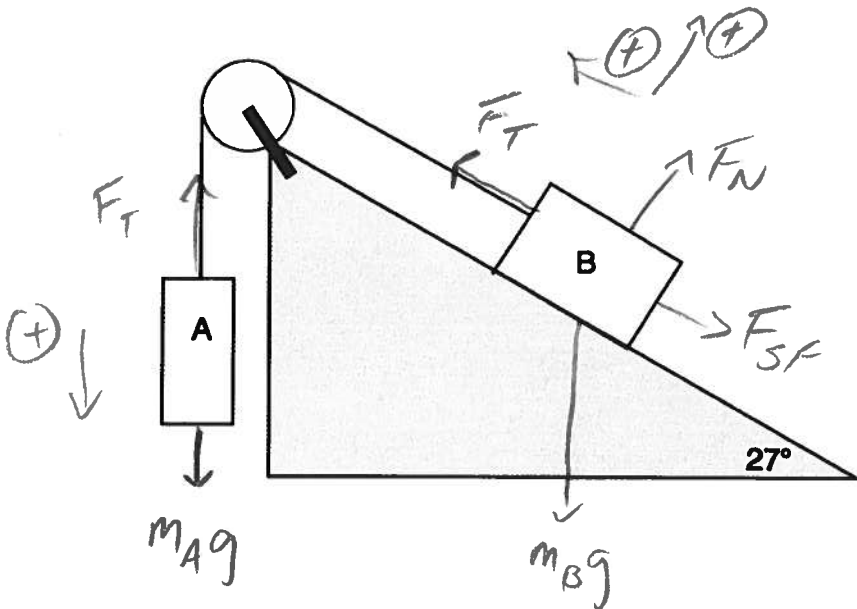


Physics 10154 - Quiz 4C

Block B has a mass of 22.0 kg and is at rest on an inclined plane as shown below. The coefficient of static friction between block B and the plane is 0.450. What is the maximum possible mass A that can be hung vertically if block B is to remain at rest and not slide up the ramp?



Since m_A very heavy,
 F_{SF} points \rightarrow
"Maximum" mass for A
means $F_{SF} = \mu_s F_N$

$$A: \Sigma F_y: -F_T + m_A g = 0$$

$$B: \Sigma F_{\perp}: F_N - m_B g \cos 27^\circ = 0$$

$$\Sigma F_{\parallel}: +F_T - m_B g \sin 27^\circ - \mu_s F_N = 0$$

$$\rightarrow F_T = m_A g = 9.8 m_A$$

$$\rightarrow F_N = m_B g \cos 27^\circ = 192.1$$

$$\Sigma F_{\parallel}: +9.8 m_A - 97.9 - (0.45)(192.1)$$

$$9.8 m_A = 184.3$$

$$\Rightarrow m_A = 18.8 \text{ kg}$$