

5-23.

Given:

$$T_1 = T_2 = T = 55 \text{ N}$$

$$\theta_1 = \theta_2 = \theta = 35^\circ$$

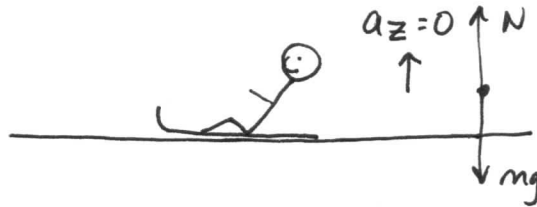
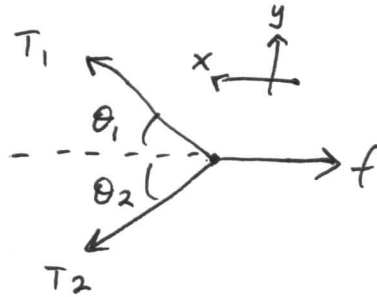
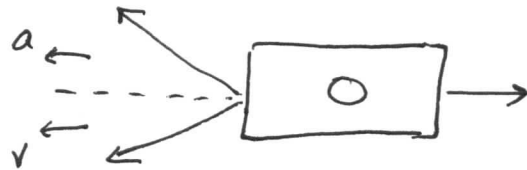
$$m_c = 19 \text{ kg}$$

$$m_s = 3.7 \text{ kg}$$

$$a_y = 0$$

$$f = 57 \text{ N}$$

Goal: Find \vec{a} .



$$\Sigma F_x = F_{\text{net},x} = T_1 \cos \theta_1 + T_2 \cos \theta_2 - f$$

$$m a_x = 2 T \cos \theta - f$$

$$m = (m_c + m_s)$$

$$a_x = \frac{2 T \cos \theta - f}{m}$$

$$= \frac{2(55 \text{ N}) \cos 35^\circ - 57 \text{ N}}{22.7 \text{ kg}}$$

$$= 1.5 \frac{\text{m}}{\text{s}^2}$$

sign: +

$$\text{units: } \frac{\text{N}}{\text{kg}} = \frac{\text{m}}{\text{s}^2}$$

sense: $1.5 \frac{\text{m}}{\text{s}^2}$ is significantly less than g

$$F_{\text{net},y} = T_1 \sin \theta_1 - T_2 \sin \theta_2$$

$$= T \sin \theta - T \sin \theta$$

$$m a_y = 0 \quad \checkmark$$