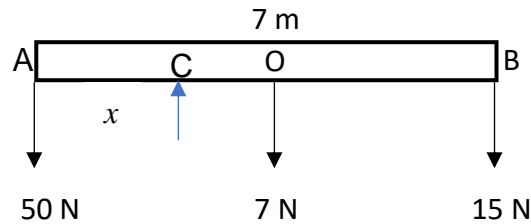


Answer on Question #90921, Physics / Mechanics | Relativity

A uniform 7 m bar has weight of 27 N. A 50 N weight is hung from the left end, and a 15 N weight is hung at the right end. How far from the left end will a single upward force produce equilibrium?

Solution:



Let the upward force is applied at point C at a distance x from the left end as shown in figure.

Since the bar is uniform, its weight will act through the centre of gravity located at the mid-point O of the bar, i.e, at a distance 3.5 m from the left end.

From figure,

$$CA = x$$

$$CO = 3.5 - x$$

$$CB = 3.5 + x$$

$$\text{Clockwise moment about C} = 7(3.5 - x) + 15(3.5 + x)$$

$$\text{Anticlockwise moment about C} = 50x$$

At equilibrium, Anticlockwise moment = Clockwise moment

$$50x = 7(3.5 - x) + 15(3.5 + x)$$

$$42x = 77$$

$$x = 1.833 \text{ m}$$

Answer: At a distance of 1.833 m from the left end, a single upward force will produce equilibrium.

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