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EXPERIMENT- 1

OBJECT- To determine the mass of a metre rule using it as a lever.

APPARATUS- A metre rule of uniform thickness graduated in centimetre and milimetre, a wooden wedge, thin thread, weight box.

THEORY- A lever is rigid, straight or bent rod capable of rotating about a fixed point, called the fulcrum.
In figure 1, AB is a straight rod supported on the fulcrum F. Let a load L act at the end A and an effort E be applied at the other end B to overcome it.

A lever works on the principle of moments, according to which in equilibrium, the moments of load about the fulcrum is equal to the moment of effort about the fulcrum.

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METHOD-

1. Suspend the metre rule with its flat portion vertical in a loose thread loop and adjust the position of the loop till the scale rests in horizontal position. Mark this position of the loop on the scale as the centre of gravity (C.G).

2. Set up the apparatus as shown in figure 2 with fulcrum vertically below a point slightly away (towards right) from the centre of gravity of the metre rule. The metre rule should be placed so that its flat edge, which is graduated, is facing upwards. The rule will depress on the left side due to its own weight.

3. Tie a known weight W gf (say 20gf) with a thread and suspend it on the right side of the function by making a loop in the thread. Adjust the position of loop on the metre rule such that the metre rule balances itself in the horizontal position. Note the weight W, the distance x of

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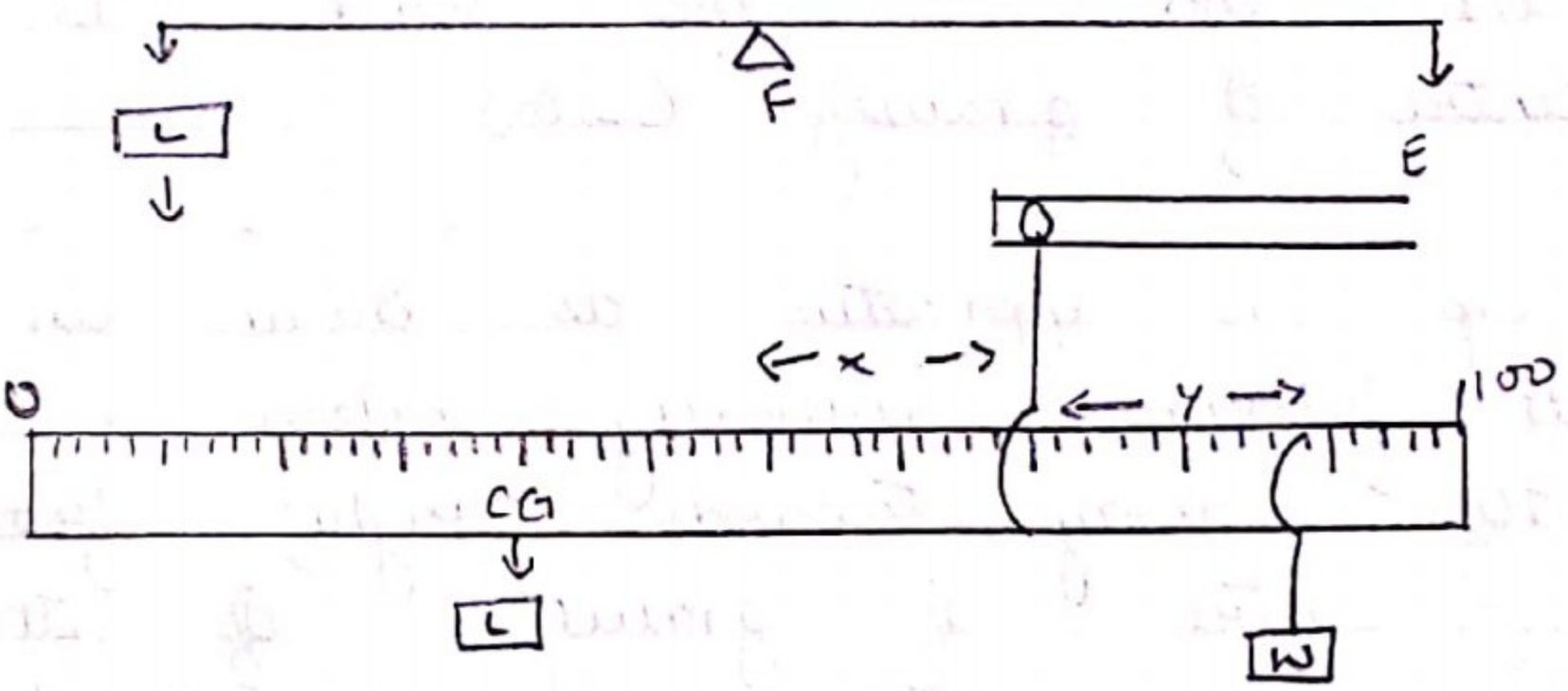

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fulcrum from the centre of gravity (C.G) of the metre rule and the distance y of the weight W from the fulcrum.

4. Repeat the experiment by changing W = 30gf and 40gf.

5. Calculate the mass of metre rule each time by using the formula $m = \frac{Wy}{x}g$ and then take its mean value.

OBSERVATIONS

a. Position of CG = 49.8 cm (b) Position of Fulcrum F = 53 cm

No of observations	Known weight W(gf)	Distance x = F - CG (in cm)	Position of weight (W) (in cm)	Distance y = W - F (in cm)	Mass of metre rule $m = \frac{Wy}{x}g$
1	10	53.50	83.2	36.1	12.3
2	20	3	72.8	19.8	132
3	30	3	.66	17	130
				Average mass =	91.4

RESULT

Mass of metre rule m = 91.4 g

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PRECAUTIONS:

1. While the position of the effort is being shifted, take care that the position of the function is not changed i.e. the scale should not slip on either side of the loop.

2. While Trying for different positions of effort or weight W on the right side, hold the scale at fulcrum with your left hand with the position of fulcrum fixed. Remove your hand and allow the scale To swing To a very small extent only when checking for scale to reach in horizontal equilibrium position; otherwise the position of the fulcrum and of the load may alter.

3. When an approximate balance point has been achieved, remove your hand, and allow the scale to swing freely to make the final adjustment.

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