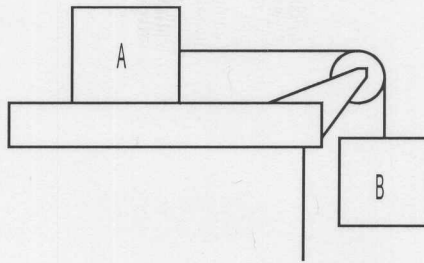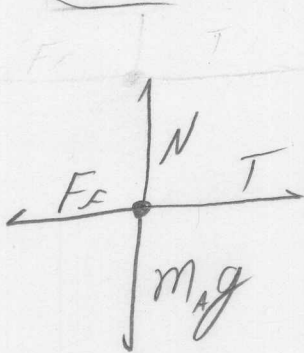# Force Problems

Consider the system shown below. The coefficient of friction between the block and the tabletop is μ_k. Calculate the mass of block m_B, in terms of m_A and μ_k that will keep the system descending at a constant rate once it is in motion. Assume the pulley is frictionless and massless.
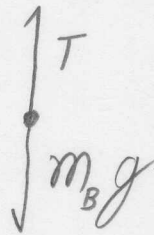

$$\text{const } v \Rightarrow a = 0$$

Block A

Block B

$$x: T - F_F = 0$$
$$T = \mu_k N$$

$$y: N - m_A g = 0$$
$$N = m_A g$$

$$① \boxed{T = \mu_k m_A g}$$

$$x: T - m_B g = 0$$
$$② \boxed{T = m_B g}$$

Combine ① and ②

$$\mu_k m_A g = m_B g$$

$$\cancel{\star} \boxed{\mu_k = \frac{m_B}{m_A}}$$