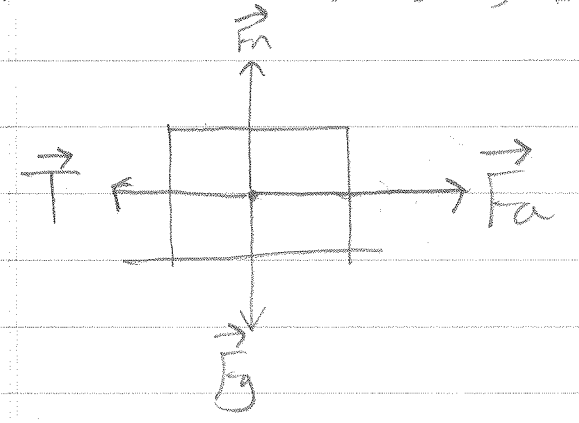
Pg 108: #27

a) $\Sigma \vec{F} = m_{tot} \cdot \vec{a} = \vec{F_a}$

$\hookrightarrow \vec{a} = \frac{\vec{F_a}}{m} = \frac{42N}{6.0\,kg} = 7.0\,m/s^2$

b) I chose to use 3.0kg blocky as FBD is more simple



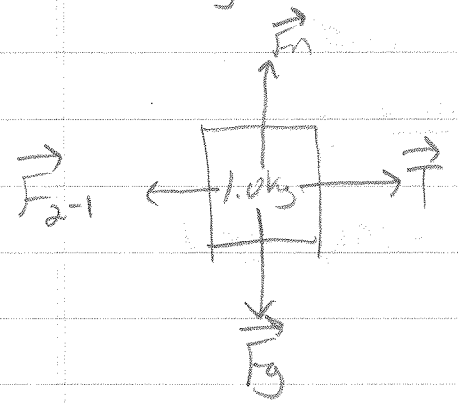
$\Sigma \vec{F} = \vec{F_a} - \vec{T} = m \cdot a$

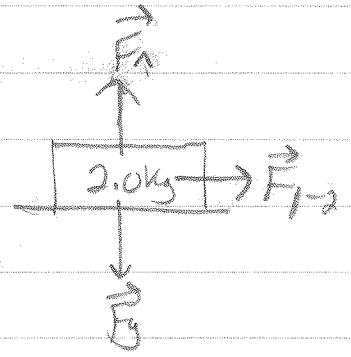
$\hookrightarrow \vec{T} = \vec{F_a} - m \cdot \vec{a}$

$\hookrightarrow \vec{T} = 42N - (3.0kg \cdot 7.0 m/s^2)$

$\vec{T} = 21N$

c) Shortly how to solve for either block





$\Sigma \vec{F} = m \cdot \vec{a} = \vec{T} - \vec{F_{2-1}}$

$\hookrightarrow \vec{F_{2-1}} = \vec{T} - m \cdot \vec{a}$

$\vec{F_{32-1}} = 21N - (1.0kg)(7.0 m/s^2)$

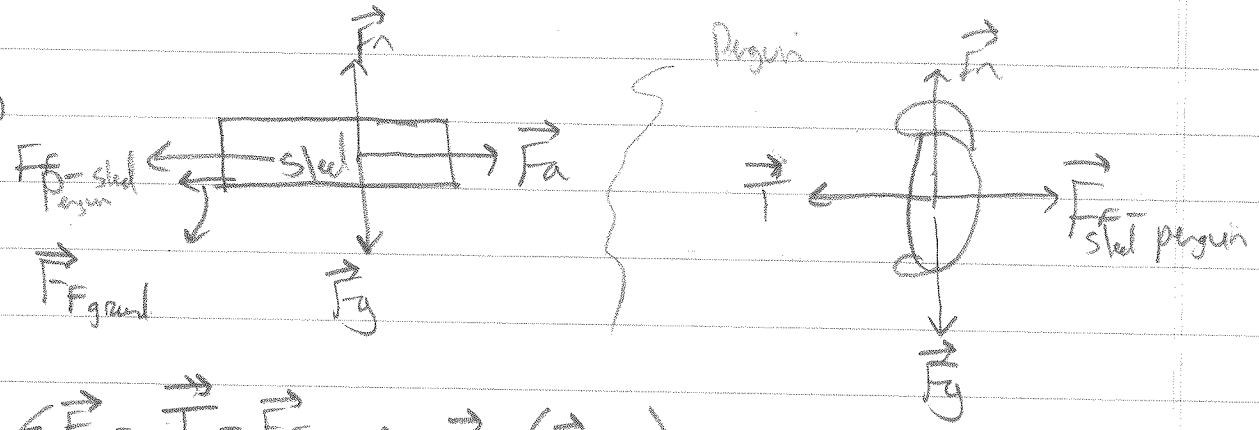
$\vec{F_{32-1}} = 14N$

$\Sigma \vec{F} = m \cdot \vec{a} = \vec{F_{1-2}}$

$\hookrightarrow \vec{F_{1-2}} = (2.0kg)(7.0 m/s^2)$

$= 14N$

(64.) a)



b.) $\Sigma \vec{F} = \vec{T} - \vec{F}_F = m \cdot \vec{a}$ $(\vec{a} = 0)$

$\vec{T} = \vec{F}_F$

$\vec{T} = \mu \cdot m_p \cdot g$

$\vec{T} = (.20) \cdot 5.0\,kg \cdot 10\,m/s^2$

$\vec{T} = 10N = \vec{F}_{F\ sled\text{-}penguin}$

c.)

$\Sigma \vec{F} = \vec{F}_a - \vec{F}_{F_{p-sled}} - \vec{F}_{F\ ground} = m \cdot \vec{a}$

$\vec{a} = \dfrac{\vec{F}_a - (\mu \cdot m_p \cdot g) - (\mu \cdot m_{sled} \cdot g)}{(m_{sled})}$

$\vec{a} = \dfrac{45N - (.20 \cdot 5.0kg \cdot 10\,m/s^2) - (.20 \cdot 15kg \cdot 10\,m/s^2)}{(10\,kg)}$

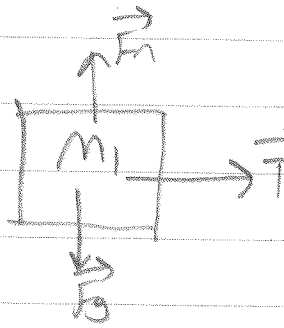
$\vec{a} = .50\,m/s^2$

13.4 +

(65) a) since frictionless, $\sum \vec{F} = \vec{F}_a = m_{tot} \cdot \vec{a}$

$$\vec{a} = \frac{\sum \vec{F}}{m_{total}} = \frac{50N}{(10kg + 20kg)} = 1.7 m/s^2$$

$\vec{T}$ → using m_1

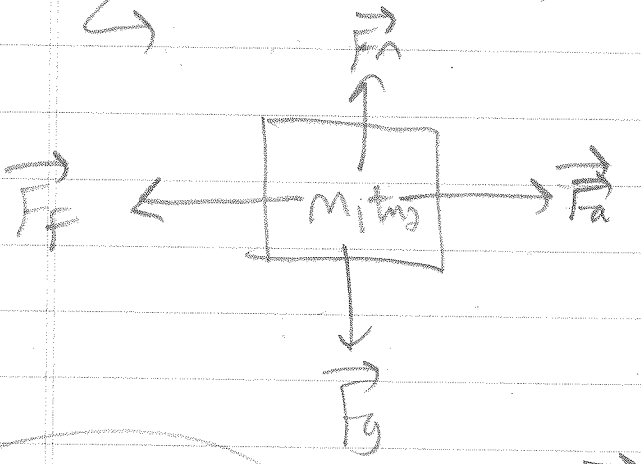


$$\sum \vec{F} = \vec{T} = m_1 \cdot a$$

$$\vec{T} = (10kg \cdot 1.7 m/s^2)$$

$$T = 17N$$

b) can treat $m_1 + m_2$ as 1 object

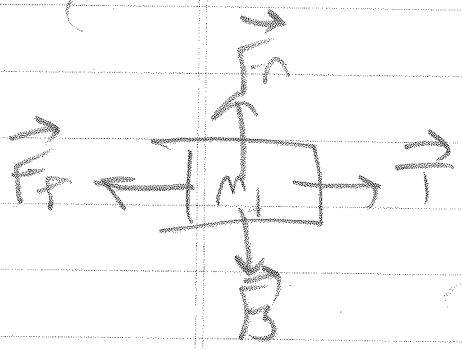


$$\sum \vec{F} = \vec{F}_a - \vec{F}_F = (m_1 + m_2) \cdot \vec{a}$$

$$\vec{a} = \frac{\vec{F}_a - (\mu \cdot (m_1 + m_2) g)}{(m_1 + m_2)}$$

$$\vec{a} = \frac{50N - (.10 \cdot (30kg \cdot 1 m/s^2))}{(30kg)}$$

$$\vec{a} = .67 m/s^2$$



$$\sum \vec{F} = m \cdot \vec{a} = \vec{T} - \vec{F}_F$$

$$\vec{T} = m \cdot a + \vec{F}_f$$

$$\vec{T} = (10.kg \cdot .67 m/s^2) + (.10 \cdot 10_{kg} \cdot (m/s^2$$

$$T = 17N$$