

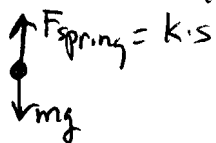
$$F_{\text{net},y} = T \cos 25^\circ - mg = 0$$

$$T = \frac{mg}{\cos 25^\circ}$$

$$F_{\text{net},x} = T \sin 25^\circ = m \frac{\Delta v}{\Delta t}$$

$$\begin{aligned} \Delta v &= \frac{T \sin 25^\circ \Delta t}{m} = \frac{mg \sin 25^\circ \Delta t}{\cos 25^\circ m} \\ &= g \tan 25^\circ \Delta t = 82.2 \text{ m/s} \end{aligned}$$

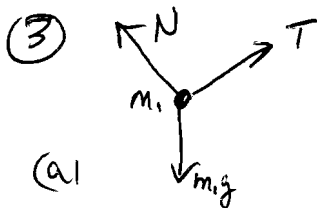
② (a) $F_{\text{net},y} = k \cdot s - mg = 0$



$$k = \frac{mg}{s} = \frac{(2.5 \text{ kg})(9.8 \text{ N/kg})}{0.048 \text{ m}} = 510 \text{ N/m}$$

(b) $F_{\text{net},y} = k s - mg = \frac{\Delta p}{\Delta t} = \frac{m \Delta v}{\Delta t}$

$$\begin{aligned} s &= \frac{1}{k} \left(mg + m \frac{\Delta v}{\Delta t} \right) = \frac{1}{510 \frac{\text{N}}{\text{m}}} \left((2.5 \text{ kg})(9.8 \frac{\text{N}}{\text{kg}}) + 2.5 \text{ kg} \left(\frac{1.6 \frac{\text{m}}{\text{s}}}{0.713} \right) \right) \\ &= 0.058 \text{ m} = 5.8 \text{ cm} \end{aligned}$$



along plane: $T - m_1 g \sin \theta = 0$ or $T = m_1 g \sin \theta$

for m_2 : $T - m_2 g = 0$

$$m_2 = \frac{T}{g} = \frac{m_1 g \sin \theta}{g} = m_1 \sin \theta$$

$$= 7.2 \text{ kg}$$

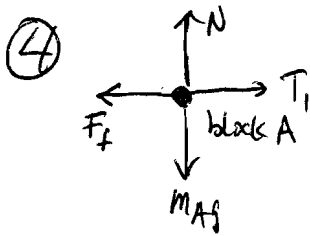
$$(b) \quad T - m_1 g \sin \theta = m_1 \frac{\Delta v}{\Delta t} \quad m_2 g - T = m_2 \frac{\Delta v}{\Delta t}$$

$$\downarrow T = m_1 g \sin \theta + m_1 \frac{\Delta v}{\Delta t} \rightarrow m_2 g - (m_1 g \sin \theta + m_1 \frac{\Delta v}{\Delta t}) = m_2 \frac{\Delta v}{\Delta t}$$

$$m_2 g - m_1 g \sin \theta = (m_1 + m_2) \frac{\Delta v}{\Delta t}$$

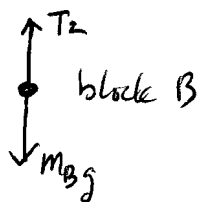
$$\Delta v = \frac{(m_2 g - m_1 g \sin \theta) \Delta t}{m_1 + m_2} = 1.31 \frac{m}{s}$$

$$v_f = v_i + \Delta v = 0 + 1.31 \frac{m}{s} = 1.31 \text{ m/s.}$$



$$F_{net,x} = T_1 - F_f = 0$$

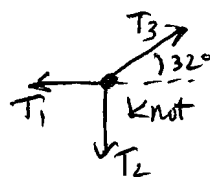
$$T_1 = F_f$$



$$F_{net,y} = T_2 - m_B g = 0$$

$$T_2 = m_B g = (5.8 \text{ kg})(9.8 \frac{N}{kg})$$

$$T_2 = 56.8 \text{ N}$$



$$F_{net,x} = T_3 \cos 32^\circ - T_1 = 0$$

$$F_{net,y} = T_3 \sin 32^\circ - T_2 = 0$$

$$T_1 = T_3 \cos 32^\circ$$

$$T_3 = T_1 / \cos 32^\circ$$

$$T_2 = T_3 \sin 32^\circ = \frac{T_1 \sin 32^\circ}{\cos 32^\circ}$$

$$T_1 = T_2 \frac{\cos 32^\circ}{\sin 32^\circ}$$

$$T_1 = 56.8 \text{ N} (1.60) = 90.9 \text{ N}$$

$$F_f = T_1 = 90.9 \text{ N.}$$