Equilibrium Quiz Study Guide – Problem 1

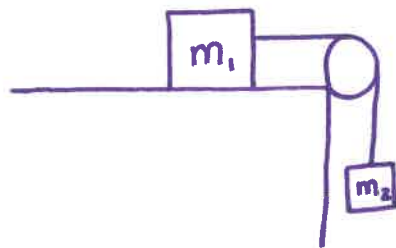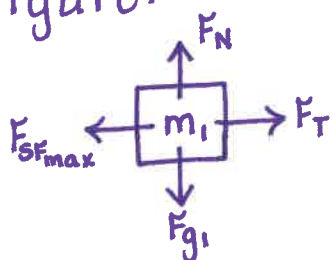Given: $m_1 = 15$ kg, $m_2 = 5$ kg, at rest

Want: $F_{SF_{max}}$

Figure:

Calculations:

at rest $\Rightarrow$ equilibrium $\Rightarrow$ up forces = down forces, left forces = right forces

$$F_N = F_{g_1} \qquad F_{SF_{max}} = F_T \qquad F_T = F_{g_2}$$

Weight: $F_g = mg$

$$F_N = m_1 g \qquad F_{SF_{max}} = F_T \qquad F_T = m_2 g$$

$$F_{SF_{max}} = m_2 g$$

$$F_{SF_{max}} = (5)(9.8)$$

$$F_{SF_{max}} = 49 \text{ N}$$

$$\boxed{F_{SF_{max}} = 50 \text{ N}}$$

Conclusion: The maximum magnitude of the frictional force acting on the 15-kg box is <u>50 N</u>.