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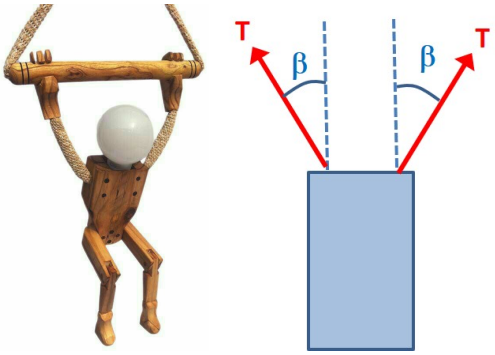
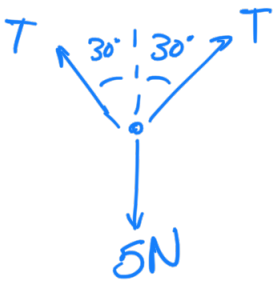
AEM 2011 Quiz #1
Tuesday, January 24, 2023

A non-communicating calculator is allowed. Full credit will only be given if all steps used are clearly communicated (free body diagrams, algebra, etc).

The figure below shows a hanging robot lamp and a simplified diagram of the hanging robot. The weight of the robot is $W = 5N$. The tension T in each robot arm acts at an angle $\beta = 30°$ from vertical. What is the tension T so that the total vertical force from the two arms balances the downward weight W of the robot?



FBD



Force Sum.

$$\Sigma F_x = T\sin\beta - T\sin\beta = 0 \quad \checkmark$$

$$\Sigma F_y = 2T\cos\beta - W = 0$$

$$\Rightarrow T = \frac{W}{2\cos\beta}$$

$$\boxed{T = 2.887N} \quad \checkmark$$