Name ..... Index No. .....

Candidate's signature .....

Date .....

232/3

PHYSICS
Paper 3

July/August 2016
Time 2½ hours

WESTLANDS JOINT EXAMINATION

Kenya Certificate of Secondary Education

PHYSICS

Paper - 232/3

July/August 2016

Time: 2½ hours

INSTRUCTIONS TO CANDIDATES

- Answer ALL the questions in the spaces provided.
- You are not allowed to start working with the apparatus for the first 15 minutes of the 2½ hours allowed in this paper.
- This time is to enable you to read the questions and make sure you have all the apparatus needed.
- Marks are given for a clear record of the observations actually made, their suitability and accuracy, and the use made of them.
- Candidates are advised to record their observations as soon as they are made.
- Mathematical tables and electronic calculators may be used.

FOR EXAMINER'S USE ONLY

Question 1	b	c	d	e	f	g	a(i)	(vi)	b	c	d
Maximum score	½	½	1	½	½	2	1	4	5	3	2
Candidates											

Question 2	b(v)	c	d	e	a(iii)	a(iv)	a(iv)
Maximum	8	5	2	2	1	2	1
Candidates score							

This paper consists of 8 printed pages

Candidates should check the question paper to ensure that all the printed pages are printed as indicated and no questions are missing.

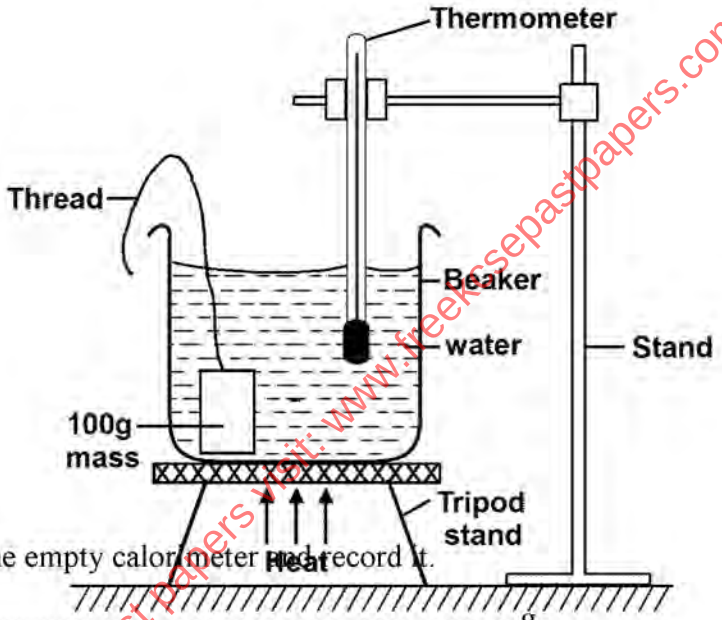
1. PART A

You are provided with the following:

- A cotton thread (about ½m long)
- A 200ml beaker.
- A thermometer.
- A complete retort stand.
- 100ml measuring cylinder.
- A calorimeter with a stirrer.
- Some water.
- A heat source
- A 100g mass
- A balance

Proceed as follows:

a) Fill the 200ml beaker to about half its volume with water. Clamp the thermometer and lower it into the water, ensuring that its bulb does not touch the base or sides of the beaker. Tie the 100g mass with the thread securely and greatly lower it into the water as shown below;



b) Weigh the mass of the empty calorimeter and record it.

Mass (M_C) = ... g (½ mark)

c) Measure 90 ml of water and gently transfer it into the calorimeter. Measure and record the temperature of the water in the calorimeter.

θ_1 = ...°C (½ mark)

d) Determine the mass of water in the calorimeter by weighing both the water and the calorimeter.

M_W = ...g (1 mark)

e) When the water with the 100g mass has started to boiling note and record the temperature θ_S of the solid.

θ_s = ...°C

f) Quickly transfer the hot solid into the water in the calorimeter and cover it. Ensure that the calorimeter is well lagged. Stir gently and note the final steady temperature of the mixture.

θ_2 = ...°C (½ mark)

g) Given that

Where:

M_S = mass of the solid.
M_C = mass of the calorimeter
M_W = mass of water in the calorimeter
C_W = specific heat capacity of water = 4200j/kg/k
C_C = specific heat capacity of the calorimeter = 400j/kg
Find the value of C_s the specific heat capacity of the solid. (2 marks)

$$M_S C_S(\theta_2 - \theta_3) = (M_W C_W + M_C C_C)(\theta_2 - \theta_1)$$

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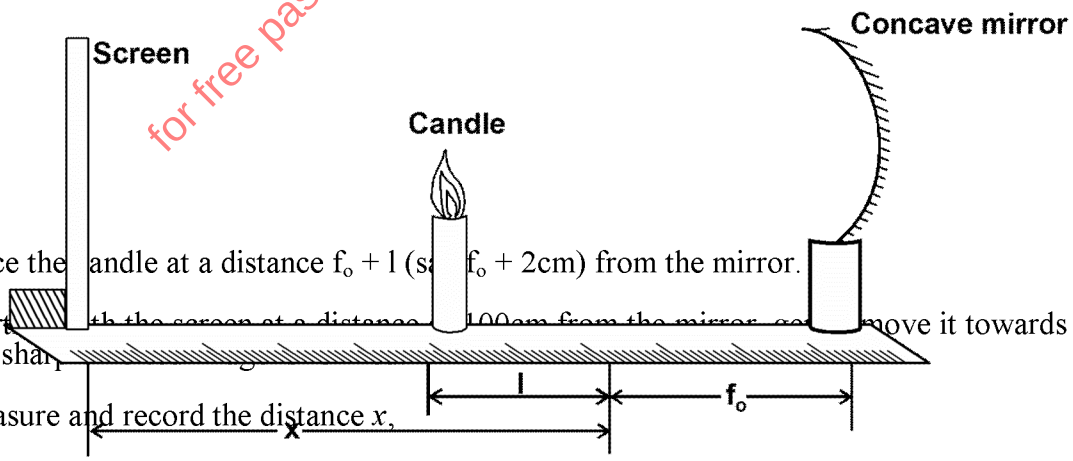
PART B
You are provided with the following apparatus:
- Concave mirror and a holder.
- Metre rule
- Candle (about 7cm)
- White screen

a) i) Determine the focal length of the mirror by focusing a distant object. (1 mark)

f_o = ...

ii) Arrange the apparatus as shown in the figure **2** below.



iii) Place the candle at a distance f_o + l (s... f_o + 2cm) from the mirror.

iv) Start ... move it towards the mirror until a sha...

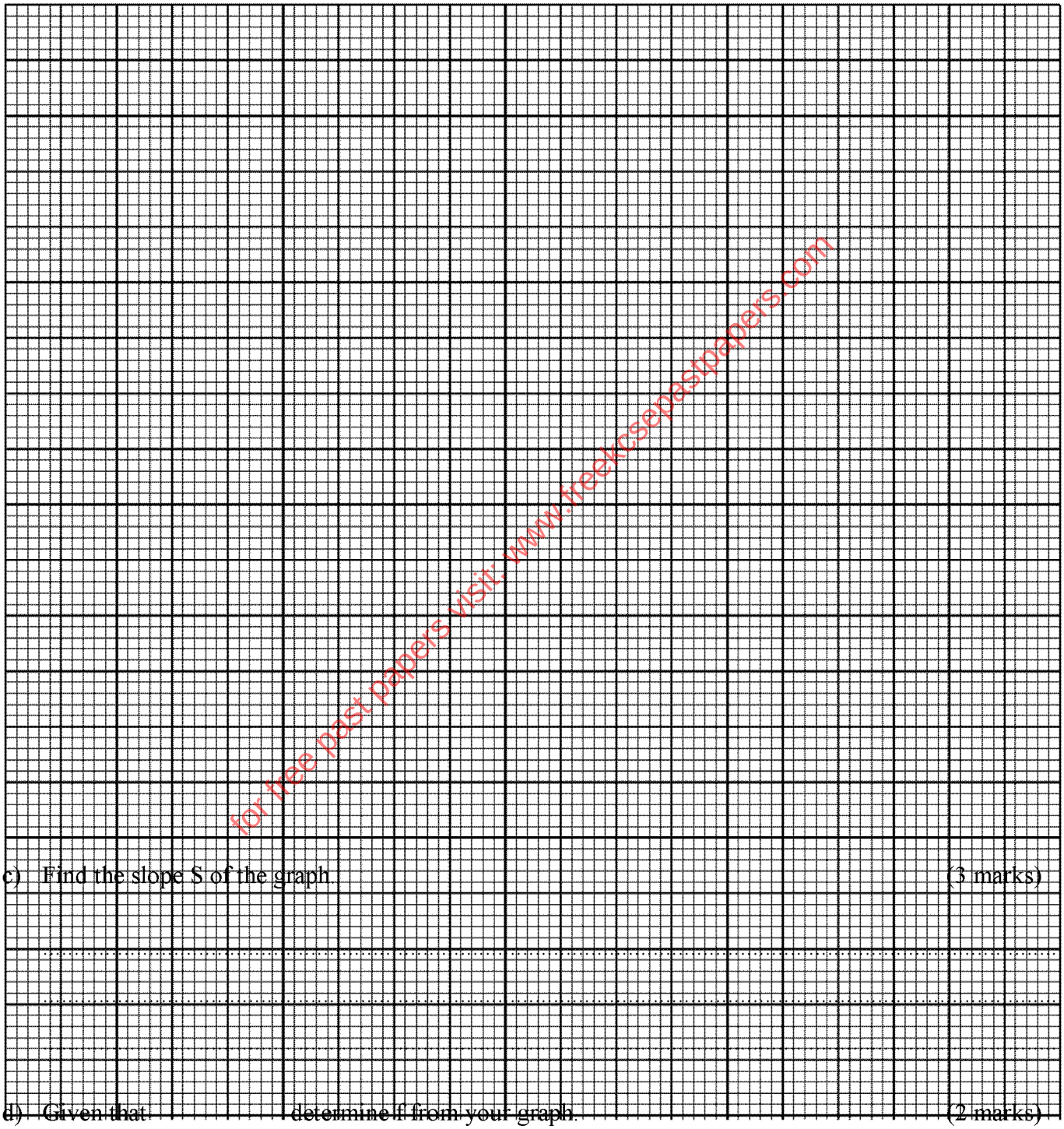
v) Measure and record the distance *x*,

vi) Repeat step (iii - v) for the other values of L and record your results in table 2. Complete the table. (4 marks)

b) Plot a graph of *x* against (5 marks)

L (cm)	2	3	4	5	6	7	8	9
x (cm)								
(cm-1)								

$\frac{1}{L}$



c) Find the slope S of the graph. (3 marks)

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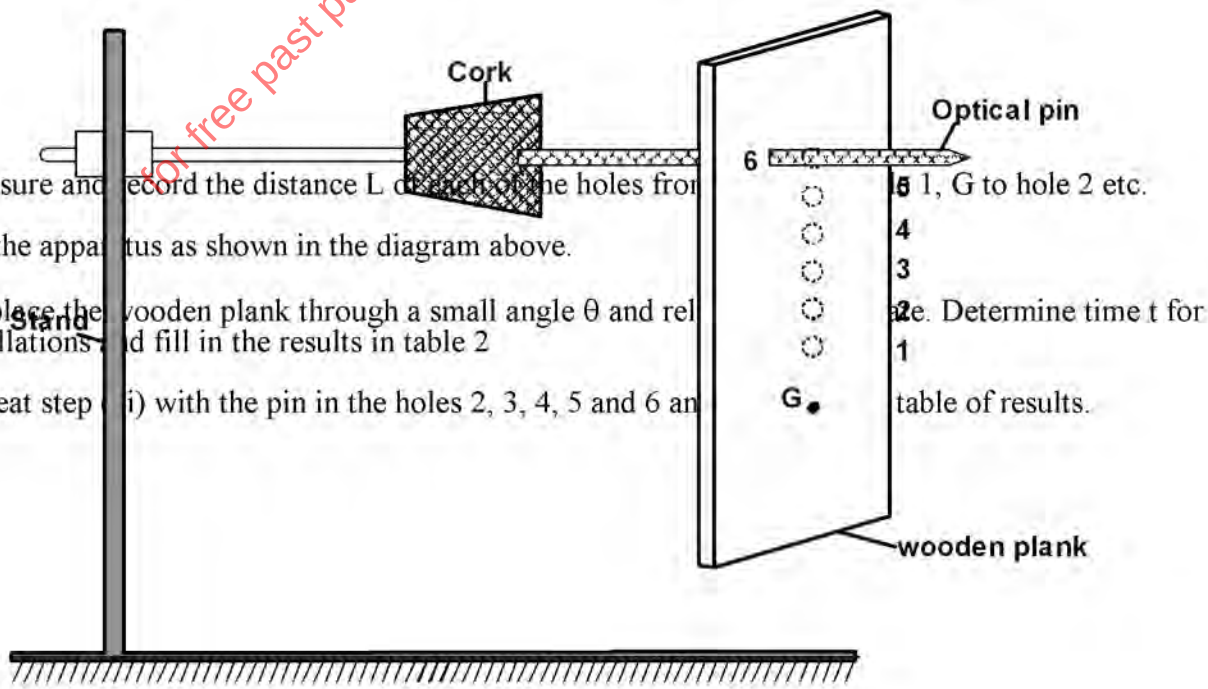
d) Given that ~~determine f from your graph.~~ (2 marks)

2.a) You are provided with the following :-

PART A

- Retort stand.
- Cork $x = \frac{f}{l} + k$
- Optical pin on which the wooden plank is suspended
- Stop watch
- Half-metre rule
- Knife-edge.
- Rectangular wooden plank (50cm × 5cm × 0.5cm)

b) i) Take, the hardboard and using the knife-edge, determine the position of the centre of gravity. Mark this as G.



ii) Measure and record the distance L of each of the holes from 1, G to hole 2 etc.

iii) Set the apparatus as shown in the diagram above.

iv) Displace the wooden plank through a small angle θ and rel e. Determine time t for 10 oscillations and fill in the results in table 2

v) Repeat step (i) with the pin in the holes 2, 3, 4, 5 and 6 an table of results.

c) Plot a graph of T^2L on y (axis) against L^2 (5 marks)

Hole	1	2	3	4	5	6
Distance L (cm)						
Time t for 10 oscillations						
Periodic time T(s)						
$T^2(Sec)^2$						
$T^2L(m\ sec^2)$						
$L^2(m)^2$						

d) Determine the gradient of you graph. (2 marks)

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e) Given that the equation of the graph your have plotted is:

f) From the graph determine the values of g and k (2 marks)

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PART B

You are provided with the following.

- A voltmeter
- Resistor (100Ω)
- A switch

- Ammeter
- Dry cell
- Cell holder
- A switch
- six connecting wires

i) Connect the above apparatus as shown in the circuit diagram **below** with the switch S open.

$$T^2L = \frac{4\pi^2L^2}{g} + \frac{4\pi^2k^2}{g}$$

ii) With the switch S open record E the voltmeter reading.

E = ...(1 mark)

iii) Close the switch and record V, the voltmeter reading and I, the ammeter reading.

V=.....(1 mark)

I=.....(1 mark)

iv) Given that:

E - V = Ir

Find r for the dry cell. (1 mark)

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