

**232/3
PHYSICS
PAPER 3
PRACTICAL
JULY/AUGUST 2014**

**MAKUENI DISTRICT JOINT FORM 4 EXAMINATION 2014
Kenya Certificate of Secondary Education
PHYSICS
PAPER 3
CONFIDENTIAL**

Provide the following apparatus for each candidate.

Question 1

- A spiral spring
- A retort stand, boss and clamp
- 6 mass of 100g each
- A stop watch
- Vernier calipers (can be shared)

Question 2

- Two dry cells (size D)
- One ammeter 0 -5A
- One voltmeter 0 -5A
- A variable resistor
- A switch
- 6 connecting wires
- A candle
- A lens and a lens holder ($F = 20\text{cm}$)
- A white screen
- A metre rule
- A match box (to be shared)

Name _____ Index No. _____

Candidate's signature _____

Date _____

232/3
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2 ½ HOURS

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INSTRUCTIONS TO CANDIDATES

- 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 awarded for a clear record of the observations made, their suitability then accuracy and for the use made of them
- Candidates are advised to record their readings as soon as they are made
- Mathematical tables and electronic calculators may be used.

FOR EXAMINER'S USE ONLY

Question		Question 2		Total
Max score		Max score		
Candidate score		Candidate score		

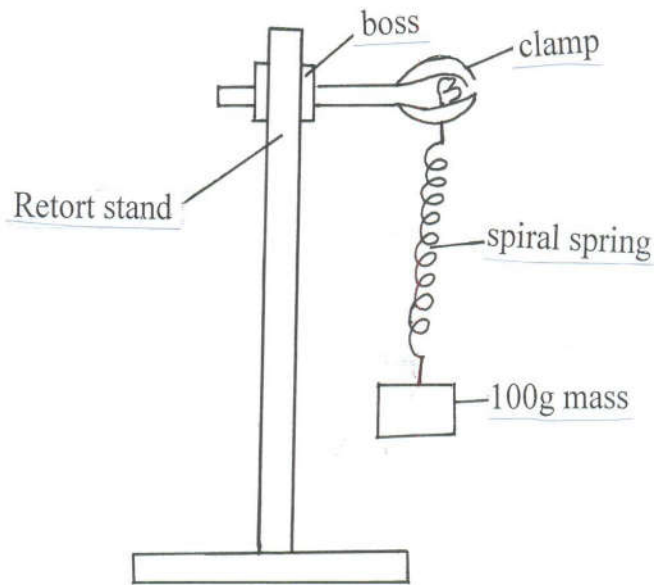
1. You are provided with the following
- A spiral spring
 - A retort stand, boss and clamp
 - 6 masses of 100g each
 - A stop watch
 - A vernier calipers

(a) Measure the length and the diameter of the spiral spring provided.

(i) Length _____ cm (1mk)

(ii) Diameter _____ cm (1mk)

(b) (i) Attach the spiral spring on the stand and clamp as shown in the figure below



(ii) Hang a 100g mass at the lower end of the spiral spring and give the mass a small displacement downwards and then release it so that it oscillates vertically. Using the stop watch, time 20 oscillations and record.

Time for 20 oscillations = _____ s (1mk)

(ii) Calculate the time, T for one oscillation

T = _____ (1mk)

(v) Repeat the same procedure using different masses as in the table below. Fill the table.

Maas, M(kg)	Time for 20 oscillations (s)	Periodic time T (s)	T ² (S ²)
0.1			
0.2			
0.3			
0.4			
0.5			
0.6			

(6mks)

I (i) On the grid provided plot a graph of T² against M.

(5mks)

(ii) Determine the slope of the graph

(2mks)

(d) Given that $T^2 = \frac{4\pi^2 Mn}{g}$ and that $n = 0.3\text{m/kg}$. Find the value of g .

(3mks)

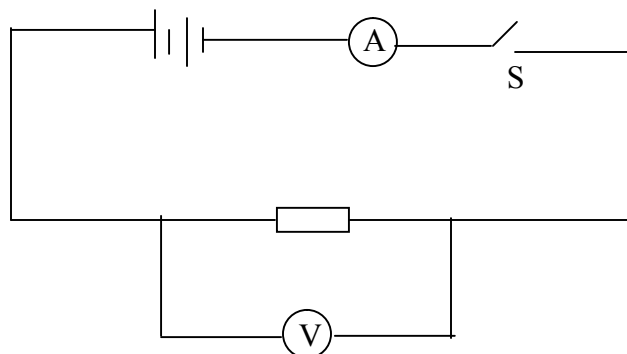
2. PART 1

You are provided with the following

- Two dry cells
- One ammeter
- One voltmeter
- A variable resistor
- A switch
- 6 connecting wires

Proceed as follows:

(a) Set up the apparatus provided as in the diagram below.



(b) Close the switch and adjust the variable resistor until the voltmeter reads 2.9V. Record this value of voltage V and the corresponding value of current I in the table below.

V (V)	2.9	2.8	2.7	2.6	2.5	2.4	2.2
I A							

(c) Repeat the procedure (b) above for the other values of V and complete the table.

(d) Plot a graph of V(axis) against I.

(5mks)

(e) From the graph determine the emf, E and internal resistance, r of the battery given that

$$E = V + rI$$

E

(1mk)

r

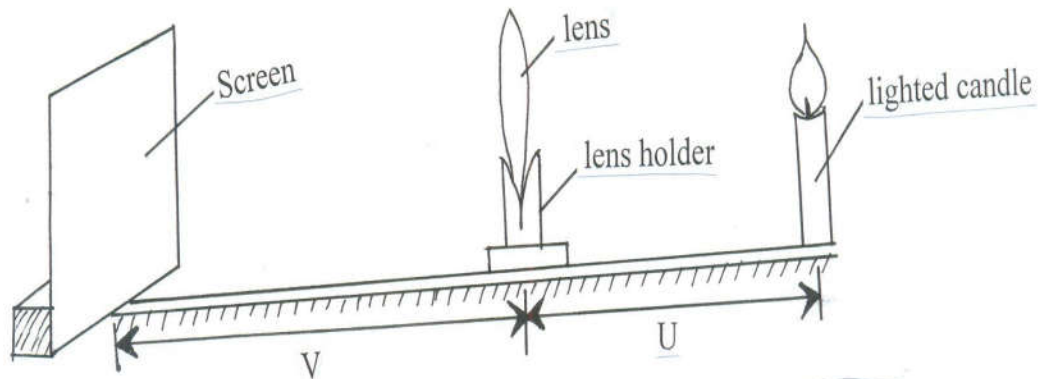
(3mks)

PART 2

You are provided with the following

- A candle
- A lens and a lens holder
- A screen
- A metre rule
- A match box (can be shared)

(a) Set up the apparatus as shown below.



Ensure that the candle flame and the centre of the lens lie in a horizontal straight line.

(b) Place the lens so that it is 40cm from the candle ($u = 40\text{cm}$). Adjust the position of the screen until a sharp image of the candle is obtained on the screen. Measure the distance V between the lens and the screen. Record in the table.

U (cm)	40	45	50
V (cm)			
$M = \frac{V}{U}$			

(c) Repeat (b) above the values of V in the table and record your results. (3mks)

(d) (i) Given that $f = \frac{UV}{M + 1}$, where f is the focal length of the lens, use the results in the table above to determine the average value of f . (3mks)

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MARKING SCHEME

1. (a) (i) $3.83\text{cm} \sqrt{\quad}$
(ii) $1.46\text{cm} \sqrt{\quad}$ (2d.p)
- (b) (ii) $5.85\text{s} \sqrt{\quad}$
(iii) $\frac{5.85}{20} = 0.29\text{s} \sqrt{\quad}$

(v)

Mass, M(kg)	Time for 20 oscillations (s)	Periodic time T (s)	$T^2(\text{S}^2)$
0.1	5.85	0.29	0.09
0.2	9.35	0.47	0.22
0.3	11.40	0.57	0.32
0.4	13.16	0.66	0.43
0.5	14.78	0.74	0.55
0.6	16.16	0.81	0.65

- (c) (i) $T^2 (\text{S}^2)$ M (kg) 0 0.1 0.2 0.3 0.4 0.5 0.6 0.1 0.2 0.3 0.4 0.5 0.6 0.7
- A 1
S 1
P 2
L 1

Scale $\sqrt{1}$
Axes labeled with units $\sqrt{1}$
Plotting $\sqrt{2}$
Straight line $\sqrt{1}$

(ii) Slope = $\frac{\Delta T^2}{\Delta M} = \frac{0.60 - 0.18}{0.55 - 0.17} \sqrt{\quad}$
 $= \frac{0.42}{0.37} \sqrt{\quad}$
 $= 1.11 \text{S}^2/\text{m} \sqrt{\text{with units}}$

2.

V (V)	2.9	2.8	2.7	2.6	2.5	2.4	2.2
I A	0.1	0.18	0.22	0.35	0.45	0.51	0.68

Award 5mks for at least 5 correct values of I.

V (V) A (A) 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.5 1.0 1.5 2.0 2.5 3.0

Axes A 1

Scale S 1

Plotting P 2

Straight line L 1

$$V = -rI + E$$

$$E = y - \text{intercept} = 3.0V \checkmark \quad (\text{Read from the graph})$$

$$r \text{ gradient of the line } \checkmark (\text{slope})$$

$$\begin{aligned} \text{slope} &= \frac{\Delta V}{\Delta I} = \frac{2.7 - 2.05}{0.26 - 0.81} \checkmark \\ &= \frac{0.65}{-0.55} \\ &= 1.18\Omega \checkmark \end{aligned}$$

(b)

U (cm)	40	45	50
V (cm)	40	36	33
$M = \frac{V}{U}$	1	0.8	0.66

$\sqrt{\frac{1}{2} \times 3}$
 $\sqrt{\frac{1}{2} \times 3}$

$$f_1 = \frac{40}{1+1} = 20$$

$$f_2 = \frac{36}{0.8+1} = 20 \quad \checkmark \text{ for 3 values correct}$$

$$f_3 = \frac{33}{0.66+1} = 19.88$$

$$\begin{aligned} \text{Average} &= \frac{f_1 + f_2 + f_3}{3} = \frac{20 + 20 + 19.88}{3} \quad \checkmark \text{ correct average} \\ &= 19.96\text{cm} \end{aligned}$$

