THE KENYA NATIONAL EXAMINATION COUNCIL
Kenya Certificate of Secondary Education
PHYSICS
PRACTICAL
Paper 3
$2^{1}/2$ hours

1. You are provided with the following:

- a metre rule.
- an optical pin fixed to a piece of cork.
- two retort stands, two bosses and two clamps.
- two wooden blocks.
- a stop watch.
- some thread tied to a mass.

Proceed as follows:

(a) Set up the apparatus as shown in figure 1.

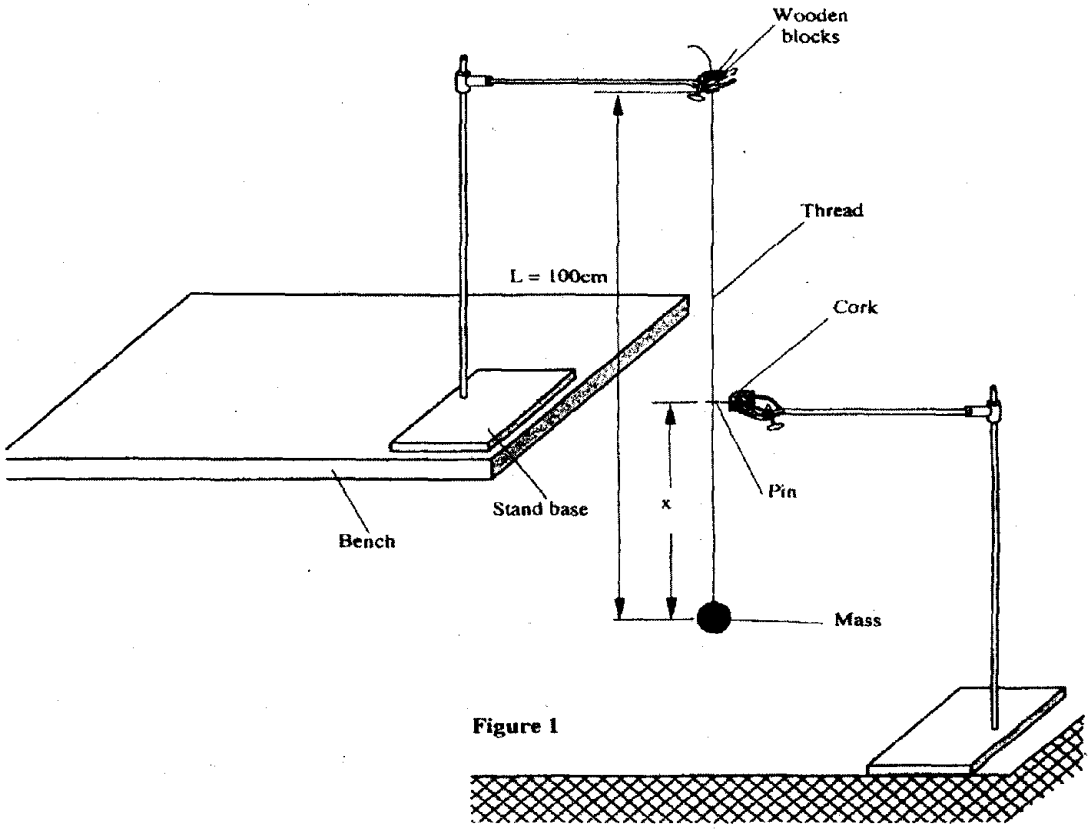


Figure 1

The thread tied to the mass should be held firmly between the two blocks of wood and clamped to the upper end of the stand so that the mass hangs freely. The distance L between the point of support and the centre of the mass is 100 cm. **Ensure that L remains constant throughout the experiment.**

Adjust the lower clamp so that the optical pin **just** touches the thread when the hanging mass is at rest.

(b) Adjust the position of the lower clamp so that the pin is at a distance X = 35 cm above the centre of the mass. Displace the mass slightly to one side and release it so that it swings in a plane perpendicular to the pin and the thread hits the pin as shown in Figure 2.

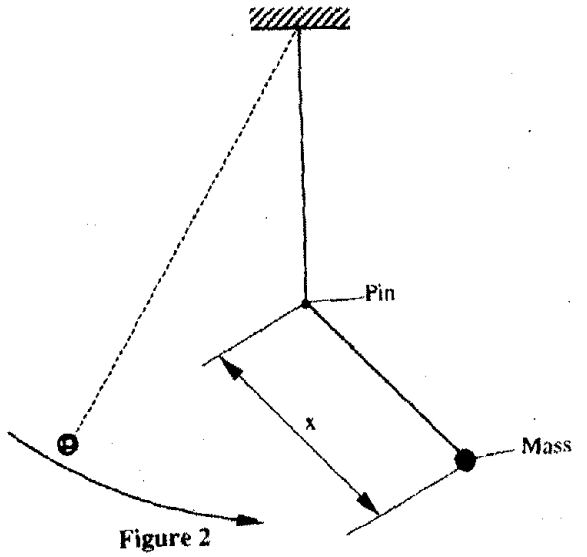


Figure 2

Measure and record in **table 1** the time t for 20 oscillations.

(c) Repeat the procedure in (b) for other values of X shown in **table 1**. Complete the table.

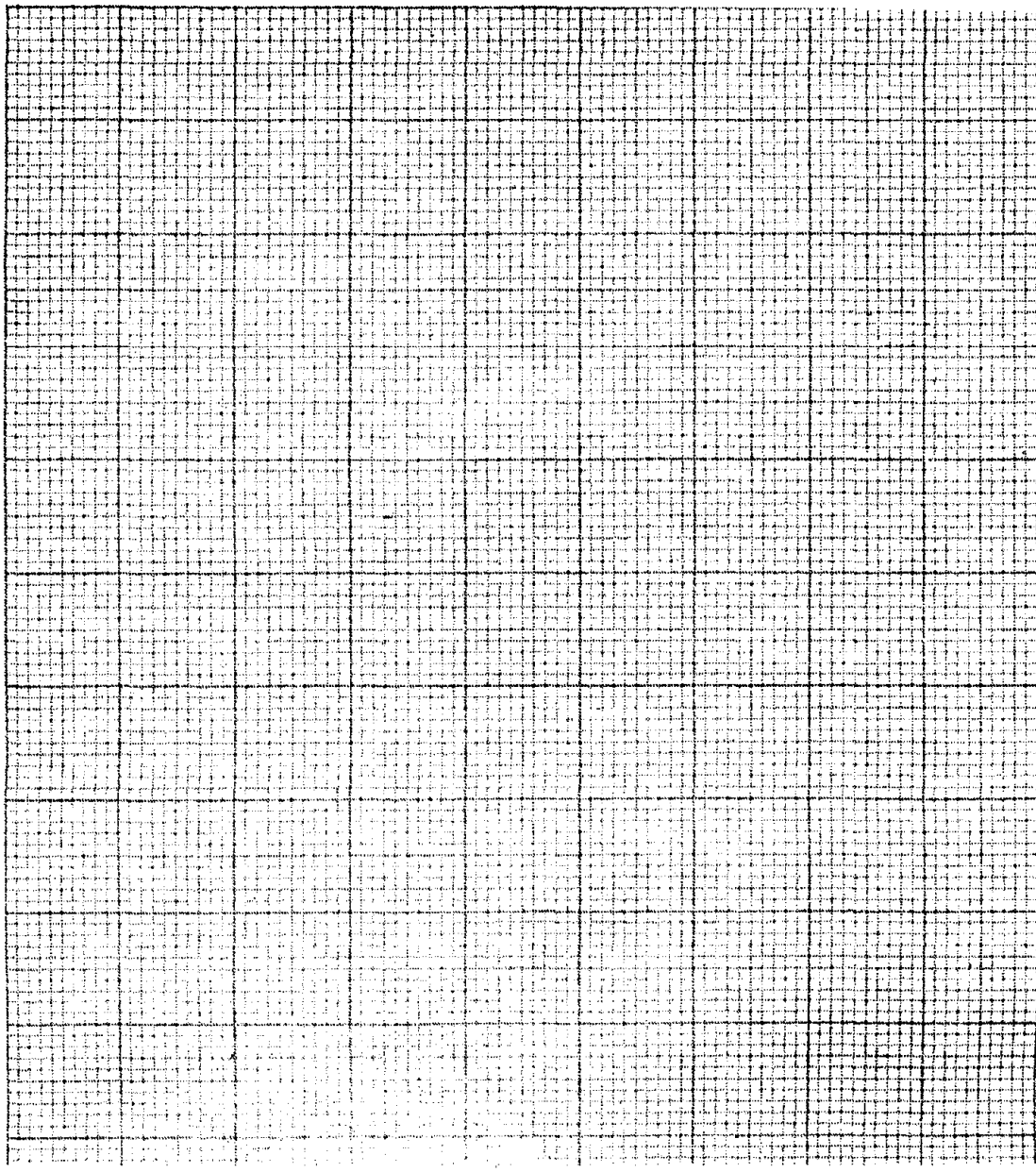
Table 1

Distance X(cm)	35	40	45	50	55	60
Time t for 20 osc (s)						
$T = \frac{t}{20}(s)$						

(8 marks)

On the grid provided

(d) Plot the graph of T(y-axis) against X. (5 marks)



(e) Determine the slope S of the graph at a point X = 52 cm. (3 marks)

(f) Determine the constant n given that $n = 52S^2$ (2 marks)

(g) Determine the constant P given that $P = \frac{\pi^2}{4n}$ (2 marks)

2. You are provided with the following:

- a voltmeter.
- two cells and a cell holder.
- a switch.
- a set of six resistors each of resistance 1000Ω.
- connecting wires.

Proceed as follows:

(a) Set up the apparatus as shown in the circuit diagram in Figure 3.

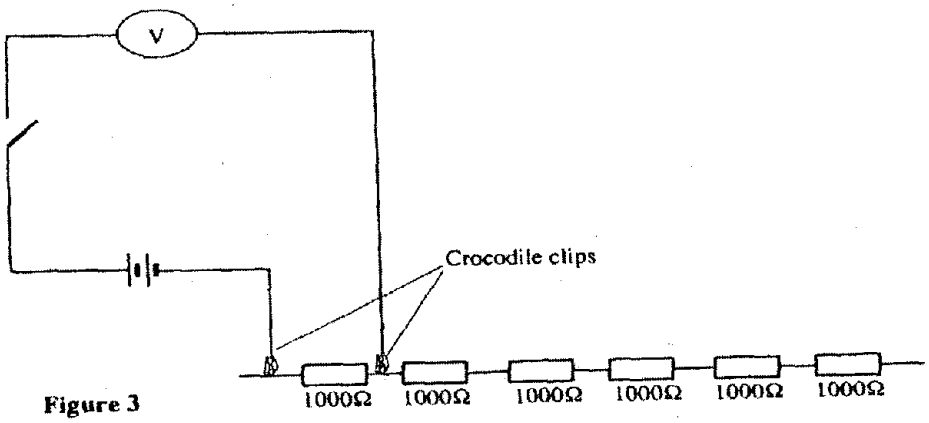


Figure 3

(b) (i) Record the voltmeter reading E, when the crocodile clips are connected together (R= 0).

E = _____volts. (1 mark)

Open the switch and separate the crocodile clips.
Indicate by ticking below, the range of the voltmeter used

0 – 3V ☐ 0 – 5V ☐ 0 – 15V ☐

(ii) Now connect the crocodile clips across resistance $R = 1000\Omega$. Close the switch and record in **table 2** the voltmeter reading V. Open the switch.

(c) Repeat the procedure in (b)(ii) for other values of resistance R shown in the table. Complete the table.

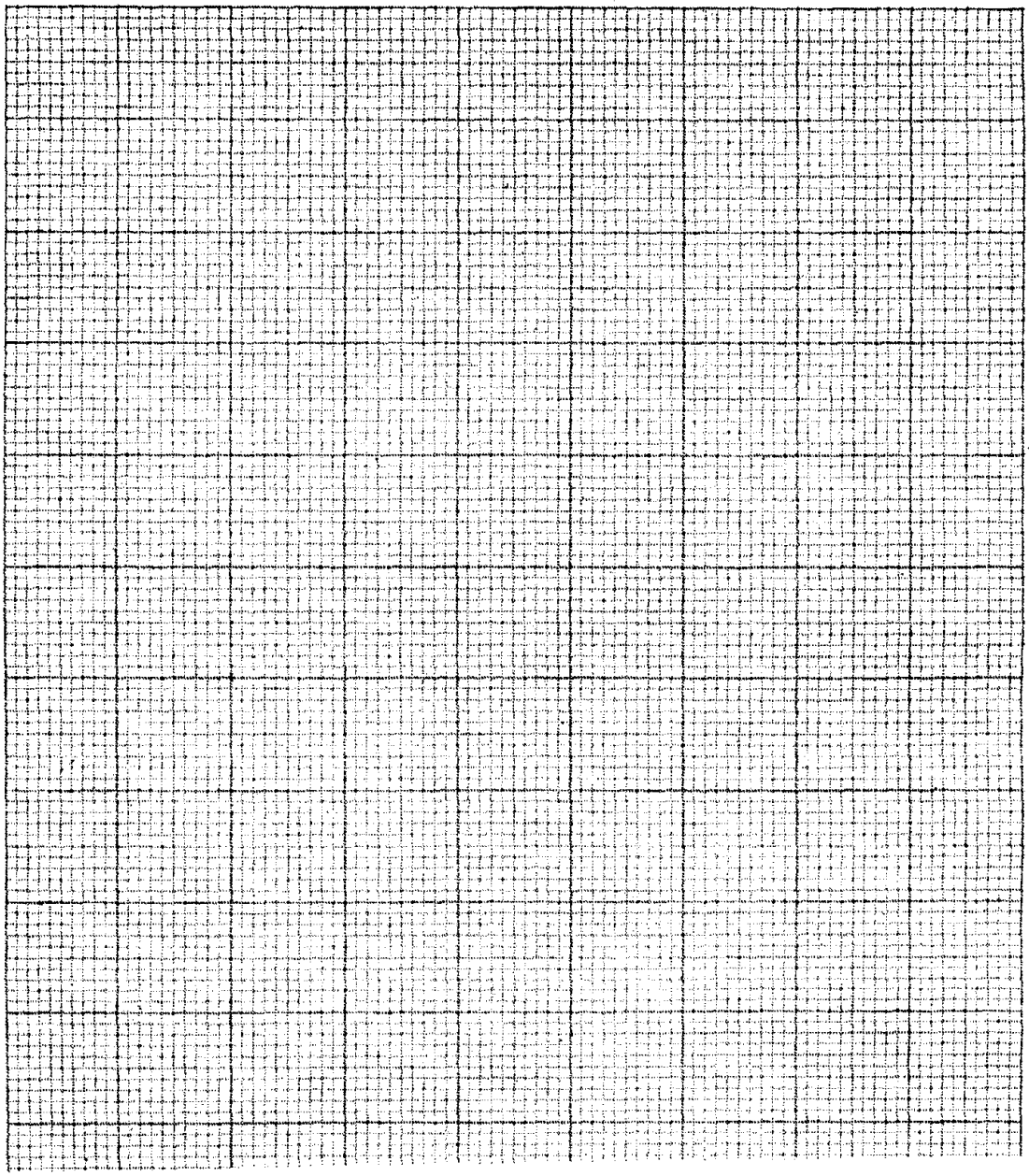
Table 2

Resistance R (Ω)	1000	2000	3000	4000	5000	6000
V(v)						
$\frac{1}{V}(v^{-1})$						

(6 marks)

(d) On the grid provided plot the graph of R (y axis) against $\frac{1}{V}$ (5 marks)

Hint: *Draw your axes to include point (0, 0) half way up the page i.e. the* $\frac{1}{V}$ *axis to run across the middle of the page.*



(e) Determine the slope S of the graph. (3 marks)

(f) Determine the constant G given that $G = \frac{S}{E}$

(2 marks)

(g) From the graph determine

(i) V_o, the value of V when R = 0 (1 mark)

(ii) R_g the value of R when $\frac{1}{V}=0$ (1 mark)

(iii) Determine $\frac{G}{R_g}$ (1 mark)

(e) Determine the slope S of the graph at a point X = 52 cm. (3 marks)

(f) Determine the constant n given that $n = 52S^2$ (2 marks)

(g) Determine the constant P given that $P=\frac{\pi^2}{4n}$ (2 marks)

2. You are provided with the following:

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- two cells and a cell holder.
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(e) Determine the slope S of the graph. (3 marks)

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(g) From the graph determine

(i) V_o, the value of V when R = 0 (1 mark)

(ii) R_g the value of R when $\frac{1}{V}=0$ (1 mark)