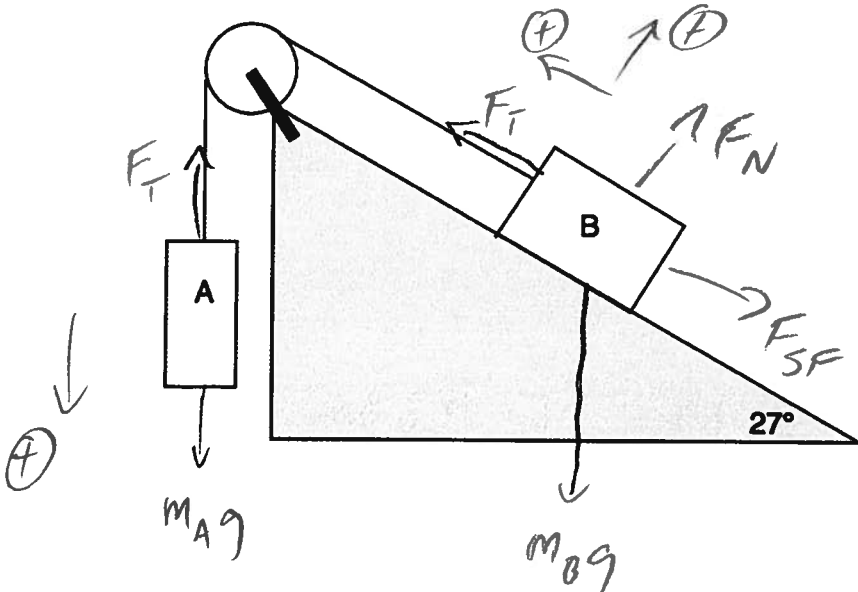


Physics 10154 - Quiz 4E

The coefficient of static friction between block B and the surface is 0.533. The coefficient of kinetic friction between block B and the surface is 0.356.

Block A has a mass of 15.0 kg. Block B has a mass of 12.0 kg.

Does the system move if it is released from rest?
 If no, what is the force of static friction acting on block B?
 If yes, what is the system's acceleration?



At rest:

$$F_T = m_A g = 147$$

$$m_B g \sin 27 = 53.4$$

Since F_T larger on block B, F_{SF} points \rightarrow

$$B: \Sigma F_{\perp} = F_N - m_B g \cos 27 = 0 \Rightarrow F_N = 104.8 \text{ N}$$

$$\Sigma F_{\parallel} = F_T - m_B g \sin 27 - F_{SF} = 0$$

$$\Rightarrow F_{SF} = 147 - 53.4 = 93.6 \text{ N}$$

$$F_{SF, \text{MAX}} = \mu_s F_N = (0.533)(105) = 55.9, \text{ so block moves}$$

$$A: \Sigma F_y: -F_T + m_A g = m_A a$$

$$B: \Sigma F_{\parallel}: +F_T - 53.4 - \mu_k F_N = m_B a$$

$$(m_A g - m_A a) - 53.4 - \mu_k F_N = m_B a$$

$$(15)(9.8) - 53.4 - (0.356)(104.8) = 27a$$

$$56.29 = 27a$$

$$a = 2.08 \text{ m/s}^2$$

up ramp