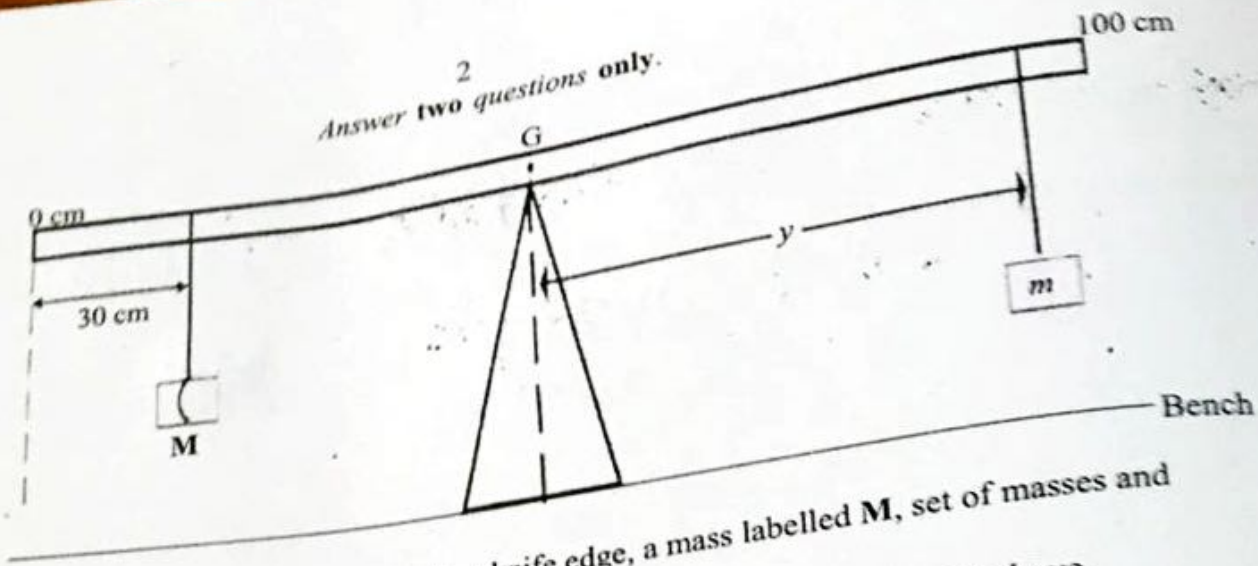
Answer **two** *questions* **only**.

1.



You are provided with a meter rule, a knife edge, a mass labelled **M**, set of masses and other necessary apparatus.

(i) Suspend the meter rule on the knife edge as shown in the diagram above.

(ii) Adjust the position of the rule until it balances horizontally. Read and record the point of balance, G of the rule. Maintain the knife edge at the G.

(iii) Suspend **M** at the 30.0 cm mark of the meter rule.

(iv) From the other side of the knife edge, suspend the mass $m = 50$ g and adjust its position until the rule balances horizontally.

(v) Read and record y.

(vi) Calculate y^{-1}.

(vii) Repeat the procedure with $m = 70$ g, 90 g, 110 g and 120 g. In **each** case read and evaluate y^{-1}.

(viii) Tabulate the results.

(ix) Plot a graph with m on the vertical axis and y^{-1} on the horizontal axis, starting both axe from the origin, (0,0).

(x) Determine the slope, s of the graph.

(xi) Evaluate $K = \frac{s}{100}$.

(xii) Using the graph, determine the value of y when m= 85 g.

(xiii) State **two** precautions taken to ensure correct results.

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(*b*) (i) State the conditions of equilibrium for a body acted upon by a number of co-planar parallel forces.

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(ii) A body of mass 60 g is suspended at the 29 cm mark of a uniform meter rule. The meter rule is adjusted on a knife edge until it balances horizontally at the 44 cm mark. Determine the mass of the meter rule.

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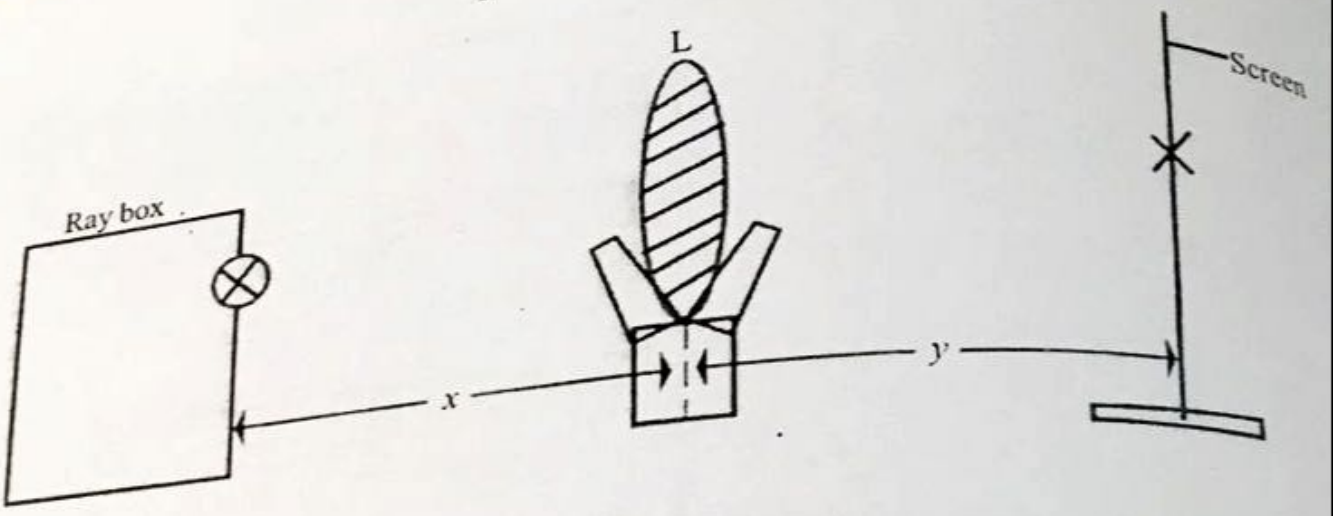
2. (a)



You are provided with a ray box, a converging lens L, a lens holder, a meter rule, a screen and other necessary apparatuses.

(i) Place the lens L in its holder, and move it towards or away from the screen until a clear image of a distant object is formed on the screen.

(ii) Determine the approximate focal length of the lens.

(iii) Set up the apparatuses as shown in the diagram.

(iv) With $x = 70$ cm, adjust the position of the screen until a clear image of the illuminate object is formed on the screen.

(v) Measure and record the distance y.

(vi) Evaluate $K = \frac{x}{y}$.

(vii) Repeat the procedure with $x = 60.0$ cm, 50.0 cm, 45.0 cm and 40.0 cm and in eac record y and evaluate $K = \frac{x}{y}$.

(viii) Tabulate the results.

(ix) Plot a graph of x on the vertical axis and K on the horizontal axis starting both ax from the origin (0,0).

(x) Determine the slope, s of the graph and the intercept, c on the vertical axis.

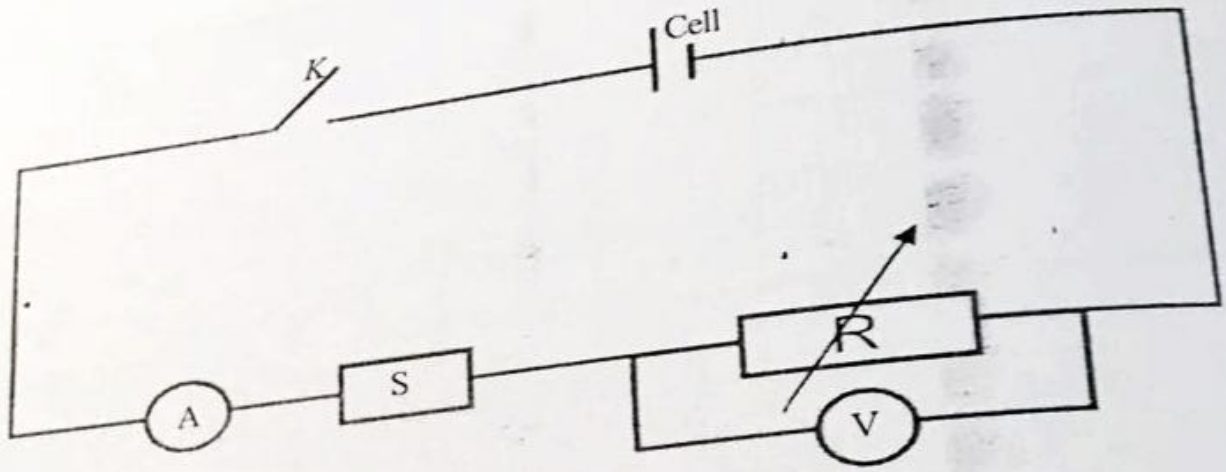
(xi) Using the graph, determine the value of y when $x = 48.0$ cm

(xii) State **two** precautions taken to ensure correct results.

(b) (i) Explain the term *conjugate foci* of a converging lens.

(ii) A converging lens of focal length 20 cm produces a virtual image 3 times the size of the object. Calculate the image distance.

3. (*a*)



You are provided with a cell, a key, an ammeter, a voltmeter, a standard resistor, s, a resistance box, connecting wires and other necessary apparatus.

(i) Set up the circuit as shown in the diagram above.

(ii) Measure and record the emf, E of the cell.

(iii) Select a resistance $R = 10\ \Omega$ from the resistance box.

(iv) Close the key. Read and record the voltmeter V and the corresponding ammeter reading, I.

(v) Repeat the procedure with $R = 15\ \Omega$, $20\ \Omega$, $25\ \Omega$, and $30\ \Omega$.

(vi) Tabulate the readings.

(vii) Plot a graph with V on the vertical and I on the horizontal axis.

(viii) Determine the slope, s of the graph and the intercept c on the vertical axis.

(ix) State **two** precautions taken to ensure correct results.

(*b*) (i) Define *resistance*.

(ii) Explain why the emf of a cell is greater than the p.d. across the cell when it i supplying current through an external circuit.

END OF PAPER