Answer on Question #45338, Physics, Mechanics | Kinematics | Dynamics

Task: A rope suspended from a ceiling supports an object of weight W at its opposite end. Another rope tied to the first at the middle is pulled horizontally with a force of 30N. The junction P of the ropes is in equilibrium. Calculate the weight W and the tension

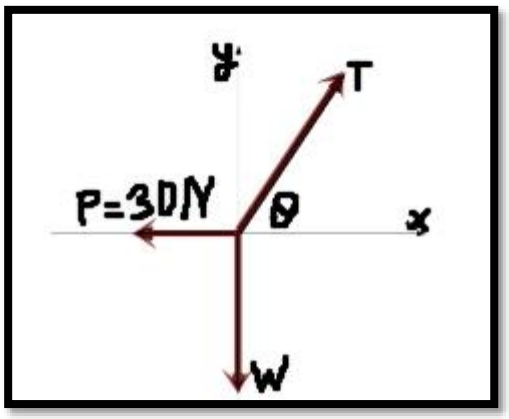
27.2N and 39.2N

40.5N and 62.5N

30.4N and 53.7N

16.6N and 27.3N

Solution:



$$\sum F_x = -F + T\cos\theta = 0$$

$$\sum F_y = T\sin\theta - W = 0$$

$$\Rightarrow T = \frac{F}{\cos\theta} = \frac{30}{\cos\theta}$$

$$W = T\tan\theta = 30\tan\theta$$

$$T^2 = F^2 + W^2$$

$$T^2 = W^2 = 900 \Rightarrow W = 30N$$

Answer: tension $\approx 53N$ **,W=30N.**