Ex 9-6
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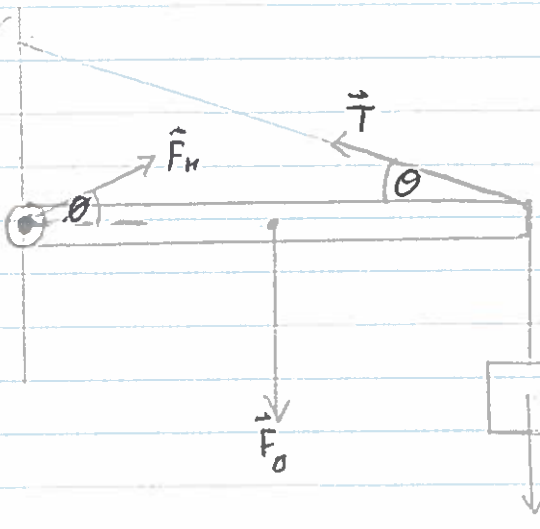
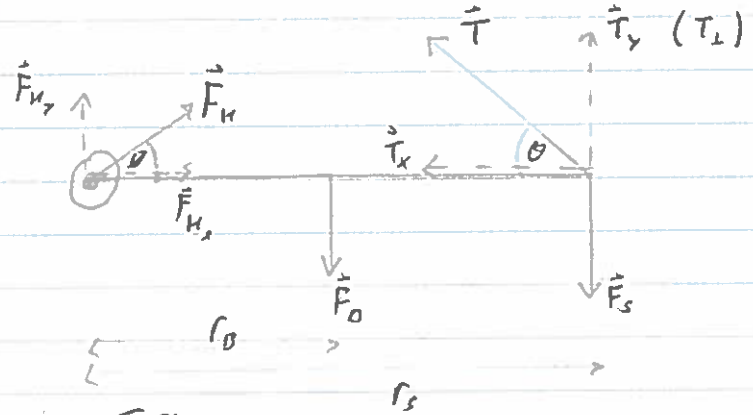


FBD:



Rot equil: $\Sigma \tau = 0$

about axis

$$\tau_H + \tau_B + \tau_T + \tau_S = 0$$

Torques: $\tau_H = 0$ acts at axis

$\tau_B = -r_B F_B$

$\tau_T = +r_S T_y = +r_S T \sin\theta$

$\tau_S = -r_S F_S$

$r_B = \frac{1}{2}$

$$0 - r_B F_B + r_S T \sin\theta - r_S F_S = 0$$

$$\therefore \quad T = \frac{r_B F_B + r_S F_S}{r_S \sin\theta} = \frac{\frac{1}{2} F_B + F_S}{\sin\theta} = \frac{(\frac{1}{2} m_B$$

$\sin$

$$T = \frac{\left[\frac{1}{2}(25\,kg) + 28\,kg\right](9.8\,m\,s^{-2})}{\sin 30^\circ}$$

$$\underline{\underline{T = 793.8\,N}}$$

- Trans equil in x: $\sum F_x = 0$

$$F_{H_x} - T_x = 0$$

$$F_{H_x} = T_x = T\cos\theta = (793.8\,N)\cos 30^\circ$$

$$\underline{F_{H_x} = 687.5\,N}$$

- Trans equil in y: $\sum F_y = 0$

$$F_{H_y} - F_B + T_y - F_s = 0$$

$$F_{H_y} = F_B - T_y + F_s$$

$$= (m_B + m_s)g - T\sin 30^\circ$$

$$= (25\,kg + 28\,kg)(9.8\,m\,s^{-2}) - (793.8\,N)\sin 30^\circ$$

$$\underline{F_{H_y} = 122.5\,N}$$

$$F_H = \sqrt{F_{H_x}^2 + F_{H_y}^2} = \sqrt{(687.5\,N)^2 + (122.5\,N)^2}$$

$$\underline{\underline{F_H = 698.3\,N}}$$