

3/31 $\uparrow \Sigma F = 0 \Rightarrow T = m_1 g / 2$

Diagram showing a mechanical system with two rods, AB and BC, connected at point O. Rod AB is inclined at 30° to the vertical. A horizontal reaction force $N_A \rightarrow 0$ acts at point A. A weight of $2mg/3$ acts at a distance $L/3$ from A. Rod BC is perpendicular to AB, with a weight of $mg/3$ acting at a distance $L/6$ from B. A weight m_1g acts at point B, supported by a pulley system where $T = m_1g/2$. A coordinate system (O_x, O_y) is shown at point O.

Counterclockwise moment equilibrium about O:

$$\curvearrowleft \Sigma M_O = 0 : \frac{2mg}{3} \left(\frac{L}{3} \sin 30^\circ \right) - \frac{mg}{3} \left(\frac{L}{6} \cos 30^\circ \right) - \frac{m_1g}{2} \left(\frac{L}{3} \cos 30^\circ \right)$$

$$m_1 = 0.436 m$$

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