**PHYSICS**
**PRACTICAL**
**Paper 2**
2¼ hours

# DIRECTOR'S SET TERM ONE 2024

## Senior 4

PHYSICS PRACTICAL

## Paper 2

2 hours 15minutes

## INSTRUCTIONS TO SEMI - CANDIDATES:

*Answer any* **two** *questions.*

*Any additional question answered will* **not** *be marked*

*For each question candidates will be required to select suitable apparatus from the equipment provided*

*You will* **not** *be allowed to start working with the apparatus for the* **first quarter** *of an hour.*

*Marks are given mainly for a clear record of the observation actually made, for their suitability and accuracy, and the use made of them.*

*Students are reminded to record their observations as soon as they are made*

*Where possible, candidates should put their observations and calculations in a suitable table drawn in advance*

*An account of the method of carrying out the experiment is not required.*

*Mathematical tables and silent non-programmable calculator may be used.*

**Turn Over**

**1.** Imagine you are a student conducting an experiment to explore the stretching of a spring. You have set up the apparatus as described below and are tasked with collecting data and analyzing the results.

You are provided with a spring setup, as shown in Figure **1**. Follow the steps outlined below and refer to the figure for guidance. Do not change its position.

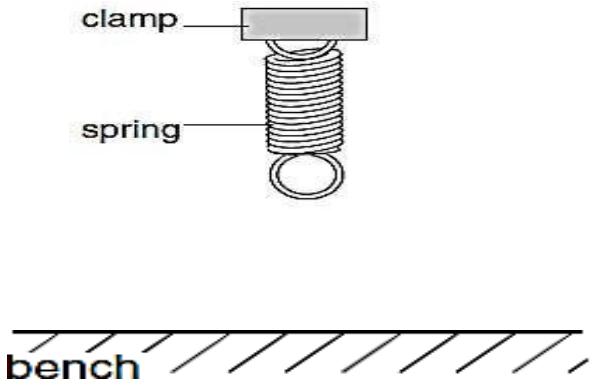



**Fig. 1**

(a) (i) Measure the vertical distance $d_0$, in cm, between the bottom of the spring and the surface of the bench.

$d_0$ =..... cm

(ii) On Figure **1**, mark clearly the distance you have measured.

(iii) Hang a 1.0 N load on the spring. Record the value of the load $L$ in the Table . Measure, and record in the table, the distance $d$ between the bottom of the spring and the surface of the bench.

(iv) Calculate the extension $e$ of the spring using the equation $e = (d_0 - d)$. Record the value of $e$ in the table.

(v) Repeat steps (iii) and (iv) using loads of 2.0 N, 3.0 N, 4.0 N and 5.0 N. Record all the readings and results in the table.

*(04 marks)*

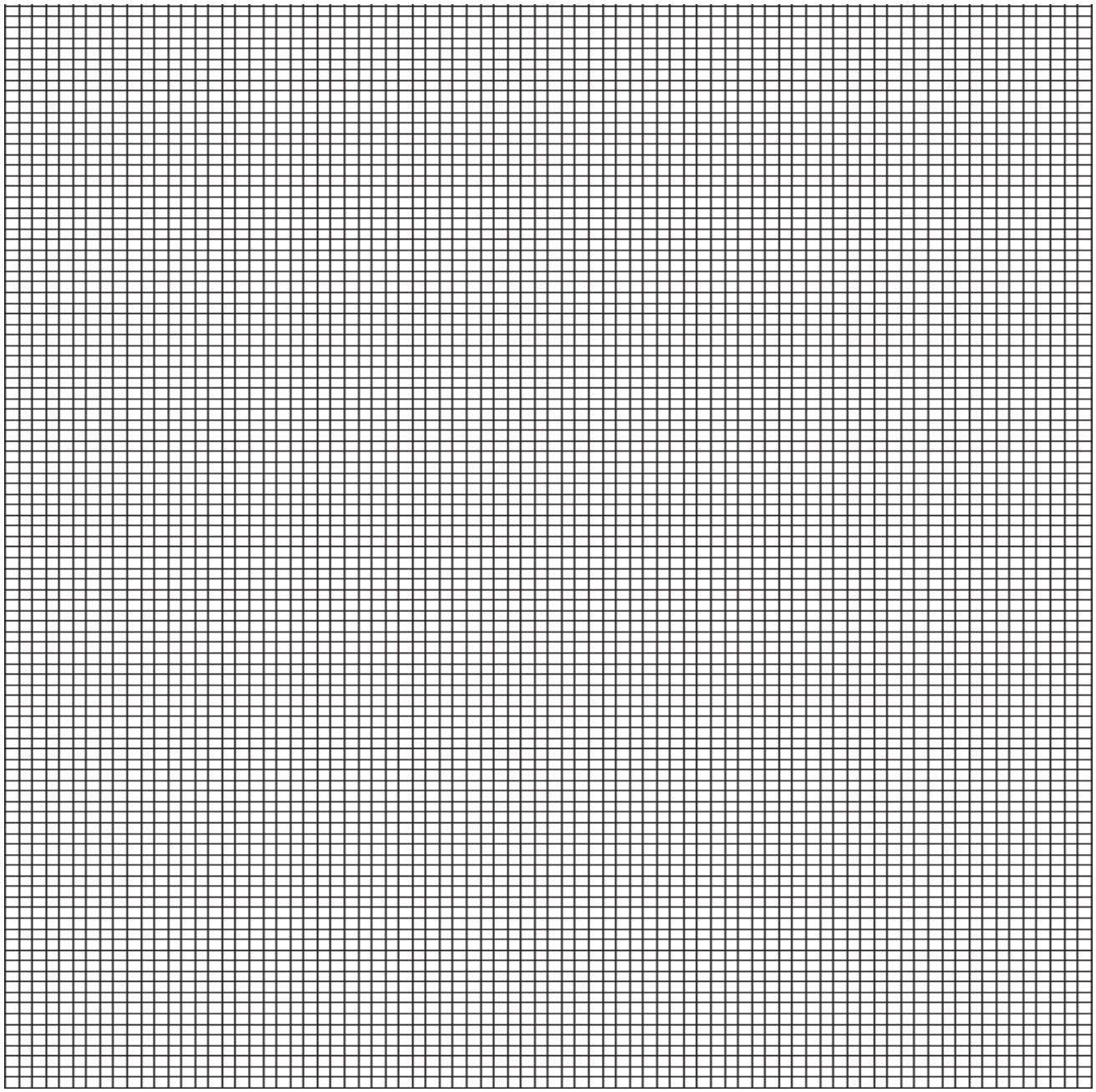
(b) From the experiment described above, identify:

(i) The independent variable ……

(ii) The dependent variable ……

(iii) The constant variable ……

(c) Plot a graph of $e$ (vertical axis) against $L$ (horizontal axis).



(d) Determine the gradient/slope, ***G*** of the graph. Show clearly on the graph how you obtained the necessary information.

*G =.....(04 marks)*

**2.** This experimental investigation has two part, (I) and (II).

**PART I**

A concave mirror is mounted in a mirror holder and a pin in cork is placed such that its pointed end lies along the axis of the mirror. The pin is moved towards and away from the mirror until it coincides with its image by no-parallax.

(a) Suggest a suitable title for this experiment. *(01 mark)*

……..

……..

(b) State **one** suitable hypothesis that could be investigated. *(01 mark)*

……..

(c) With the apparatus provided, set up this experiment. Measure and record the distance, $r$ between the pin and the mirror.

$r$ =.....*(01 mark)*

(ii) Calculate, the quantity, $f$ from: $f = {}^{1}/_{2}r$

$f$ =.....*(02 marks)*

**PART II**

(a) Set up a new arrangement of apparatus as shown in Figure **2**. Place the mirror, wire gauze and bulb such that distance, $x = 1.5f$.

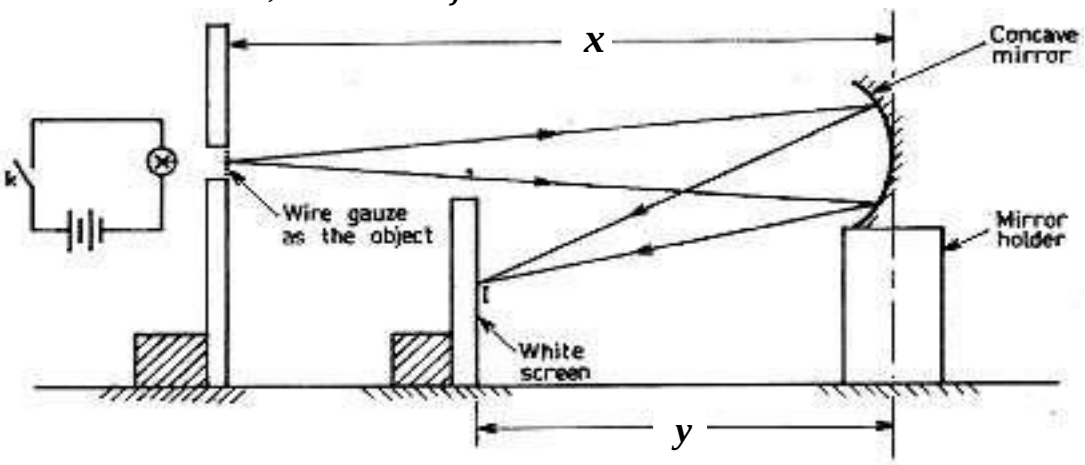



**Fig. 2**

Close switch, *K* and adjust the position of the screen until a clear image of the wire gauze is obtained on the screen.

(i) Measure and record the distance, $y$ between the mirror and screen.

$y$ = ..... *(01 mark)*

(b) Repeat procedures (a) to (c) for $x = 2.0f, 2.5f, 3.5f, 4.0f$ and $4.5f$.

(c) Tabulate your results including values of $\frac{y}{x}$. *(06 marks)*

(d) From the experiment you have just carried out, state; *(04 marks)*

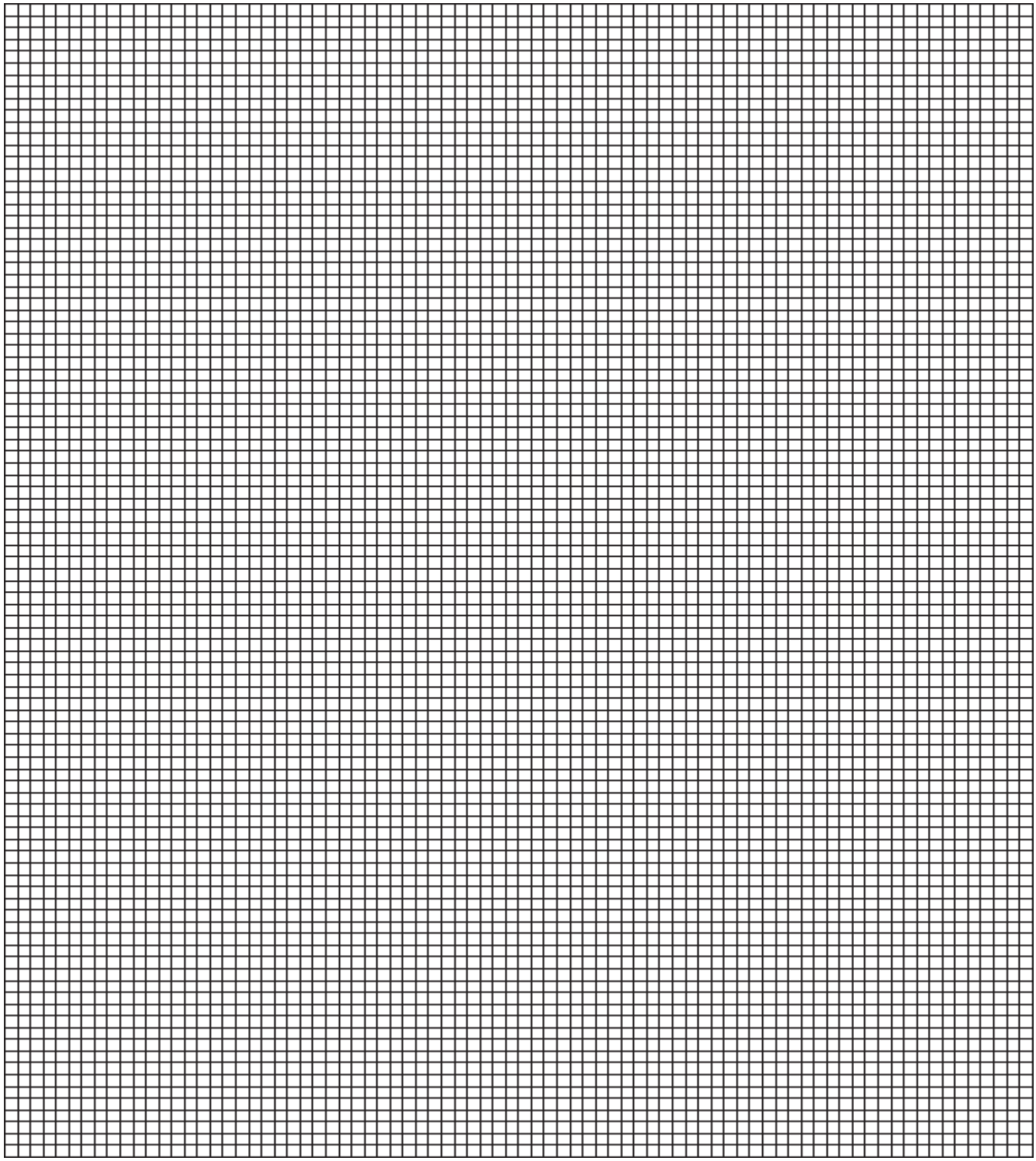
(i) The aim of the experiment ……
……

(ii) The independent variable ……

(ii) The dependent variable ……

(iii) The constant variable ……

(e) Plot a graph of $\frac{y}{x}$ against $y$. *(06 marks)*



(d) Find the slope, $S$ of the graph. $y$

$S$ =.....*(02 marks)*

(e) Calculate the quantity, $f$ from: $f = \frac{y}{x}$

$S$ =.....*(02 marks)*

**3.** In this experiment, you will investigate the resistance of a wire.
Carry out the following instructions referring to Figure **3**, which shows the circuit that has been set up for you.

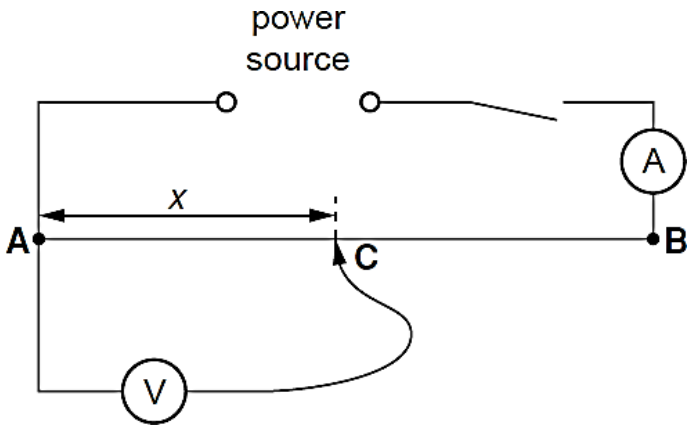



**Fig. 3**

You are provided with a length of resistance wire **AB**.

(a) Place the sliding contact **C** on the resistance wire **AB** at a distance $x$ from **A**, where $x = 0.100$ m.

(b) Record the value of $x$ in Table **3**.

(c) Switch on. Using the voltmeter, measure the p.d. $V$ across the wire between **A** and **C**. Record the value of $V$ in Table.

(d) Using the ammeter, measure the current $I$ in the wire. Record the value of $I$.

$I$ =.....*(01 mark)*

(e) Take the sliding contact away from the wire **AB** and switch off.

(f) Calculate the resistance $R$ of the section **AC** of the wire using the equation $R = \frac{V}{I}$

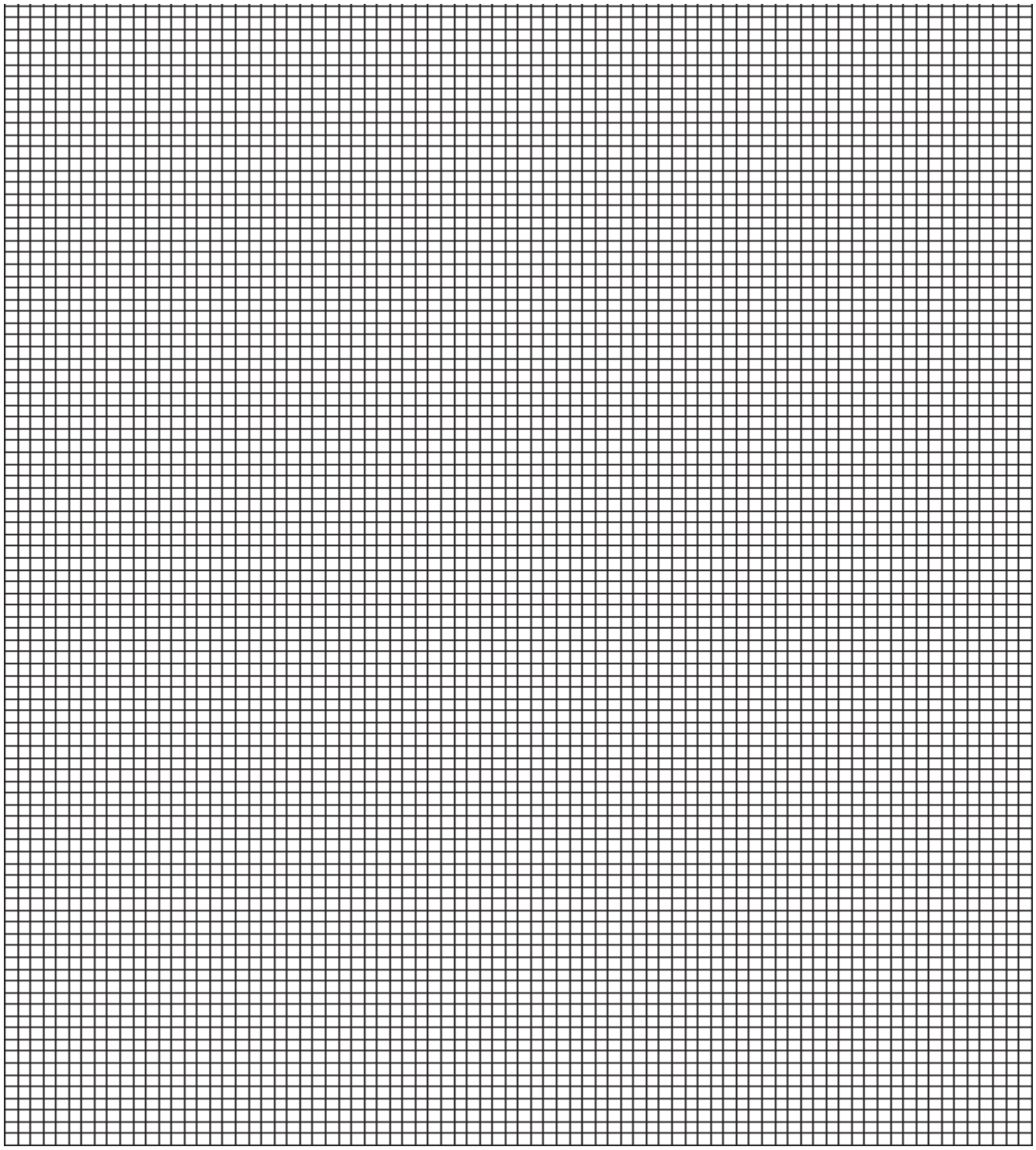
(g) Record $R$ in the table.

**Table**

*(03 marks)*

(h) Repeat steps **(a)** to **(g)** with the sliding contact at distances of $x$ = 0.300 m, 0.500 m, 0.700 m and 0.900 m from **A**.

(i) Plot a graph of $R$ (*along the vertical axis*) against $x$ (*along the horizontal axis*). *(03 marks)*



(j) Within the limits of experimental accuracy, what do you conclude about the variation of resistance with distance along the wire? Justify your conclusion by reference to your graph.

**statement**…….

**justification** …….

…..... *(01 mark)*

(k) Using your graph, determine a value for the resistance $R$ when the length $x$ = 0.750 m. Show clearly on your graph how you obtained the necessary information.

$R$ =.....*(02 marks)*

**END**