**NAME: ………………………………………………………… INDEX NO: ……………………..………………**

**SCHOOL………………………………………………………. DATE: ……………………………………….….**

**CANDIDATE’S SIGN……………………………..………….**

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232/3

**Physics**

Paper 3 (Practical)

**Time: 2 ½ hours**

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

**Physics**

**Paper 3**

**Practical**

**INSTRUCTIONS TO THE CANDIDATES**

* *Write your* ***name******school*** *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.*
* *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*
* *All working must be clearly shown*
* *Mathematical tables, and electrical calculators may be used*

**For Examiners’ Use Only**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Question One** | a (i) | a (ii) | b (i) | b(ii) | c | d(i) | d(ii) | d(ii) |  |
| **Maximum score** | 1 | 1 | 1 | 1 | 6 | 5 | 3 | 2 |  |
| **Candidates score** |  |  |  |  |  |  |  |  |  |

Total score

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Question two** | a(i) | a(ii) | a(iii) | b(i) | b(ii) | b(ii) | b(iii) | d | e(i) | e(ii) | f | g |
| **Maximum score** | 1 | 1 | 1 | 2 | 1 | 1 | 3 | **5** | **1** | **2** | **2** |  |
| **Candidates score** |  |  |  |  |  |  |  |  |  |  |  |  |

**Total score Grand Total**

*This paper consists of 6 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

**Question 1**

***You are provided with the follwing:***

- A glass marble

- A stop watch

- A 105 cm plastic tube split open with a mark near one end.

- Vernier calipers (to be shared)

- A metre rule or half metre rule.

- A balance (to be shared).

- Retort stand, one boss and one clamp

- Wooden block (for blocking the marble from rolling away)

***Proceed as follows***

1. Use the vernier calipers provided to measure the diameter of the marble and hence determine the radius.

(i) Diameter of the marble ‘d’ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_ cm (1mk)

(ii) Radius of the marble ‘r’ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_cm (1mk)

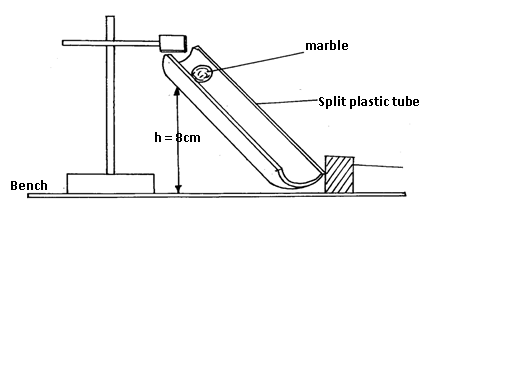
(b) (i) Using the balance provided obtain the mass m of the marble.

m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_g (1mk)

(ii) Determine the constant ‘**P**’ given that **P** = 0.4 mr2 (1mk)

(c) The experiment involves timing a marble as it rolls down the split tube as a runway

lamp the marked end of the split tube with the inside uppermost. Ensure the end with the mark is on the greater slope. Raise this end such that the mark is at a height h = 8cm above the bench level. The other end should rest on the bench as shown in the figures below.



**Wooden block**

Place the marble at the mark on the runway and hold it in place gently with the finger as shown in the figure. By simultaneously releasing the ball and starting the stop watch, measure and record in the table below the time taken by the marble to reach the lower end of the runway. (it is advisable to measure the time twice and record the average value).

Vary the height **h** to other values shown in the table below. Measure and record in the table the corresponding average value of **t**. Complete the table.

**TABLE**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Height h (cm)** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| **Average time t(s)** |  |  |  |  |  |  |  |  |
| **t2 (S2)** |  |  |  |  |  |  |  |  |
| **1/h (cm-1)** |  |  |  |  |  |  |  |  |

**(6mks)**

(d) (i) On the grid provided plot the graph of t2 (y - axis) against 1/h (5mks)

(ii) Determine the slope **S** of the graph (3mks)

(iii) Determine the constant **G** for the marble given that:-

G = Mr2 (s/20 - 1) (2mks)

**Question Two**

***You are provided with the following:***

* A voltmeter
* Two dry cells and a cell holder
* A switch
* A resistor labelled **R** (10 ohms)
* A wire mounted on a mm scale and labelled **G**
* A micrometer screw gauge (to be shared)
* Six connecting wires with six crocodile clips.

***Proceed as follows***

(a) Record the length of the wire labeled **G** in meters m.

(i) Lo ………………….m (1mk)

Use the micrometer screw gauge provided to measure the diameter of the wire labelled **G** at two different points and determined the average diameter **d.**

(ii) The diameter of d = ………………….mm

d = …………………..m (1mk)

(iii) The radius **r** of the wire in metres

r …………………….m (1mk)

(b) Set-up the apparatus as shown in the circuit diagram below.

(i) Use the voltmeter provided to measure the p.d VR and the p.d VG across **G** when the switch is closed.

VR = ………………………………….Volts (1mk)

VG = ………………………………….Volts (1mk)

***Open the switch.***

(ii) Use the value of **R** provided and the value of the VR in b(i) above to calculate the current I flowing through **R** when the switch was closed.

I = …………………………………Amperes (1mk)

(iii) Determine the constant **H** given that

H = 100VG

I x L0

H = …………………………………….Wm-1  (1mk)

Connect the voltmetre across **R** as shown below in the diagram.

Adjust the position of one crocodile clip on the wire **G** to a point such that the length **L** of the wire in the circuit is 5cm. (see the figure). Close the switch.

Read and record in table below the value of the p.d across **R.** Open the switch.

(d) Repeat the procedure in **C** above for the other values of **L** shown in the table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Distance L (cm) | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 70 |
| p.d v across R(V) |  |  |  |  |  |  |  |  |

(3 mks)

(e) (i) On the grid provided plot the graph of V (y – axis)against **L** (5mks)

(ii) From the graph, determine L1,the value of **L** when V = Vo where Vo is the p.d when

2

L = O (1mk)

(f) Determine the constant **D** for the wire given that

D = R 300

X

L1 V0 (2mks)

(g) Determine then constant P given that

P = πr2 (D + H), where r is the radius of the wire in metres.

2 (2mks)