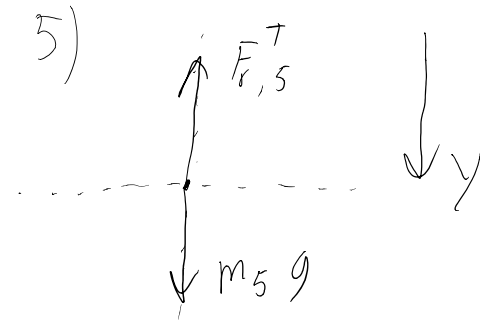
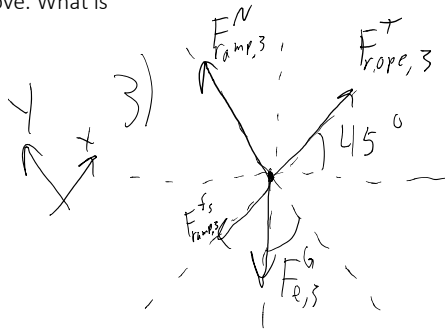
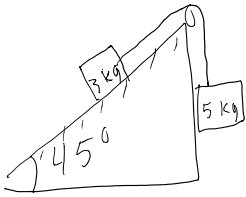


A 3 kg block is resting on a 45 degree ramp with friction. It is connected by a massless rope, over the top of a ramp to a 5 kg block. It is found if the 5 kg block is made any more massive the 3 kg block will start to move. What is the coefficient of static friction?



$$\sum F_{x,3} = m_3 a_{x,3}$$

$$F_{rope,3}^T - F_{ramp,3}^{fs,max} - F_{e,3,x}^G = m_3 a_{x,3}^0$$

$$F_{ramp,3}^{fs,max} = \mu_s F_{ramp,3}^N$$

$$F_{rope,5}^T - \mu_s F_{ramp,3}^N - F_{e,3}^G \sin \theta = 0$$

$$m_5 g - \mu_s m_3 g \cos \theta - m_3 g \sin \theta = 0$$

$$-\mu_s m_3 g \cos \theta = m_3 g \sin \theta - m_5 g$$

$$\mu_s = \frac{m_3 g \sin \theta - m_5 g}{m_3 g \cos \theta} = 1.36$$

$$\sum F_{y,3} = m_3 a_{y,3}$$

$$F_{ramp,3}^N - F_{e,3,y}^G = m_3 a_{y,3}^0$$

$$F_{ramp,3}^N - F_{e,3}^G \cos \theta = 0$$

$$F_{ramp,3}^N = m_3 g \cos \theta$$

$$\sum F_{y,5} = m_5 a_{y,5}$$

$$-F_{r,5}^T + m_5 g = m_5 a_{y,5}^0$$

$$m_5 g = F_{r,5}^T$$

$$|F_{rope,3}^T| = |F_{rope,5}^T|$$