**Name: …………………………………………………………… Adm No. …………………………**

**Class: ………………………………………………………….**

**232/3**

**PHYSICS**

**PAPER 3**

**F4 OPENER TERM 1**

**TIME: 2 ½ HOURS**

**TEACHER.CO.KE EXAMINATION 2022**

***Kenya Certificate of Secondary Education.***

**232/3**

**PHYSICS**

**PAPER 3**

**TIME: 2½**  **HOURS.**

**INSTRUCTIONS TO CANDIDATES:**

* *Write your* ***name*** *and* ***index number*** *in the spaces provided above.*
* *Sign and write the* ***date*** *of the examination in the spaces provided above.*
* *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 observation actually made, their suitability, accuracy and the use made of them.*
* *Candidates are advised to record their observations as soon as they are made*
* *Non-programmable silent electronic calculators* ***may be*** *used.*
* *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** | **Maximum score** | **Candidate’s score** |
| 1 | 20 |  |
| 2 | 20 |  |
| **TOTAL** | 40 |  |

***This paper consists of 8 printed pages candidates should check the questions to ascertain that all pages are printed as indicated and that no questions are missing***

1. You are provided with the following apparatus:
* A half-metre rule.
* A piece of thread.
* A knife edge.
* A 50g mass.

**Procedure**

1. Write down the mass of the half-metre rule as labelled on it.

Mass R………………………….kg (1 mark)

1. Using a loop of thread suspend the 50g mass at the 49.5cm mark on the half-metre rule.
2. 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 1.



1. At the balance position, read off the length x and y and record in table 1.
2. Move the suspended mass 2cm towards the centre of the rule and repeat parts (iii) and (iv) to obtain other values of x and y so as to complete table1. (6 marks)

**Table 1**

|  |  |  |
| --- | --- | --- |
| 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 |  |  |
| 39.5 cm mark |  |  |
| 37.5 cm mark |  |  |
| 35.5 cm mark |  |  |

1. Plot a graph of y (cm) against x (cm). (5 marks)



1. Calculate the gradient of your graph. (3 marks)
2. The relationship between y and x is given by $y= \frac{50}{P}$x + C where P is a constant and C is the distance of the centre of gravity of the rule from the ‘zero’ end. From your graph determine;
3. The constant P. (3 marks)
4. The position of the centre of gravity of the rule. (2 marks)
5. (a) You are provided with the following apparatus:
* Resistance wire fitted on a scale labelled MN
* Switch
* Voltmeter
* Ammeter
* Two dry cells
* Six connecting wires
1. Set up the apparatus as shown in the figure below;

V

A

M

N

Crocodile clip

Switch

L

1. Remove the crocodile clip to the resistance wire such that MN and close the switch. Record the voltmeter reading.

Y=………………………………………..V (1 mark)

1. Attach the crocodile clip to the resistance wire such that L=10cm
2. Record the voltmeter and ammeter readings in the table below.
3. Repeat the procedure in (iii) and (iv) for L=20cm, 30cm, 50cm, and 80cm
4. Complete the table below; (5 marks)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Length L=cm | 10 | 20 | 30 | 50 | 80 |
| Current I (A) |  |  |  |  |  |
| P.d (V) |  |  |  |  |  |
| Y-V |  |  |  |  |  |
| $$\frac{V}{Y-V}$$ |  |  |  |  |  |
| R = $\frac{V}{I}$ |  |  |  |  |  |

b) Plot a graph of R (vertical axis) against $\frac{V}{Y-V}$ (5 marks)



c) Determine the slope m of the graph (2marks)

d) The graph is given by the equation $R=\frac{5mv}{y-v}+d$ determine the value of m and d (2 marks)

(b) You are provided with the following set of apparatus

* A metre rule
* A white screen
* A candle
* Lens and lens holder

 **Procedure**

1. Set up the apparatus as shown

**L1**

L**2**

Screen

Lens

Candle

1. Starting with L1=30cm, adjust the position of the candle in order to obtain a sharp image on the screen. Record the value of L2………………………………………. (1mk)
2. Repeat the procedure for L1=60cm
3. Fill and complete for values of L1/L2 below. (3 marks)

|  |  |  |
| --- | --- | --- |
| L1cm | L2(cm) | $$\frac{L\_{1}}{L\_{2}}$$ |
| 30 |  |  |
| 60 |  |  |

1. Given the equation

$$F\_{1}=\frac{L\_{1}}{m+1}$$

When m=magnification determine the value of focal length f, (2 marks)