535/4
PHYSICS
(Practical)
Paper 4
July/Aug. 2022
2 ½ hours

ASK INTERGRATED TEACHERS' MOCK EXAMINATIONS BURREAU

AITEL JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

PHYSICS

(PRACTICAL)

Paper 4

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

Answer **question 1** *and* **one** *other question.*
Any additional question answered will **not** *be marked.*
You are **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 observations actually made, for their suitability and accuracy, and for the use made of them.*

Candidates are reminded to record their observations as soon as they are made.

Whenever possible, candidates should put their observation and calculated values in a suitable table drawn in advance.

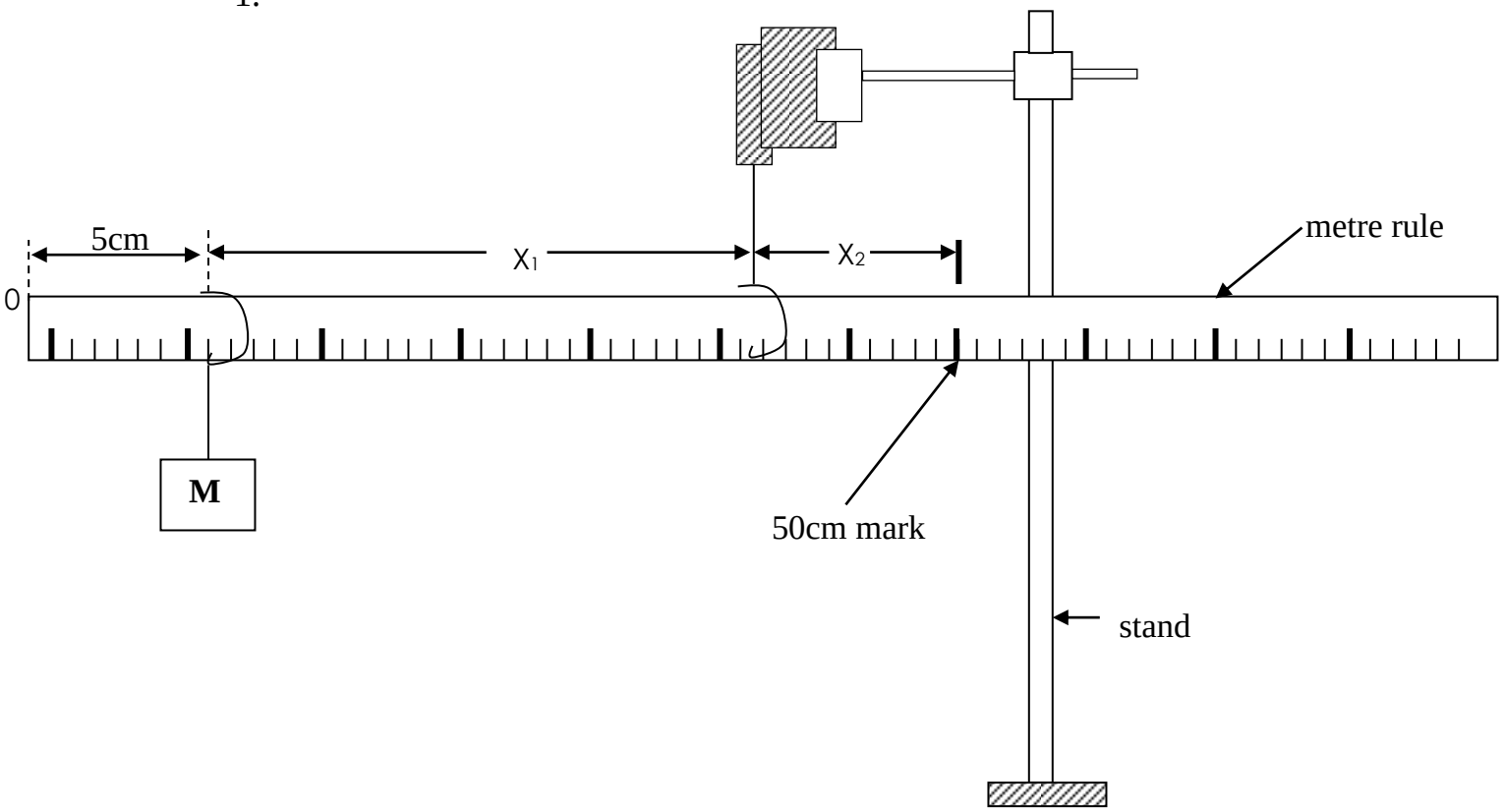
Squared papers are provided.

Mathematical tables and silent non – programmable calculators may be used.

1. In this experiment, you will determine the mass $\mathbf{M_0}$ of the metre rule provided by two methods.

(a) Read and record the mass $\mathbf{M_1}$ of the metre rule provided.

(b) Suspend the metre rule provided on a retort stand using a thread as shown in figure 1.



(c) Suspend a mass **M** of 0.050kg at the 5cm mark of the ruler.

(d) Adjust the position of the clamped thread along the metre rule until the metre rule balances horizontally.

(e) Measure and record the distances $\mathbf{X_1}$ and $\mathbf{X_2}$.

(f) Determine the value of $\mathbf{M^1}$ from; $\mathbf{M^1 = \frac{0.050X_1}{X_2}}$

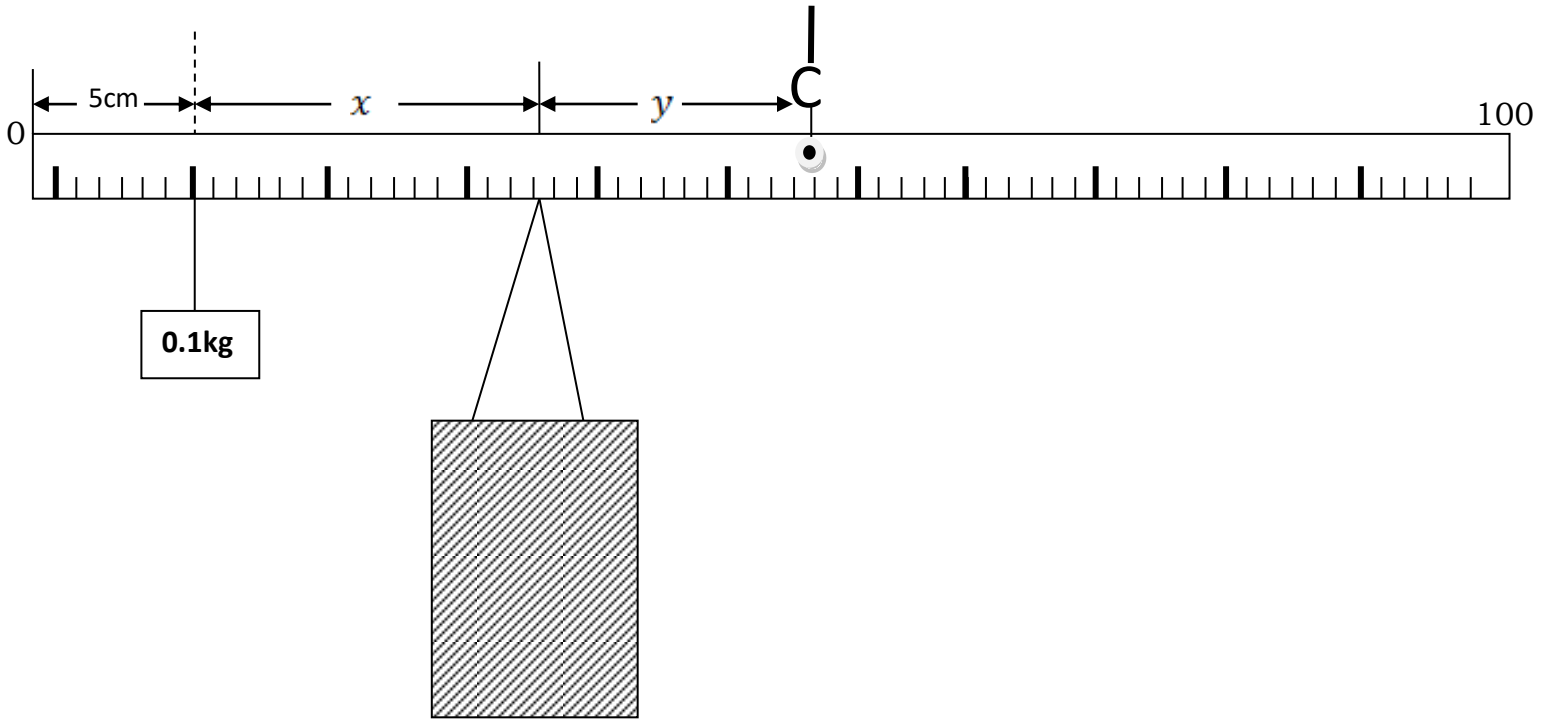
(g) Calculate the mass $\mathbf{M_0}$ from the expression

$$\mathbf{M_0 = \frac{1}{2}\left(M_1 + M^1\right)}$$

Method II

(a) Balance the metre rule on the knife edge.

(b) Read and record the point C, corresponding to the balance point.



(c) Hang a mass of 0.1kg at a distance of S=5.0cm from the end with the 0cm mark of the metre rule.

(d) Adjust the position of the knife edge until the metre rule balance again.

(e) Read and record the distances x and y.

(f) Repeat procedures (c) to (e) for values of S=10.0, 15.0, 20.0, 25.0 and 30.0cm.

(g) Record your results in a suitable table.

(h) Plot a graph of y and x.

(i) Find the slope, n, of your graph.

(j) Calculate the mass M_0 of the metre rule from the formula;

$$\mathbf{M_0} = \frac{0.1}{n}$$

DISMANTLE THE SET UP

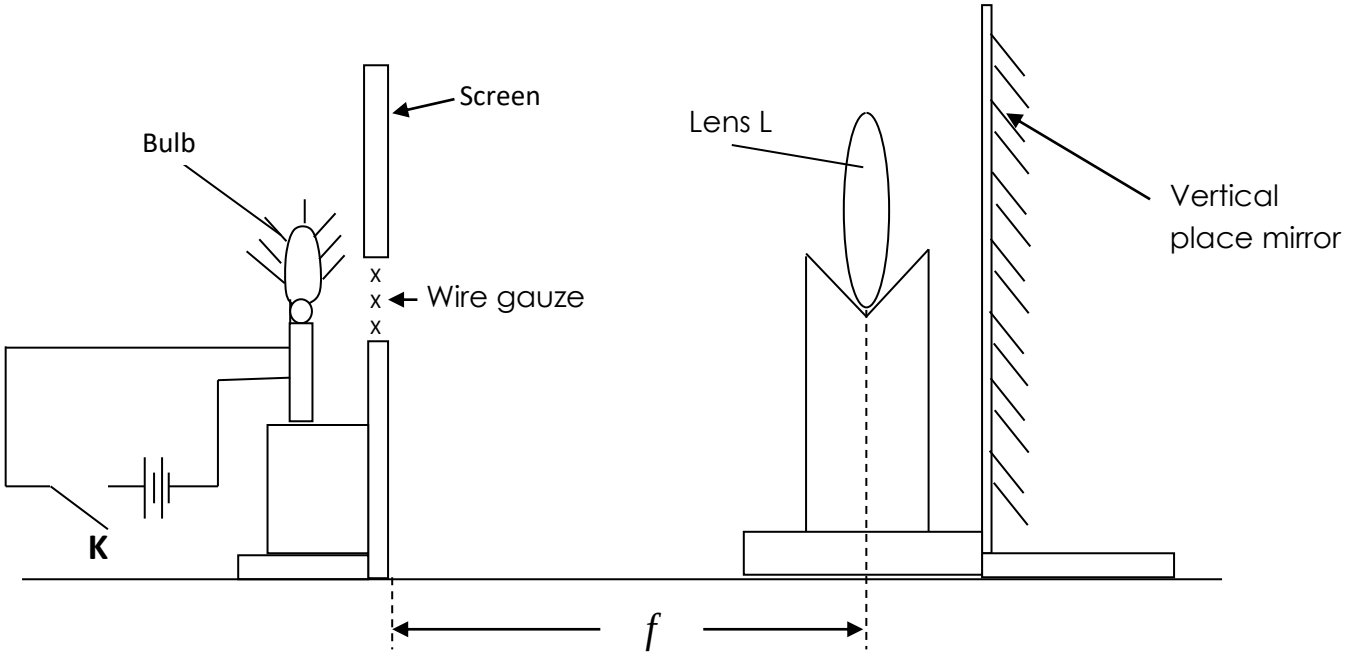
Turn Over

2. In this experiment, you will determine the focal length, f, of the converging lens provided by two methods.

Method I

(a) Mount the lens L, provided vertically on a lens holder.

(b) Place a vertical plane mirror M, just behind the lens L and set up a bulb on the bulb holder just beside the wire gauze as shown in the figure 2 below.



(c) Close switch **K**, to light up the bulb.

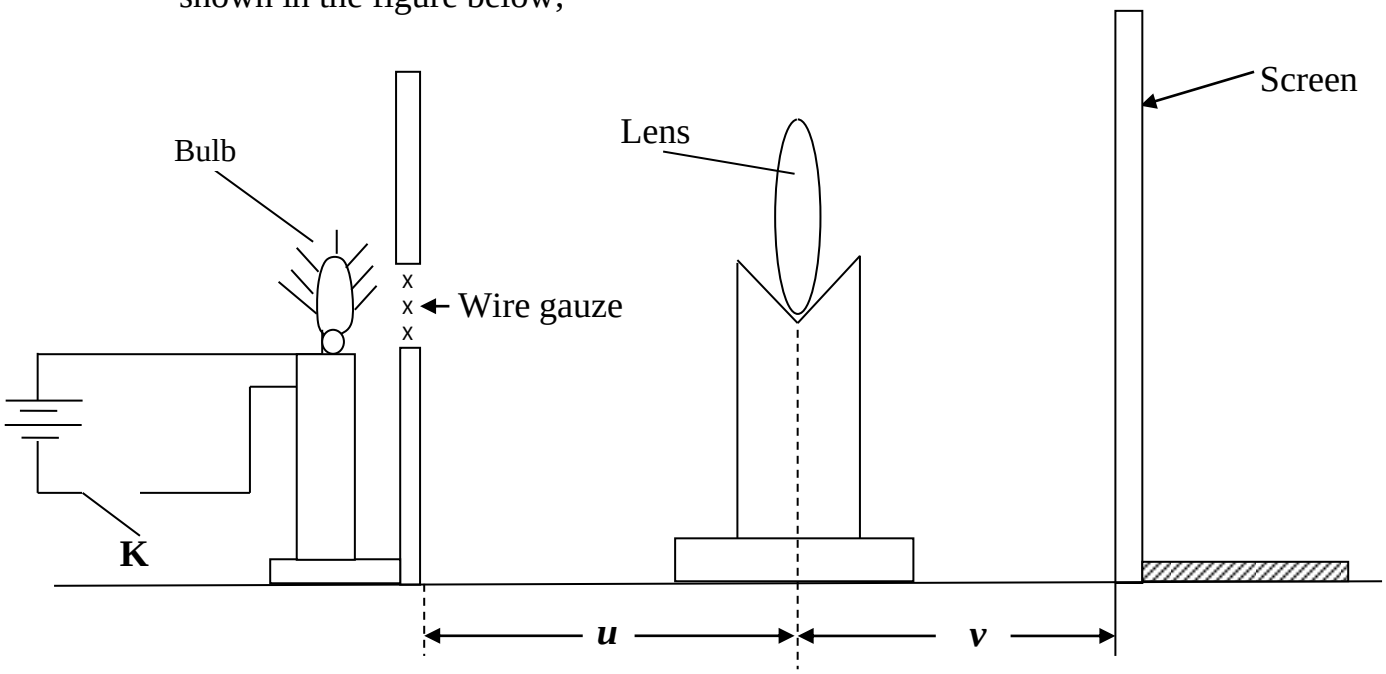
(d) Move the lens **L**, simultaneously with mirror **M** to and fro the screen until a sharp image of the wire gauze is formed just beside the illuminated object on the same screen.

(e) Measure and record the distance f . from the screen to the centre of the lens on the holder.

(f) Open switch **K**, and remove the plane mirror.

Method II

(a) Mount the lens, the wire gauze object and the white screen in their holders as shown in the figure below;



(b) Place the wire gauze object at a distance $u = f + x$ from the lens, where $x = 2.5cm$

(c) Close the switch **K**, to illuminate the object and move the screen to obtain a clear image of the object on the screen.

(d) Open switch, **K**, and measure the distance, v, of the screen from the lens.

(e) Find the value of $y = v - f$.

(f) Repeat procedures **(b)** to **(e)** for values of x **= 5.0, 7.5, 10.0, 12.5** and **15.0**

(g) Enter your results in a suitable table including values of $\frac{1}{x}$

(h) Plot a graph of y against $\frac{1}{x}$.

(i) Find the slope, S , of your graph.

(j) Find the focal length of the lens from the expression;

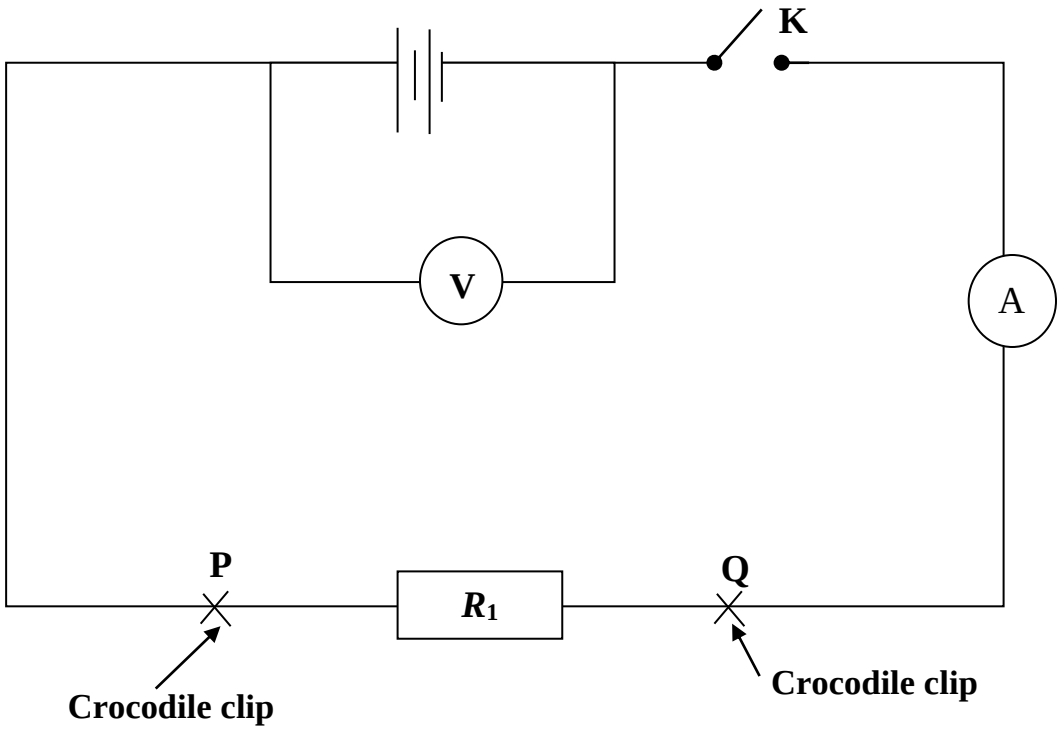
$$f = \sqrt{S}$$

DISMANTLE THE SET UP

Turn Over

3. In this experiment, you will determine the internal resistance, r, of two cells in series.
(20 marks)

Part I



(a) Connect the circuit shown in the figure above with a standard resistor $R_1 = 2.0\Omega$

(b) Read and record the voltmeter reading, V_1, and the ammeter reading I_1.

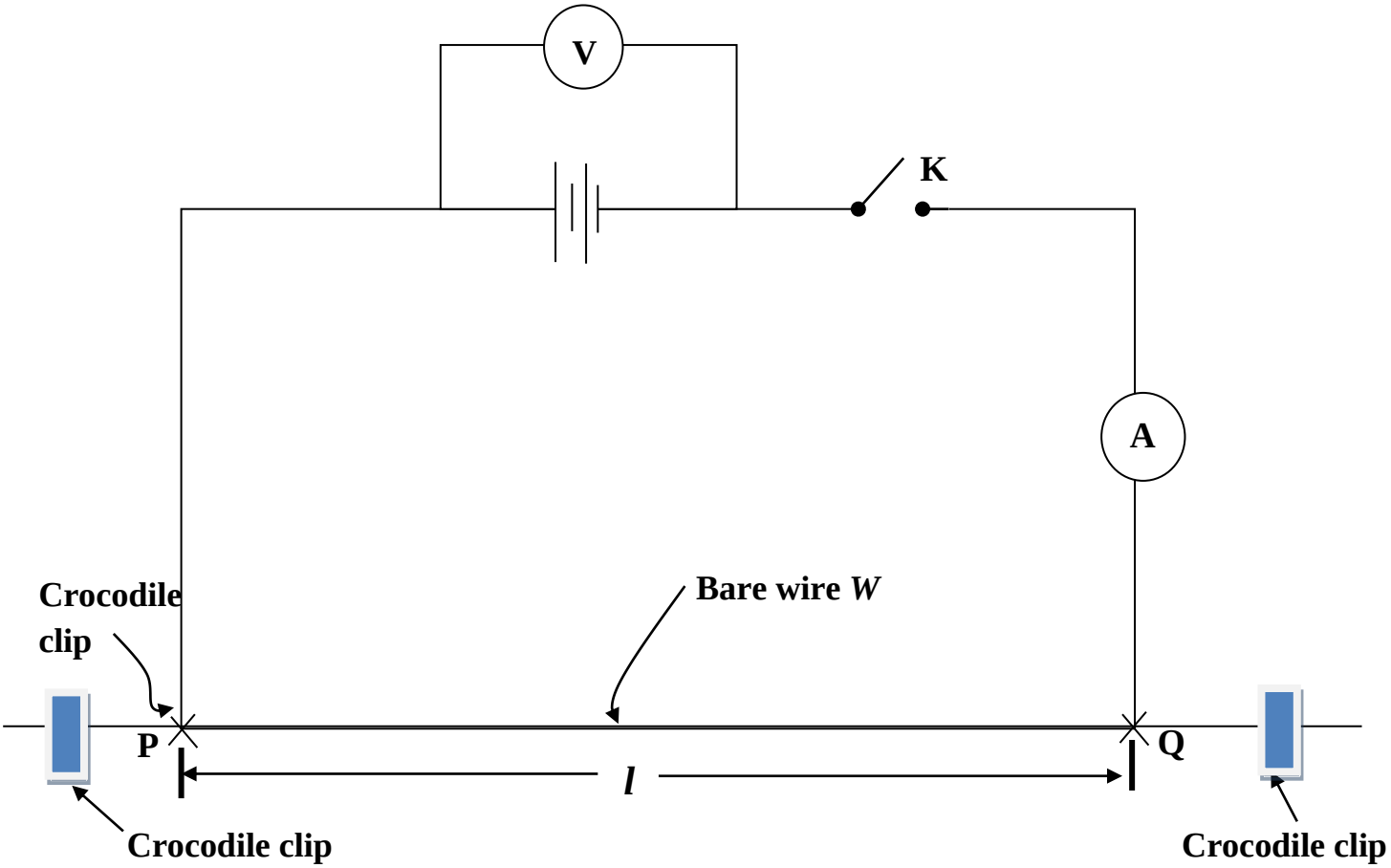
(c) Open switch **K**.

(d) Read and record the voltmeter reading, V_1 and the ammeter reading I_1

(e) Calculate, r , from the expression.

$$r_1 = \frac{(V_0 - V_1)}{I_1}$$

Part II



(a) Disconnect Crocodile clips **P** and **Q**, from R_1 in the circuit above.
(b) Fix the bare wire labeled ***W***, on the table using cello tape.
(c) Comment crocodile clips **P** and **Q** to the bare wire as shown in the figure above.
(d) Adjust the length l , to 1.000m.
(e) Close switch **K**.
(f) Read and record the voltmeter reading, **V** and the ammeter reading **I**.
(g) Repeat the procedures **(d)** to **(f)** for values of
(h) l**=0.900, 0.800, 0.700, 0.600** and **0.500*m***
(i) Open switch **K**.
(j) Record your results in a suitable table
(k) Plot a graph of **V** (along the vertical axis) against I(along the horizontal axis).
(l) Determine the slope, ***S***, of the graph.
(m) Calculate r_2 from $r_2 = -S$
(n) Calculate the value of r from;

$$r = \frac{1}{2}(r_1 + r_2)$$

DISMANTLE THE SET UP

END