

MARKING SCHEME.

SUKELEMO MOCK EXAMINATIONS

Kenya Certificate of Secondary Education (K.C.S.E)
 PHYSICS
 (PRACTICAL)
 Paper 3 -- December 2020

QUESTION ONE

Part A

(a) Measure the length l of the boiling tube provided using a metre rule

$l = 15.0 \text{ cm}$ (1 mark)
 ± 0.2 2dp. a.s.t

(b) Measure the external diameter d of the boiling tube at the middle using a Vernier callipers.

$d = 2.46 \text{ cm}$ (1 mark)
 2dp. w.t. ed

(c) Calculate the external volume of the boiling tube. $V_1 = 14$ (1 mark)

Substitution $V = \pi r^2 l$ (a) oak(10)

Exact evaluation or 4s.f. $V = 14$

(d) Completely fill the boiling tube with water. Pour the water into the measuring cylinder. Read and record the volume V of the water.

$V_2 = 62 \text{ cm}^3$ (1 mark)
 $\pm 1 \text{ cm}^3$ 1dp. w.t. ed

- (e) Calculate the volume V , of the glass used to make the boiling tube.
(1 mark)

Answer in (c) -- V_a (exact subtraction)

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- (a) Measure the length l of the boiling tube provided using a metre rule.

$l = \dots\dots 15.0 \text{ cm}$ (1 mark)

- (b) Measure the external diameter d of the boiling tube at the middle using a Bourdon caliper.

$d = \dots\dots 2.25 \text{ cm}$ (1 mark)

- (c) Calculate the external volume of the boiling tube. $V_1 = \frac{\pi d^2 l}{4}$ (1 mark)

Substitution of values into the formula

Exact evaluation of $V_1 = \dots\dots 1.47 \text{ cm}^3$

- (d) Completely fill the boiling tube with water. Pour the water into the measuring cylinder. Read and record the volume V_2 of the water.

$V_2 = 12 \text{ cm}^3$ (1 mark)

- (e) Calculate the volume V of the glass used to make the boiling tube.
(1 mark)

Answer in (c) -- V_2 (exact subtraction)

$V = V_1 - V_2 = 1.47 - 12 = -10.53 \text{ cm}^3$

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(f) Using the electronic balance measure the mass of the boiling tube

Mass = **0.026** kg (1mark)

(e) Determine the density of the glass. (1mark)

Answer in (f) Answer in (e)

Exact evaluation or 4 s.f.

PART B

(a) Record the voltmeter reading when the switch is open.

E = 6.0 V

(ii) Close the switch and record the voltmeter and ammeter readings V and I.

I = 0.09 A (1mark)

(iii) Explain why V is less than E. (1mark)

volts are lost in overcoming the internal resistance

(iv) Now connect the voltmeter across the carbon resistor X and record voltmeter reading V_x when the switch is on.

V_x = 1.0 V

Determine X given that I (1mark)

h

Correct substitution ✓

Exact evaluation or 4 s.f. ✓

ore $u \& s.$

(i) Using the vernier scale, measure the mass of the falling tube

Mass = 12.34 ± 0.01 g (1 mark)

(ii) Determine the length of the glass

Answer in (i) is correct in (ii) ✓

Exact evaluation or 4 s.f. ✓

1 mark ✓

1 mark ✓

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$\sqrt{A, CU \parallel 1c; u \parallel VY \parallel \parallel}$

$V = 1.0 \pm 0.2$ V (1 mark)
 1 d.p. a must; deny $\frac{1}{2}$ mk for missing unit.

$I = 0.00 \pm 0.00$ A (1 mark)
 2 d.p. a must; deny $\frac{1}{2}$ mk for missing unit.

(iii) Explain why V is less than E . (1 mark)
 volts are lost in overcoming the internal resistance

(iv) Now connect the voltmeter across the carbon resistor X and record voltmeter reading V_1 when the circuit is on.

$V_1 = 1.0 \pm 0.1$ V (1 mark)
 1 d.p. a must; deny $\frac{1}{2}$ mk for missing unit.

(v) Determine X given that $X = \frac{V_1}{I}$ (1 mark)

Correct substitution ✓

Exact evaluation or 4 s.f. ✓

1 mark ✓

(b) Using the micrometre screw gauge, measure and record the diameter D of the resistance wire R provided

$D = 0.00045$
+000005
5d-past, accept

(i) Move the sliding jockey along the resistance wire AB and note the length L_1 and L_2 where the galvanometer pointer points at the zero mark. Record the values of L_1 and L_2

$L_1 = 0.00035$ m (1 mark)

±000057
5d-P 

$L_2 = 0.00045$ m (1 mark)

to ebos, 5d-p av « t.

(ii) Determine the resistance of the resistance wire R using the relationship, (2 marks)

$$\frac{R}{L} = \frac{X}{V_a} I$$

Correct substitution \checkmark

Exact evaluation or 4 s.f \checkmark {

(iii) Determine the resistance of the wire R per metre. (1 mark)

Correct substitution \checkmark *1/1.*

Exact evaluation or 4s.f \checkmark *h.*

lore ud^o

Using the micrometer screw gauge, measure and record the diameter D of the resistance wire R provided.

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$D = 0.0005$ m (1mark)

std form of 1 d.p. i.e 4.5×10^{-4}

Using the sliding feeler along the resistance wire R and note the length l_1 and l_2 where the galvanometer pointer points at the zero mark. Record the values of l_1 and l_2 .

$l_1 = 0.0005$ m (1mark)

std form of 1 d.p. i.e 4.5×10^{-4}

$l_2 = 0.0005$ m (1mark)

std form of 1 d.p. i.e 4.5×10^{-4}

Determine the resistance of the resistance wire R using the relationship. (2marks)

$\frac{l_1}{l_2} = \frac{R}{R}$

Correct substitution

Correct evaluation of R of

Deny $\frac{1}{2} \mu K$ for missing unit

Determine the resistance of the wire R per metre. (2 marks)

Correct substitution

Correct evaluation of R of

Deny $\frac{1}{2} \mu K$ for missing unit

(iv) Given that, $R = \frac{0.1114S}{p}$ determine the value of S, where R is the resistance per metre, (1mark)

Correct substitution $t = h$

Exact evaluation or 4 s.f. h
Joe uee

QUESTION TWO PART A

(a) Measure and record the width t of the glass block using the vernier calipers provided.

$t = 0.0650$ (m) (1 mark)

+p>olt
t.d.p. ave±t

(b) $O'OP = 10''$ (1mark) ± 2 *0sy ±rd fr vksqq u d*

(c) $OO'P = 20''$ (1mark) ± 2 *Aecy 1k (i str u ct*

Measure the perpendicular distance d from the line $O'N$ to OP produced.

(d) $d = 0.012$ (m) (1mark)

t0.co2

(e) Determine t given that, $t = \frac{d \cos \text{angle}(OO'P)}{\sin \text{angle}(O'OP)}$

(2marks)

Correct substitution V

Exact evaluation or 4s.f.

ey 4k f « missing unit.

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(f) How do the values of t and C compare.

(1mark)

They are equal or approximately the same

NB. The worksheet should be handed in with the question paper.

PART B

(e) Complete the table.

(8marks)

p(cm)		21.0	19.0	17.0	15.0	13.0	10.0	8.0	
q(cm)	$\pm t_0$	17.0	18.0	19.0	20.0	20.7	20.0	19.8	$t_{dp} 6 < 5 = 3 \ll ks$
Time t for 10 oscillations (s)	$+ 200$	8.50	9.50	10.50	10.50	12.50	13.50	17.50	$2\phi? \quad 6 \neq = 3\% \phi$
Periodic time $T(s)$									$ff \ll (le \ll \%e \quad ce \cdot ec \quad k$
$\frac{p}{q}$									$[x \ll L \quad L \quad 44 \text{ lr. } 4 \quad Ca'ca_{le} \quad \gg k_t$

(g) () Plot a graph of T (y axis) against $\frac{p}{q}$

(4marks)

A-----1/2

S-----1/2

P-----2

C-----1



(3) How do the values of I and II compare.

(1 mark)

They are equal or approximately the same

100. The number of should be similar to with the greater paper.

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TABLE 3

(a) Complete the table.

(10 marks)

Repeated values to be treated as one.

Group	200	150	175	183	190	198	200
Time	17.0	19.0	18.0	20.0	19.7	19.0	19.2
Time < 10 collisions (3)	2.00	1.00	10.50	10.50	11.00	11.50	11.50
Time > 10 collisions (3)							
$\frac{\Sigma}{n}$							

(b) Plot a graph of $\frac{\Sigma}{n}$ (y axis) against $\frac{\Sigma}{n}$

(10 marks)

$\Sigma = 175$

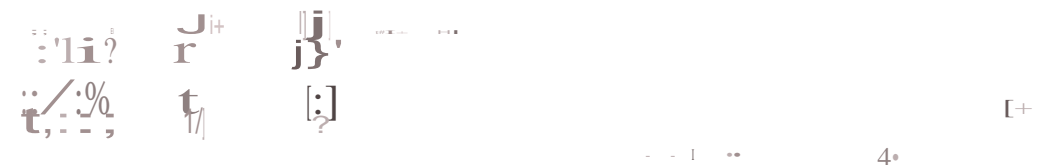
$\Sigma = 175$

$\Sigma = 175$

$\Sigma = 175$

$\Sigma = 175$

$\Sigma = 175$



(i) Determine the slope S of the graph when $t = 2.0$



(ii) Determine the slope S of the graph when $t = 2.0$

Tangent line drawn at $t = 2.0$ (2marks)

Change in y , change in x ; marked independently

Exact evaluation or 4s.f

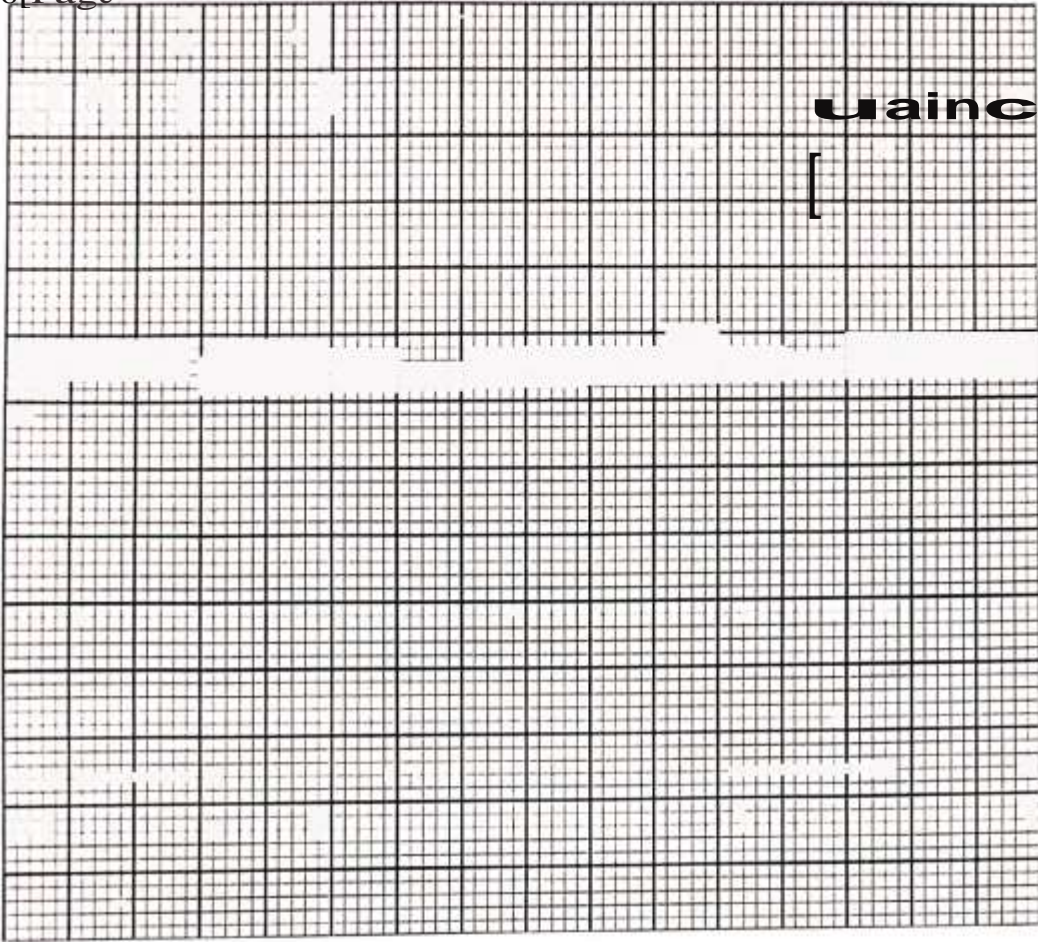
(iii) Determine the constant k given that $k = \frac{1}{2} g t^2$ where $g = 10 \text{ m/s}^2$

Correct substitution

Exact evaluation or 4s.f

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(1) Determine the slope S of the graph when $\lambda = 1.0$

Repeat the above at $\lambda = 1.5$

Change in y , change in x ; constant independently

Repeat evaluation of S at $\lambda = 2.0$

Compare your results with the a values of the λ values

(2) Determine the constant k given that $k = \frac{1}{a}$ when $\lambda = 1.000^2$

Check substitution \checkmark

Repeat evaluation of k at $\lambda = 1.5$

1 unit

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