

# Chapt 4

4.8  $F = ma$ , so  $F \rightarrow 2F \Rightarrow a \rightarrow 2a$

Only change is in  $a$ , so  $x$  is the same

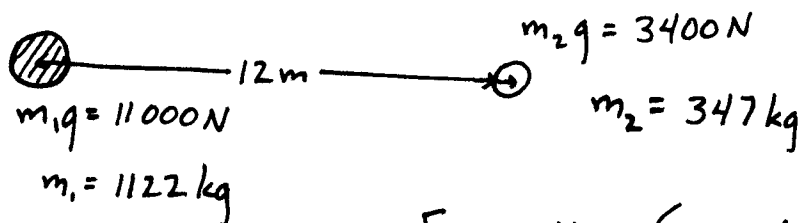
Use  $v^2 = v_0^2 + 2ax$

$(25)^2 = 2ax$  (1) let  $a \rightarrow 2a$   $v^2 = 2(2a)x$  (2)

$$\frac{(1)}{(2)} \Rightarrow \left(\frac{25}{v}\right)^2 = \frac{2ax}{2(2a)x} \Rightarrow \left(\frac{25}{v}\right)^2 = \frac{1}{2}$$

$$v^2 = 2(25)^2 \quad v = \sqrt{2}(25) = \underline{35.4 \text{ m/s}}$$

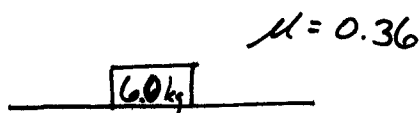
4.22



$$F_{\text{Grav}} = \frac{m_1 m_2 G}{R^2} = \frac{(1122 \text{ kg})(347 \text{ kg})(6.67 \times 10^{-11} \text{ N m}^2/\text{kg}^2)}{(12 \text{ m})^2}$$

$$\underline{F_G = 1.8 \times 10^{-7} \text{ N}}$$

4.44



$f = \mu N$  in this case  $N = ma$

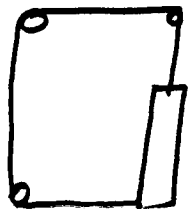
a.)  $a = 0$   $f = 0.36(6.0)(9.8) = 21 \text{ N}$

b.)  $a = 1.2 \text{ m/s}^2 \uparrow$   $f = 0.36(6.0)(9.8 + 1.2) = 24 \text{ N}$

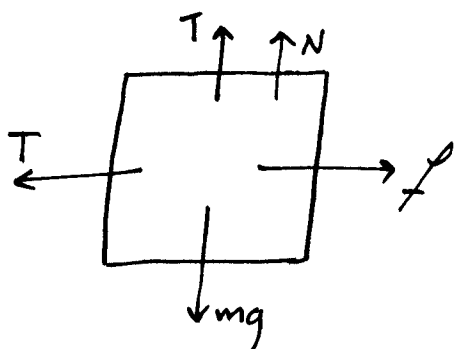
c.)  $a = 1.2 \text{ m/s}^2 \downarrow$   $f = 0.36(6.0)(9.8 - 1.2) = 19 \text{ N}$

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4.58



$\mu = 0.53$      $mg = 890 \text{ N}$



Vertical

Not moving up or down

$$0 = mg - T - N \quad \underline{N = mg - T}$$

Horizontal

Want to know when  $f = T$

$$\underline{T = \mu N}$$

so

$$T = \mu mg - \mu T$$

$$T(1 + \mu) = \mu mg$$

$$T = \frac{\mu mg}{1 + \mu} = \frac{(0.53)(890 \text{ N})}{1 + 0.53}$$

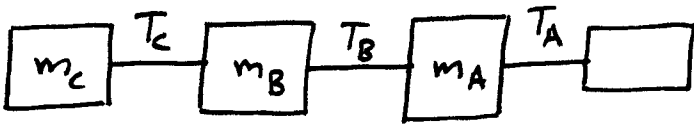
$$\underline{T = 310 \text{ N}}$$

Chapt 4 (pg 3)

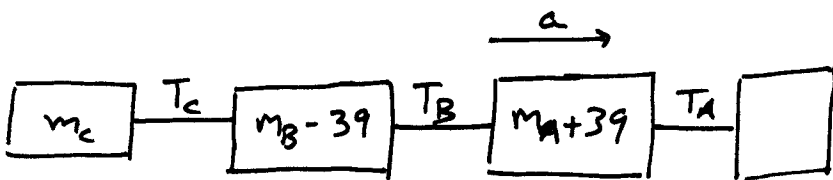
$\xrightarrow{a}$

$a = 0.12 \text{ m/s}^2$

4.82



a.)

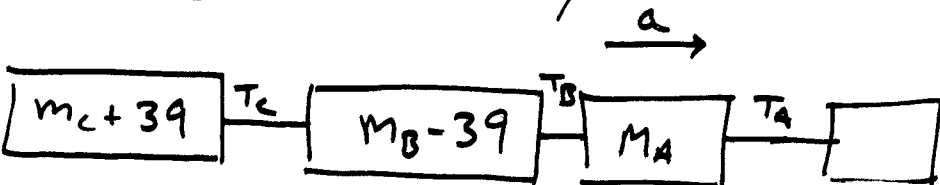


$T_A = [(m_A + 39) + (m_B - 39) + m_c]a \Rightarrow \text{No change}$

$T_B = [(m_B - 39) + m_c]a \Rightarrow \Delta T_B = (-39)a = \underline{-4.7 \text{ N} = \Delta T_B}$

$T_c = m_c a \Rightarrow \text{No change}$

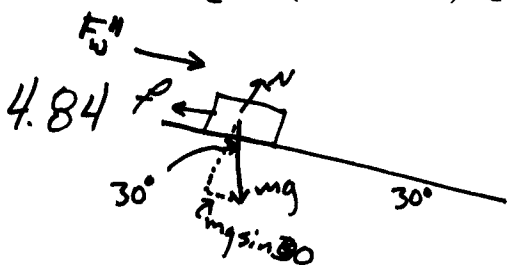
b.)



$T_A = [m_A + (m_B - 39) + (m_c + 39)]a \Rightarrow \text{No change}$

$T_B = [(m_B - 39) + (m_c + 39)]a \Rightarrow \text{No change}$

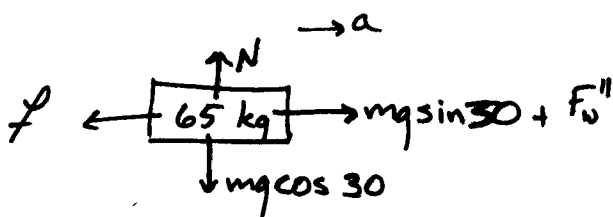
$T_c = (m_c + 39)a \Rightarrow \Delta T_c = 39a \Rightarrow \underline{\Delta T_c = +4.7 \text{ N}}$



4.84

$\mu = 0.15 \quad F_w^{\parallel} = +105 \text{ N}$

$t$  to travel 175 m?



Vertical No motion so  
 $N = mg \cos 30$

Horizontal  $mg \sin 30 + 105 \text{ N} - \mu N = ma$

$a = g \sin 30 + \frac{105}{65} - \mu g \cos 30$

$\underline{a = 5.25 \text{ m/s}^2}$

$x = x_0 + v_0 t + \frac{1}{2} a t^2$

$175 \text{ m} = \frac{1}{2} (5.25 \text{ m/s}^2) t^2$

$\Rightarrow \underline{t = 8.2 \text{ s}}$