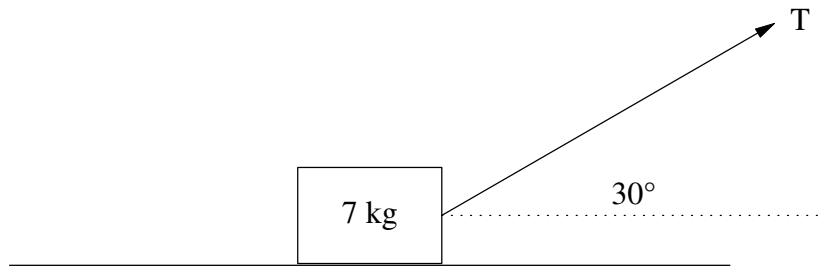
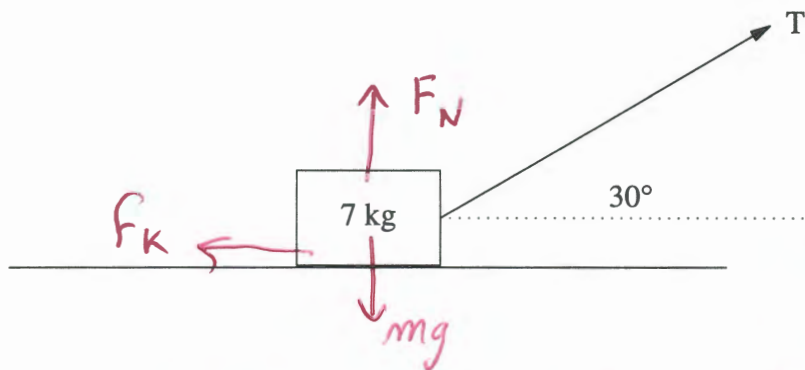


6. (30 pts.) A girl pulls a 7 kg box with a massless string along a rough floor with a constant velocity of 0.5 m/s . The coefficient of kinetic friction between the box and the floor is 0.3 . The rope makes an angle of 30° with the horizontal. Find the work done by the girl in moving the box a horizontal distance of 3 m .



6. (30 pts.) A girl pulls a 7 kg box with a massless string along a rough floor with a constant velocity of 0.5 m/s. The coefficient of kinetic friction between the box and the floor is 0.3. The rope makes an angle of 30° with the horizontal. Find the work done by the girl in moving the box a horizontal distance of 3 m.



Note: $\vec{a} = 0!$

$$W = (F_x)(\Delta x)$$

$$\Sigma F_x = ma_x$$

$$T \cos 30^\circ - F_k = 0$$

$$T \cos 30^\circ - \mu_k F_N = 0$$

$$\Sigma F_y = ma_y$$

$$T \sin 30^\circ + F_N - mg = 0$$

$$F_N = mg - T \sin 30^\circ$$

put together

$$T \cos 30^\circ - \mu_k (mg - T \sin 30^\circ) = 0$$

$$T (\cos 30^\circ + \mu_k \sin 30^\circ) = \mu_k mg$$

$$T = \frac{\mu_k mg}{\cos 30^\circ + \mu_k \sin 30^\circ} = \frac{(0.3)(7)(9.8)}{(0.866 + 0.3(\frac{1}{2}))}$$

$$T = 20.3 \text{ N}$$

$$T_x = T \cos 30^\circ = 17.5 \text{ N}$$

$$W = T_x \Delta x = (17.5 \text{ N})(3 \text{ m}) = \boxed{52.6 \text{ J}}$$