



MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education

POST MOCK 1 EXAMINATIONS 2021

CODE 232/3

PHYSICS

Paper 3

January 2021

TIME: $2\frac{1}{2}$ Hours

Name: *Marking Scheme* Adm No:

Class: Candidate's Signature: Date:/...../2021.

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

	A	b	D	h	i	j	K	TOTAL
Maximum Score	2	2	1	5	5	3	2	20
Candidate's Score								

QUESTION 2

	b	C	D	F	g	h	I	TOTAL
Maximum score	1	1	1	5	5	3	4	20
Candidate's score								

TOTAL SCORE

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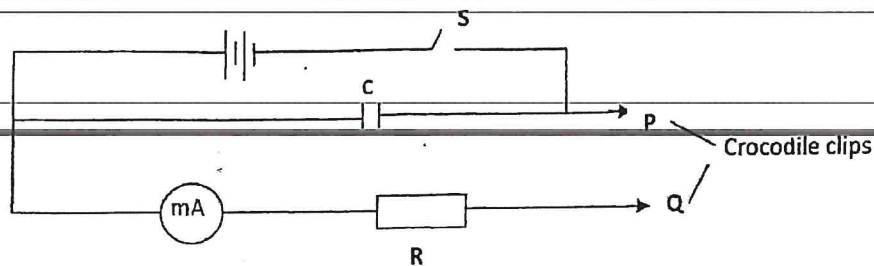
Question one

You are provided with the following:

- 2 new dry cells size D
- A cell holder
- A switch
- A milliammeter of range 0 to 1 mA
- A capacitor labeled C
- 8 connecting wires; at least four with crocodile clips on one end
- A stopwatch
- A carbon resistor labeled R

Proceed as follows

- a. Connect the circuit as shown in the **Figure 1** below, where **P** and **Q** are crocodile clips.



- b. Close the switch S

- c. Name the process which takes place when the switch S is closed (1mark)

- d. Charging the Capacitor ✓

- e. Connect the crocodile clips P and Q. Observe and record the highest reading of the milliammeter I_0 (This is the current at $t_0 = 0$)

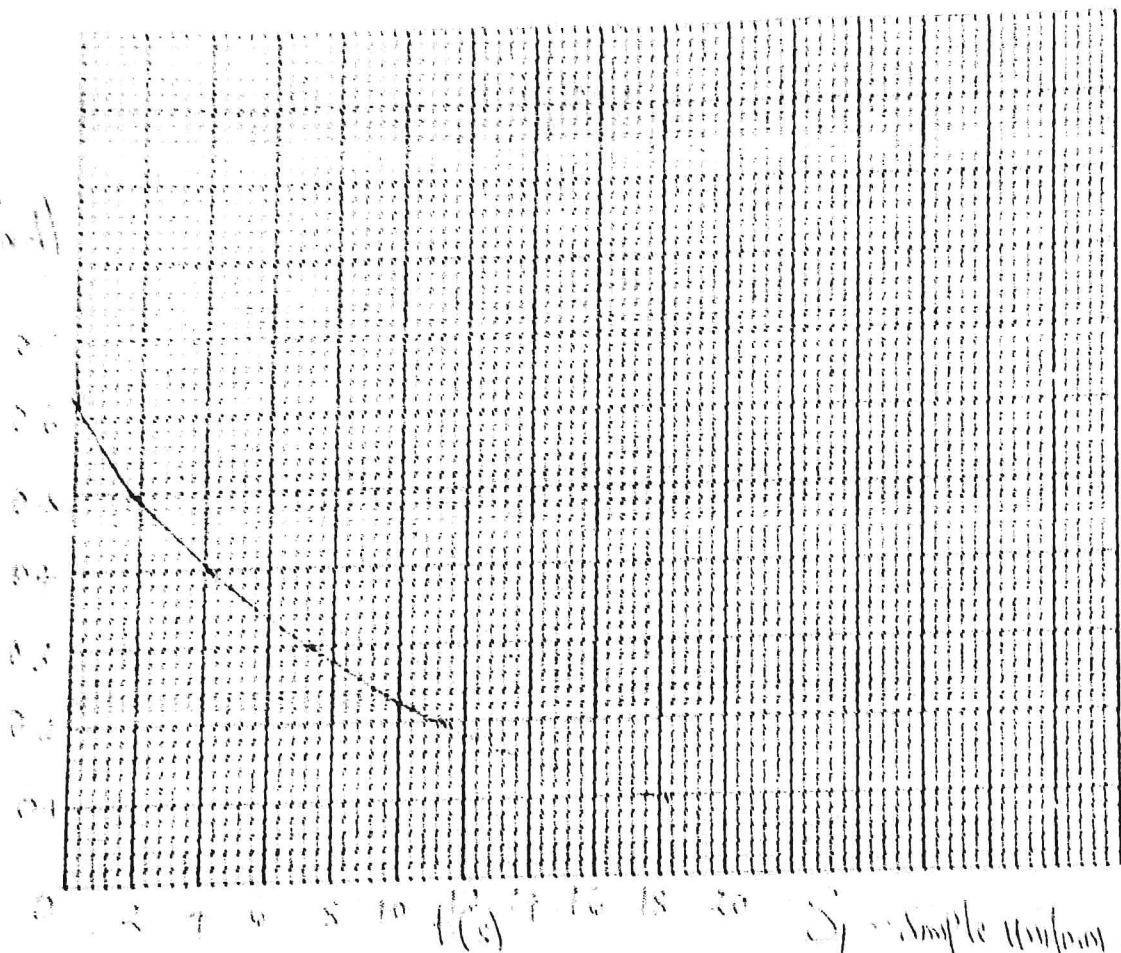
$I_0 = 0.62 \pm 0.02$ mA (1mark)
 must be 2 d.p.

- f. While the milliammeter show the maximum value of current I_0 , open the switch S and start the stop watch simultaneously. Stop the stop watch when the current has dropped from I_0 to 0.5 mA. Read and record in the table below the time taken

Now, to get τ close to the value τ_0 of the procedure in (c) to measure and record the time taken for the current to drop from I_0 to each of the other values shown in Table 1.8. (4 marks)

Current I (mA)	0.8	0.4	0.2	0.1	t_{meas} (s) (calculated)
$t_{\text{drop}}(s)$	1.81	4.20	7.11	11.35	18.18

5. Plot a graph of Current I (mA) on the y-axis against time t (s) (4 marks)



S_1 - Simple uniform circle
 P_2 - Plotting all points by
 G_1 - Smooth curve through

{ a }

- i. From your graph, find **W** the value of **I** when **t** = 10s. (2marks)

$0.23 \text{ mA} \pm 0.02 \checkmark$ 2 d.p.
(Check evidence from graph and read student work) $\checkmark$

- j. Given that **A** = 10W, determine the value of **A**. (1mark)

$A = 10 \times 0.23$
 $2.3 \text{ mA} \checkmark$ Use student value i.(i) above

- k. Determine the voltage across **R** at **t** = 10s given that **R** = 4.7k Ω (3marks)

$V = IR \checkmark$
 $= \frac{0.23}{1000} \times 4.7 \times 1000 \checkmark$
 $1.081 \text{ V} \checkmark$ (give half mark if no unit or wrong unit).

Question 2

PART A

You are provided with the following apparatus;

- A nichrome wire
- A 50g mass
- A metre rule
- A test-tube
- A retort stand, boss and clamp

Proceed as follows.

- a. Measure the length, **L**, of the nichrome wire provided

$L = 50.0 \pm 1 \checkmark$ cm 1 d.p. a must (1mark)
(49.0 - 51.0)

- b. Wind the whole length of the wire tightly on the test-tube making sure that the turns are as close as possible but not overlapping. Measure the length, **ϕ** , of the coil made.

$\phi = 1.6 \pm 0.2 \checkmark$ cm 1 d.p. a must (1mark)
(1.4 - 1.8)

- c. Remove the coil from the test-tube. Straighten the first and the last turns of coil. Bend one end to make a hook.

- d. Count and record the number, **N**, of complete turns remaining on the coil.

$N = 10 \pm 2 \checkmark$ (1mark)
(8 - 12)

- e. Measure and record the distance h_1 between the end turns of the coil as shown on the Figure 2 below

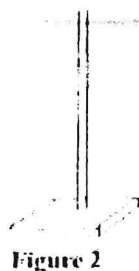


Figure 2



Figure 3

h_1 9.0 ± 2 cm (1 mark)
(7.0 - 11.0)

- f. Load a 50 g mass on the coil as shown in Figure 3 above. Measure and record the distance h_2 between the end turns of the coil.

h_2 20.0 ± 2 cm (1 mark)
(18.0 - 22.0)

- g. Determine the spring constant K in S.I units.

(2marks)

$$K = \frac{F}{e} = \frac{0.5 \text{ N}}{0.11 \text{ m}} = 4.545 \text{ N/m}$$

Use student's value in (e) and above
(1 mark if no unit wrong)
(2 unit)

- h. Obtain the constant, p , for the wire from the expression:

(3marks)

$$P = \frac{4mgR^3}{Kr^4}$$

$$R = \frac{50}{2 \times \pi \times 10} = 0.7957$$

$$r = \frac{1.6}{2 \times 10} = 0.08$$

$$P = \frac{4 \times 0.05 \times 10 \times (0.7957)^3}{4.545 \times (0.08)^4} = 54.123296 \text{ kg m/s}^2$$

Ignore units.

Where: m is the mass used, g is acceleration due to gravity ($g = 10 \text{ m/s}^2$), and

$$R = \frac{L}{2\pi N} \quad \text{and} \quad r = \frac{\phi}{2N}$$

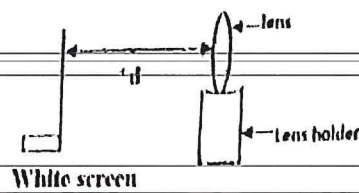
PART II

You are provided with the following apparatus:

- A screen with cross wire
- Lens and a lens holder
- A white screen
- About 10cm candle stick
- A Metre rule
- Lighting source (match box)

Proceed as follows:

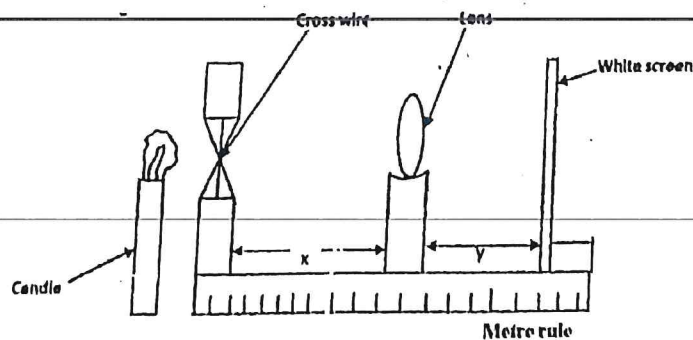
- a. Arrange the lens and screen as shown in the diagram below.



Adjust the distance of the lens from the screen until a sharp image of a distant object is formed on the screen. Measure and record the distance d (1 mark)

$d = \dots\dots\dots 20.0 \pm 2 \dots\dots\dots \text{cm}$ *dep is given*
 $(18.0 - 22.0)$

- b. Place the metre rule on a horizontal table so that the millimeter scale faces upwards, place the candle at one end of the metre rule and the screen with cross wire at the zero cm mark (just near the candle). Arrange the lens and the white screen as shown below:



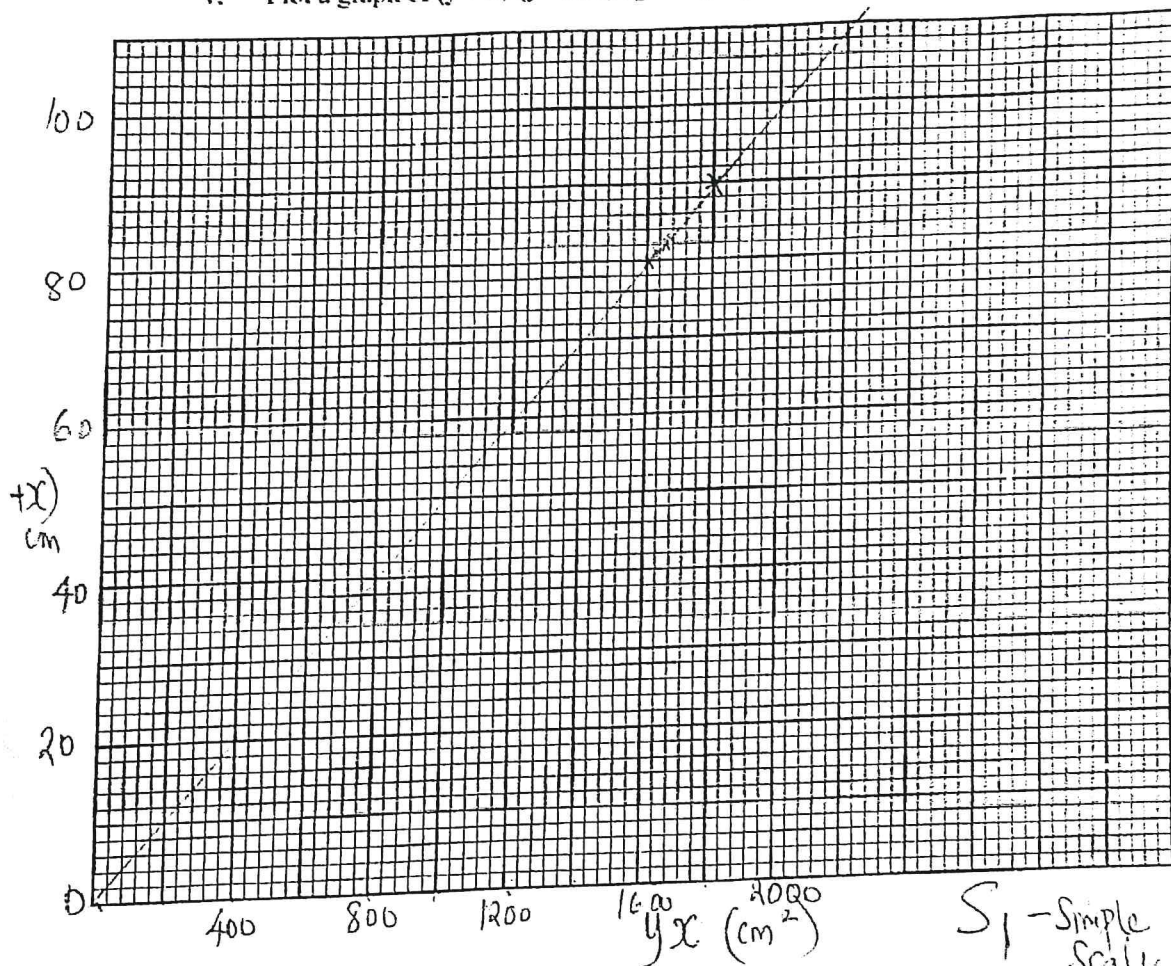
- Adjust the lens so that the distance x is 30cm.
- Adjust also the position of the white screen to obtain a sharp image of the cross wire and record the value of y in the table below.
- Repeat steps b (i) and b (ii) above for values of $x = 35\text{cm}, 40\text{cm}, 45\text{cm}, 50\text{cm}$ and record the corresponding values of y each time in the table below.
- Hence complete the table. (4marks)

$\frac{1}{2}$ mk each (Max 2)

$x(\text{cm})$	30	35	40	45	50
$y(\text{cm})$	60.0	47.0	40.0	36.0	33.0
$y + x (\text{cm})$	90.0	82.0	80.0	81.0	83.0
$yx (\text{cm}^2)$	1800	1645	1600	1620	1650

$\pm 2.0 \text{ cm}$
✓
✓

- Plot a graph of $(y + x)$ (y - axis) against yx (x-axis) (4marks)



S_1 - Simple Uniform Scale
 P_2 - Plotting all points
 L_1 - line of best fit

c. Determine the gradient of your graph

(2marks)

$$\text{grad} = \frac{50 - 0}{100 - 0} \checkmark 0.05 \text{ cm}^{-1} \checkmark$$

($\frac{1}{2}$ cm on y axis every unit)

d. Given that the equation of graph is

$$1 = f \left(\frac{y+x}{xy} \right)$$

Use the graph to find the value

(3marks)

of f

$$\frac{1}{f} = \text{grad} \cdot x \checkmark \quad \frac{1}{f} = \left(\frac{y+x}{xy} \right) \checkmark$$

$$(y+x) = xy \left(\frac{1}{f} \right)$$

$$\frac{1}{f} = f = \frac{1}{\text{grad}} = \frac{1}{0.05} \checkmark$$

$$20 \text{ cm} \checkmark$$