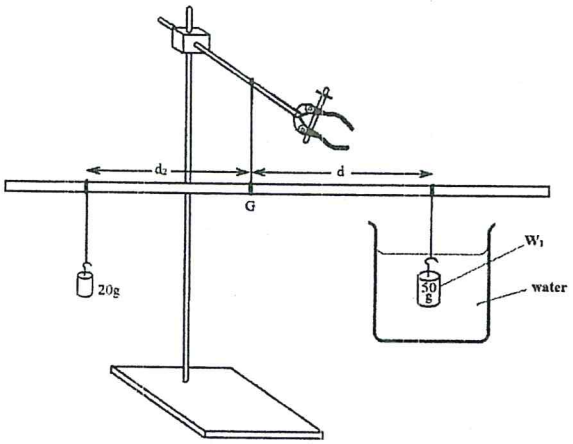
b) Suspend the 50g mass at a distance $d = 10\ cm$, then suspend the 20g mass and adjust its position such that the metre rule is balanced as shown in the figure below




c) Record the distance distance $d_1$

$d_1$ = ..... cm (1 mark)

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




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

$d_2$ = ..... cm (1 mark)

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

.....

.....

.....

(2 marks)

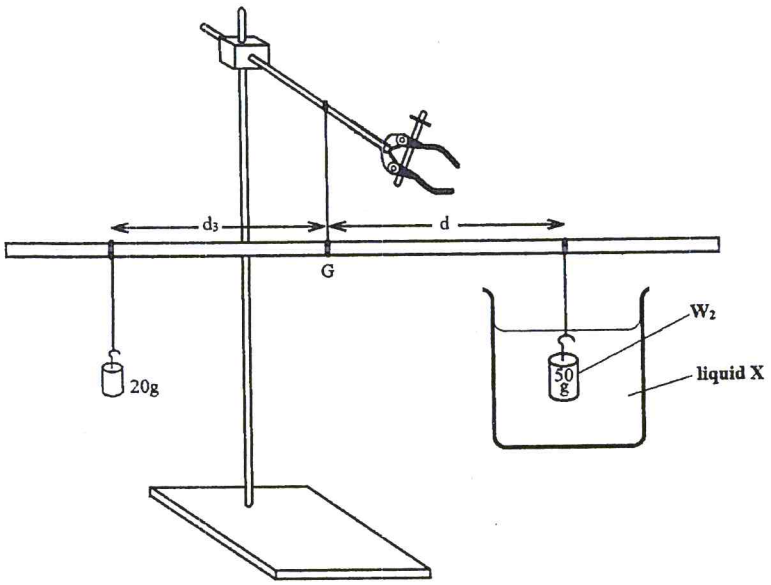
g) Determine the upthrust $U_1$ on the 50g mass in water. (2 marks)

.....

.....

.....

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




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

.....

.....

.....

j) Determine the upthrust $U_2$ on the 50g mass in liquid X. (2 marks)

.....

.....

.....

k) Given that $\rho_L = \frac{U_2}{U_1} \times \rho_W$ where $\rho_W = 1000 kgm^{-3}$ . Calculate $\rho_L$ (2 marks)

.....

.....

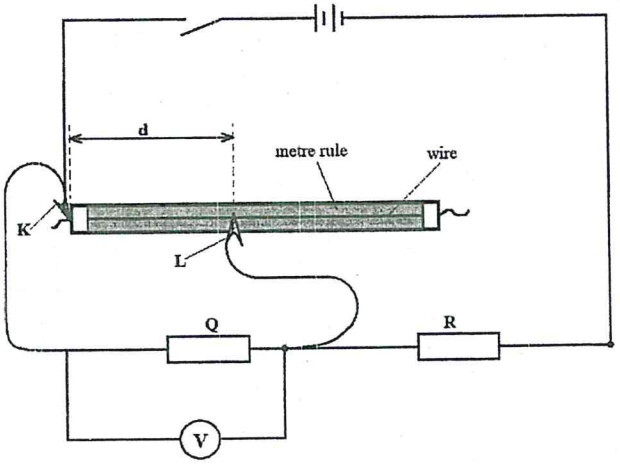
## QUESTION 2

You are provided with the following:

- 2 new size D dry cells
- A cell holder
- A switch
- 8 connecting wires
- Resistor box labelled $R = 18\Omega, 22\Omega, 27\Omega, 33\Omega$ *and* $39\Omega$
- Resistor labelled $Q = 10\Omega$
- Nichrome wire mounted on a mm scale
- A micrometer screw gauge (to be shared)
- A Voltmeter

**Proceed as follows**

(a) Set up the circuit as shown in the figure below.




Place L at a length $d = 20\ cm$, **keep the length constant through throughout the experiment.** The distance between K and L is $d$ as shown above. Close the switch and record the voltmeter reading V.

$V$ = ..... V (1 mark)

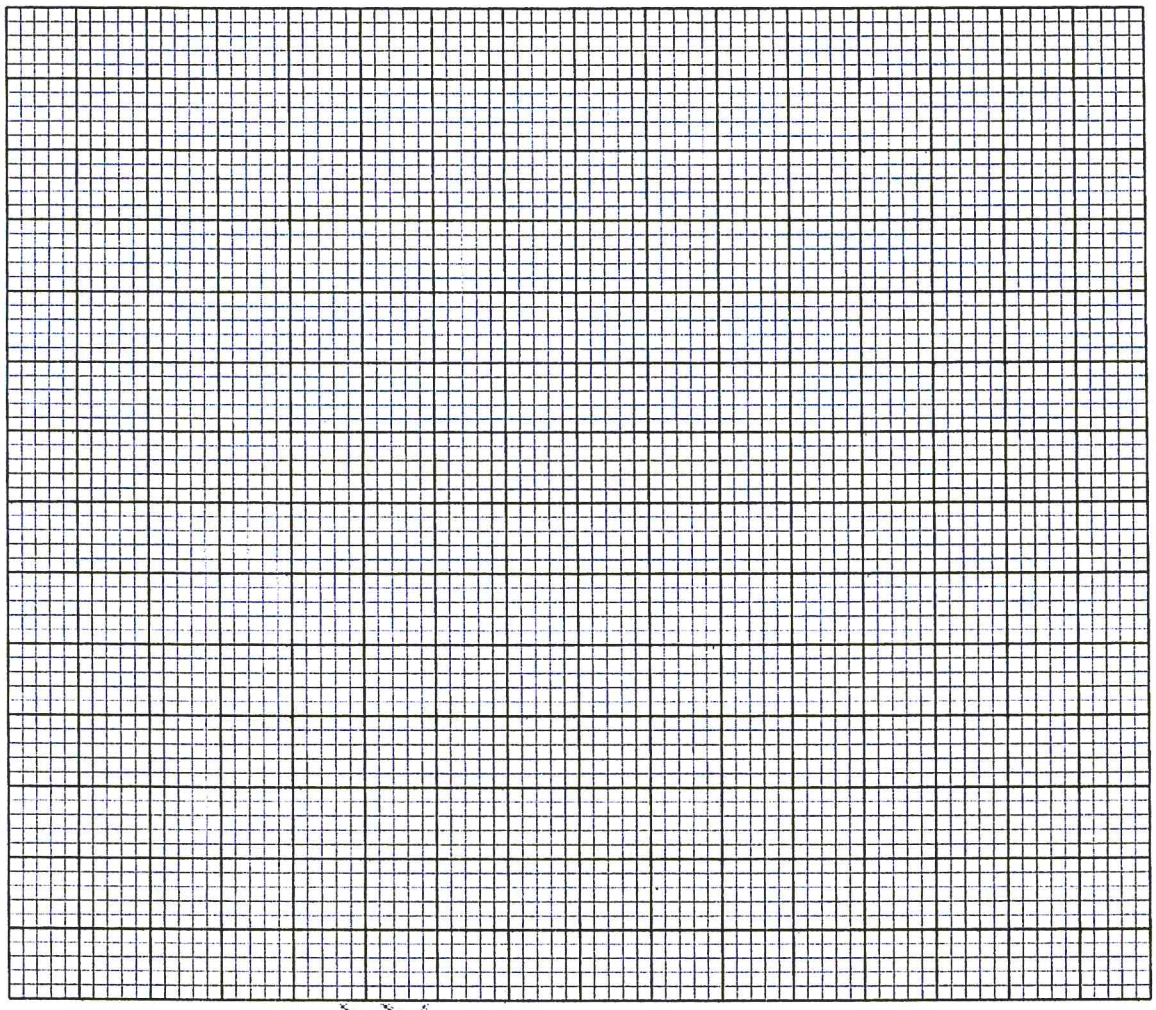
(b) Open the switch. Repeat the steps above for other values of resistor to measure voltage across each of the resistors

$R = 18\Omega, 22\Omega, 27\Omega, 33\Omega$ *and* $39\Omega$ to measure the v

Read and record corresponding voltmeter reading in table 1 below. (6 marks)

| Resistor R ($\Omega$) | 18 | 22 | 27 | 33 | 39 |
|---|---|---|---|---|---|
| Voltage V (V) | | | | | |
| $\frac{V}{R}(A)$ | | | | | |

(c) Plot a graph of $\frac{V}{R}(y-axis)$ against V on the $x-axis$ (4 marks)



(d) Determine the slope $S$ at $V = 0.5V$ (3 marks)

.....

.....

.....

(e) Measure the diameter D of the nichrome wire.

$D =$ ..... mm ($\frac{1}{2}$ mark)

$D =$ ..... m ($\frac{1}{2}$ mark)

(f) Determine the cross-section area A of the nichrome wire.

A..... $m^2$ (2 marks)

(g) Given that $X = \frac{A}{Sd}$, find the value of $X$ where $d = 20\ cm$ (2 marks)

.....

.....

.....

(h) What physical quantity does X represent? (1 mark)

.....

.....