NAME:..... INDEX NO.....

SCHOOL..... SIGN..... DATE.....

232/3
PHYSICS
PAPER 3 (PRACTICAL)
FORM 4
MARCH 2013
TIME: 2 1/2 HOURS

PENTAGON JOINT EXAMINATIONS
WARENG DISTRICT

The Kenya Certificate of Secondary Education

INSTRUCTIONS TO CANDIDATES

- Write your name, index number and sign in the spaces provided.
- Write the date of examination in the spaces provided above.
- Answer ALL the questions in the spaces provided in the question paper.
- You are supposed to spend the first 15 minutes of he 2 ½ hours allowed for this paper reading the whole paper carefully to confirm that you have all the apparatus required for this examination before commencing your work.
- Marks are given for a clear record of the observations actually made, their suitability, accuracy and the use made of them.
- Candidates are advised to record their observations as soon as they are made.
- Non-programmable silent electronic calculators and for KNEC mathematical tables may be used except where stated otherwise.

FOR EXAMINERS USE ONLY

Q1

Question	a(i)	(vi)	a	b	Total
Maximum score	1	6	5	8	20
Candidates score					

Q2

Question	d	e	f	h	i	j	Total
Maximum score	1	6	3	5	1	2	20
Candidates score							

1. You are provided with the following;

- A pair of vernier calipers (to be shared)
- A stop watch or stop clock
- Two retort stands, two bosses and two clamps
- A cylindrical 20g mass with a hook attached
- A metre rule
- A piece of cotton thread

Procedure

i) Measure the diameter, d of the cylindrical mass using the vernier calipers provided.

d = _____ cm (1mark)

ii) Tie the thread provided to the 20g mass securely so that it is at the centre of the thread (make a knot on the thread at the hook).

iii) Use your pen to mark on the loose ends of the thread points A and B 50cm from the point where the hook of the mass is tied.

iv) Fix the bosses on the stands at points 60cm above the bench. Suspend the bob between the two stands by tying the loose ends of the thread to the bosses at the points marked in (b) above. See figure 1 (A and B are marked points)

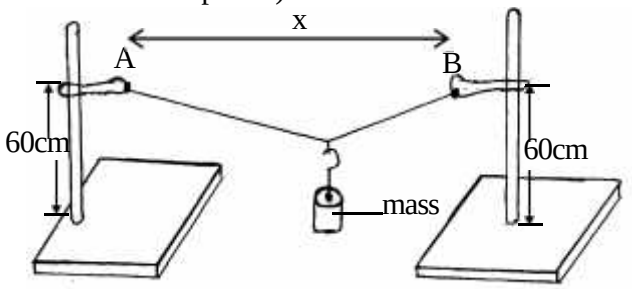


fig 1

v) Adjust the position of one of the stands (by moving it close to or away from the other) so that the distance X is 50cm. Give the mass a small displacement perpendicular to the plane containing the two portions of the thread and then release it. Measure t, the time for 10 oscillations. Repeat the measurement and record in Table 1.

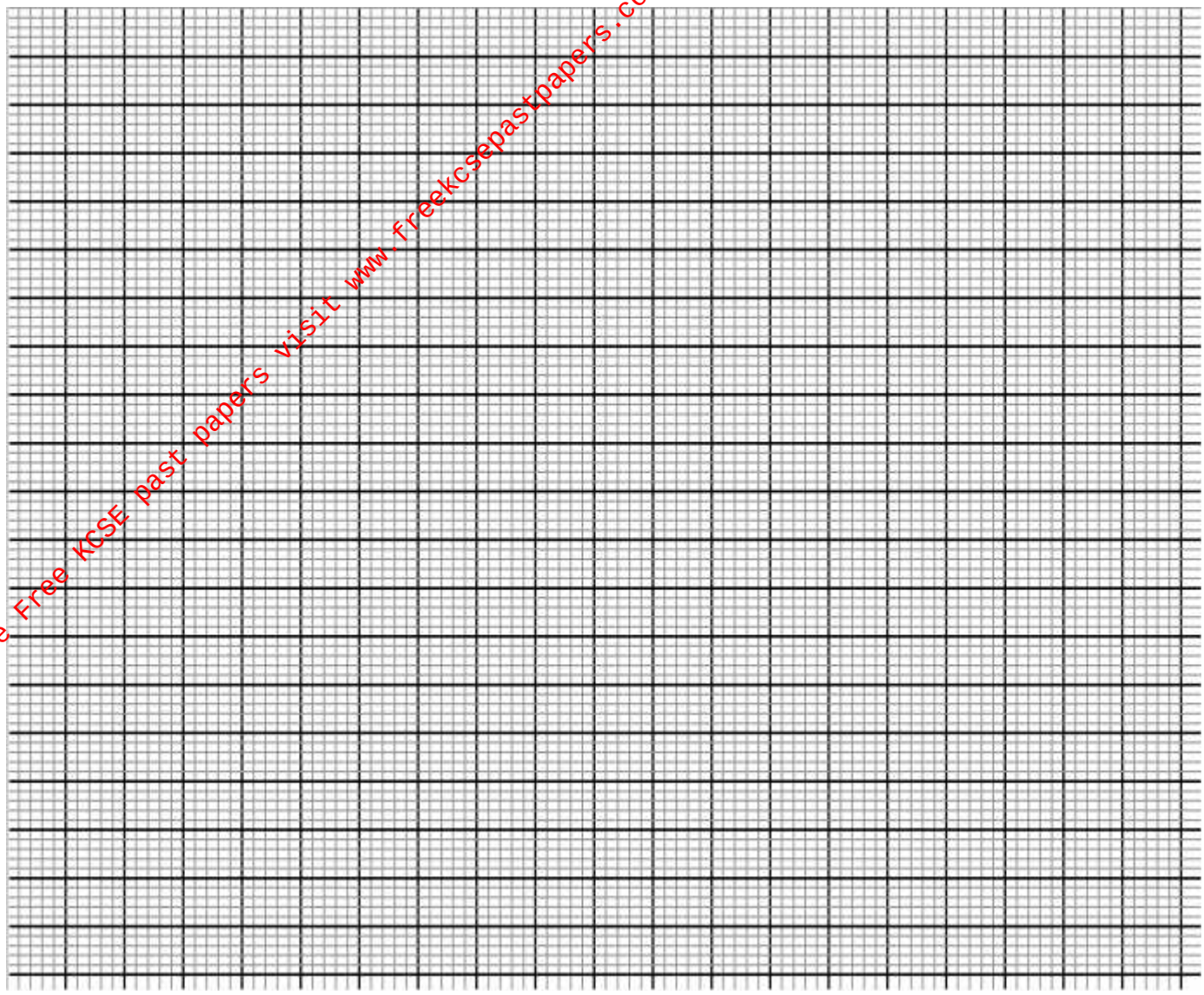
vi) Repeat the procedure in (e) for other values of x shown in the table and complete the table.

Table I

Distance x (cm)	50	55	60	65	70	75	80	85	90
Time t (s)									
Periodic Time T (s)									
$T^2(s^2)$									
$\frac{x}{d}$									

(6marks)

a) On the grid provided plot a graph of T^2 against ($\frac{x}{d}$). (5marks)



b) Given that $T^2 = m\left(\frac{x}{d}\right) + K$ where m and k are constants, use your graph to determine;

i) m (3marks)

ii) The value of the periodic time when x = 0cm. (3marks)

iii) Time t, for 10 oscillations when x = 25cm. (2marks)

2. This question has two parts A and B. Answer both parts.

PART A

You are provided with the following:

- A rectangular glass block
- Four optical pins
- A piece of soft board
- A plain sheet of paper
- A piece of cellotape

You are required to have your complete mathematical set.

Proceed as follows;

a) Place the plain sheet of paper on the soft board and fix it firmly using cellotape. Place the glass block at the centre of the sheet, and draw its outline. Remove the glass (see figure 2).

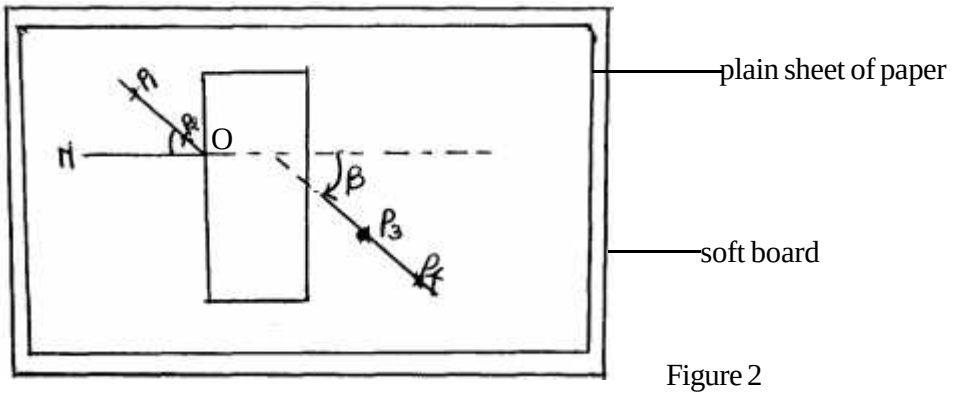


Figure 2

b) Draw a normal at a point 2cm from the end of one of the longer side of the block outline. This normal line will be used for the rest of this experiment.
Draw line at O at an angle of 20^0 from the normal stick two pins P_1 and P_2 vertically on this line.

c) By viewing through the glass from the opposite side stick two other pins P_3 and P_4 vertically such that they are in line with the images of the first two pins. Draw a line through the marks made by P_3 and P_4 to touch the normal extended.
Measure and record in table 2 the acute angle ( ) made between the extended normal and line P_3P_4 (see figure 2)
Record this value in table 2.

d) Repeat the procedure in (b) and (c) for other values shown in table 2.

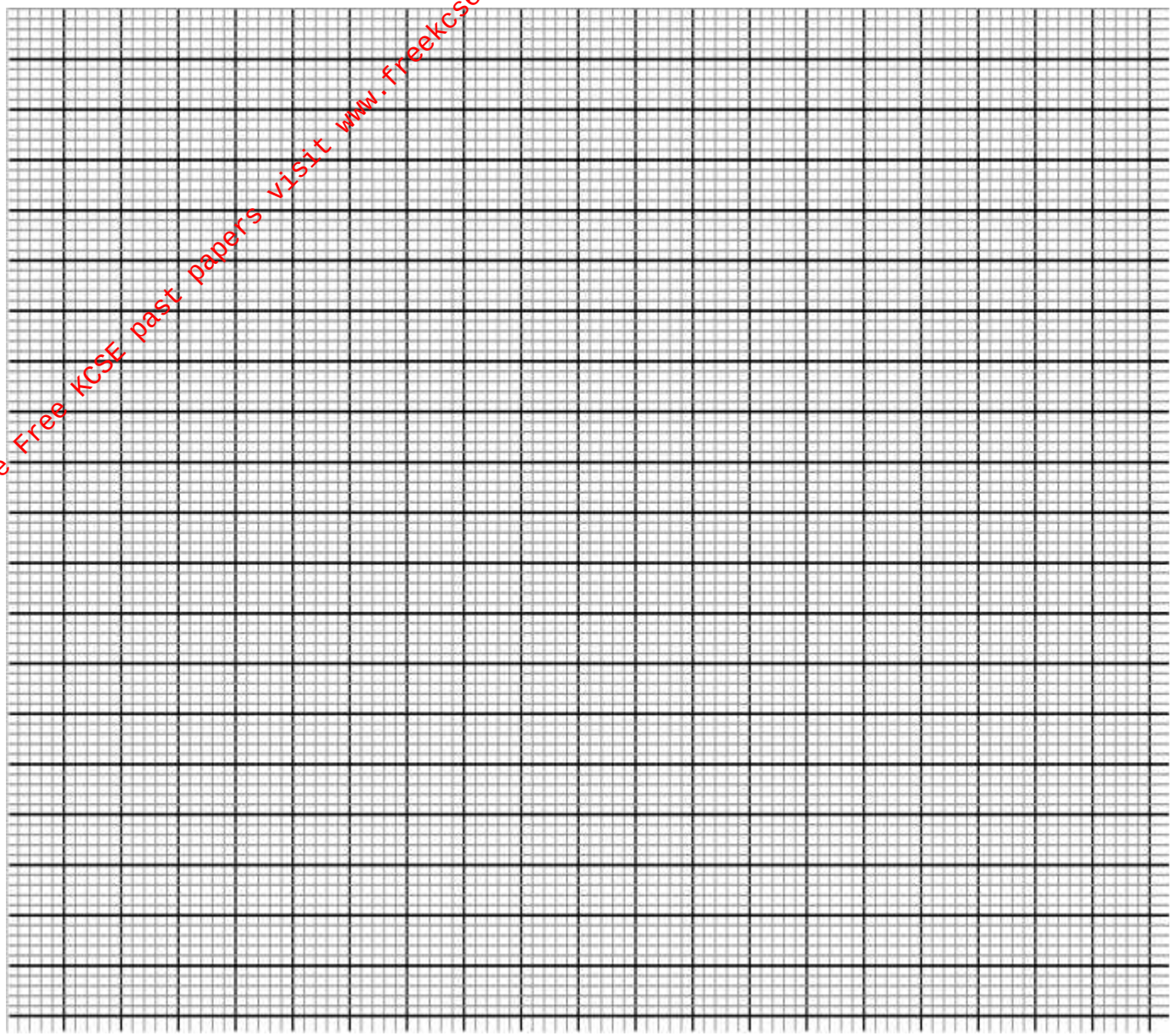
NB: The sheet of paper with the drawing MUST be handed in together with this question paper. Ensure you write your name and index number on the sheet of paper.

Table 2

θ (deg)	20	30	35	45	55	60	65
β (deg)							

(3marks)

e) i) On the grid provided, plot a graph of β against θ. (5marks)



ii) Using the graph estimate the value of β when $\theta = 0^0$ (1mark)

PART B

You are provided with the following

- A voltmeter
- A millammeter, (MA)
- A resistance box with values indicated
- A switch S
- Two cells and a cell holder
- Connecting wires
- Unknown resistor R

Proceed as follows:

f) i) Complete the diagram fig.3 below to show how you would determine the resistance of the unknown resistor using the ammeter-voltmeter method, using the apparatus. (1mark)

Fig. 3

Using the set-up you have drawn above set-up the circuit and record the following;

ii) MA reading I -……. Amperes (1mark)

iii) Voltmeter reading V - …….. volts (1mark)

Hence calculate the resistance of the unknown resistor. R_u

iv) $R_u = \frac{V}{I}$…… Ohms. (1mark)

g) i) Now dismantle your set-up in (f) above and set-up the apparatus as shown in the circuit diagram of fig.4.

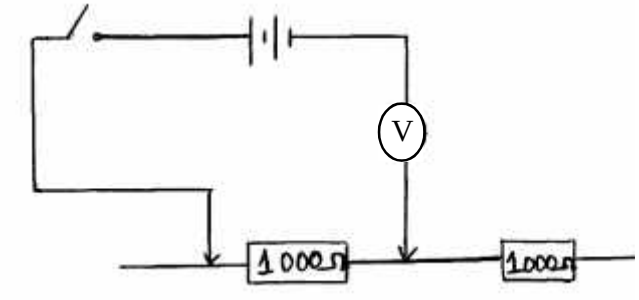


Fig.4

ii) Close the switch and record in table 3 the voltmeter reading V. Open the switch.

h) Repeat the procedure in g(i) and (ii) for other values of resistance R showing in the table 3. Complete the table.

Table 3.

Resistance R (Ω)	1000	2000	3000
V (v)			
I = $\frac{V}{R}$ (A)			

(5marks)

i) Calculate the average value of I from table 3.

Average, L = ... (1mark)

j) Determine Q given that L = $\sqrt{\frac{R_u}{Q}}$ (2marks)