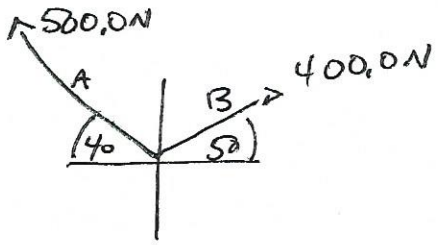
Chapter 5
Problems 79, 85, 88, 90, 92, 94, 95, 97, 99, 101

79) 65 km → ← 45 km

$\Delta X = 65 + (-45) = 20\text{ km East}$

85)



$F_{AX} = -500.0 \cos 40 = -383.0\text{N}$
$F_{AY} = 500.0 \sin 40 = 321.4\text{N}$
$F_{BX} = 400.0 \cos 50 = 257.1\text{N}$
$F_{BY} = 400.0 \sin 50 = 306.4\text{N}$

$\vec{F}_x = -383.0 + 257.1 = -125.9\text{N}$
$\vec{F}_y = 321.4 + 306.4 = 627.8\text{N}$

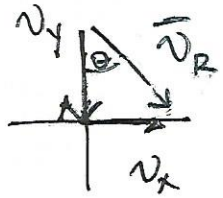
$\vec{F}_{net} = \sqrt{(-125.9)^2 + (627.8)^2}$
$\vec{F}_{net} = 640.3\text{N}$

$\text{Tan}^{-1}\frac{627.8}{-125.9} + 180° = 101.3°$

$\vec{F}_{net} = 640.3\text{N} \text{ @ } 101.3°$

88. $v_y = -5.5\text{ m/s}$
$v_x = 3.5\text{ m/s}$

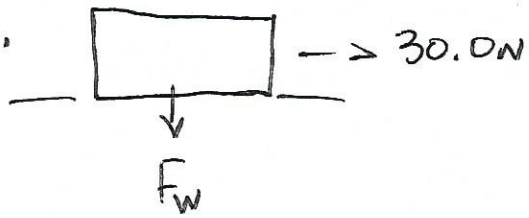
$v = \sqrt{v_y^2 + v_x^2} = \sqrt{(-5.5)^2 + (3.5)^2} = 6.5\text{ m/s}$



$\tan\theta = \frac{v_x}{v_y} = \frac{3.5}{-5.5}$; $\theta = -32.5°$

$v = 6.5\text{ m/s}$ @ 32.5° to the vertica

90.



$m = 12.0\text{ kg}$
$F_W = mg = (12.0)(-9.80) = -118\text{N}$

v is constant
$F_A = F_f$
$30.0 = (-118)\mu$

$\left|\frac{30.0}{-118}\right| = \mu$

$0.254 = \mu$

$F_W = (5.0)(9.80) = 49.0\,N$

92. $F_a = 40.0\,N$

$m = 5.0\,kg$

$a = 6.0\,m/s^2$

$F_N = F_W =$

$F_a - F_f = ma$

$F_a - ma = F_f$

$40.0 - (5.0)(6.0) = F_f$

$40.0 - 30.0 = F_f$

$10.0\,N = F_f$

$\mu = \frac{F_f}{F_N} = \frac{10.0}{49.0} = 0.204$

94. $m = 2500.0\,kg$

$v_o = 14.0\,m/s$

$\Delta x = 25.0\,m$

$v_f = 0\,m/s$

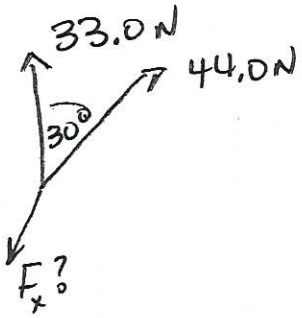
$a = \frac{v_f^2 - v_o^2}{2\Delta x} = \frac{0^2 - (14.0)^2}{2(25.0)} = -3.92\,m/s^2$

$F_{stop} = ma = (2500.0)(-3.92)$

$F_{stop} = 9800\,N = F_f = \mu mg$

$\mu = \frac{9800}{(2500)(9.80)} = 0.400$

95.



$\vec{F_R} = \sqrt{22.0^2 + 71.1^2} = 74.4\,N$ $\theta = \tan^{-1}\frac{71.1}{22.0}$

$\theta =$

$F_{1x} = 33.0\cos 90 = 0$ $F_{2x} = 44.0\cos 60 = 22.0$

$F_{1y} = 33.0\sin 90 = 33.0$ $F_{2y} = 44\sin 60 = 38.1$

$F_x = 0 + 22.0 = 22.0$

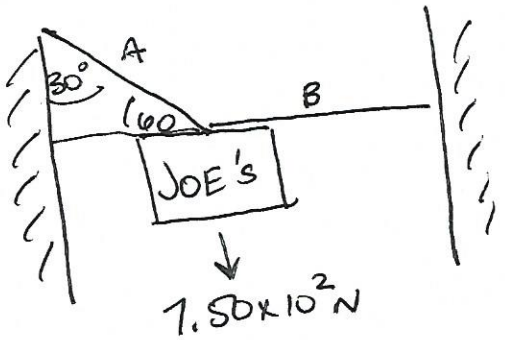
$F_y = 33.0 + 38.1 = 71.1$

$F_R = 74.4\,N$ @ $72.8°$

$F_E = 74.4\,N$ @ $252.8°$

$F_E = 74.4\,N$ @ $252.8°$

97.



$$\sum F_x = T_{A_x} + T_{B_x} = 0$$

$$\sum F_y = T_{A_y} + T_{B_y} - F_W = 0$$

$T_{AX} = -T_A \cos 60$ $\quad T_{BX} = T_B$

$T_{AY} = T_A \sin 60$ $\quad T_{BY} = 0$

$F_W = 7.50 \times 10^2 N$

$\sum F_x \quad -T_A \cos 60 + T_B = 0$; $\quad T_B = T_A \cos 60$

$\sum F_y \quad T_A \sin 60 + 0 - 7.50 \times 10^2 = 0$; $\quad T_A \sin 60 = 7.50 \times 10^2$

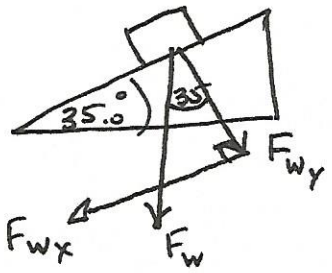
$$T_A = \frac{7.50 \times 10^2}{\sin 60}$$

$T_A = 866$ N

$T_B = 866 \cos 60 = 433$ N

$T_B = 433$N to the right

99.

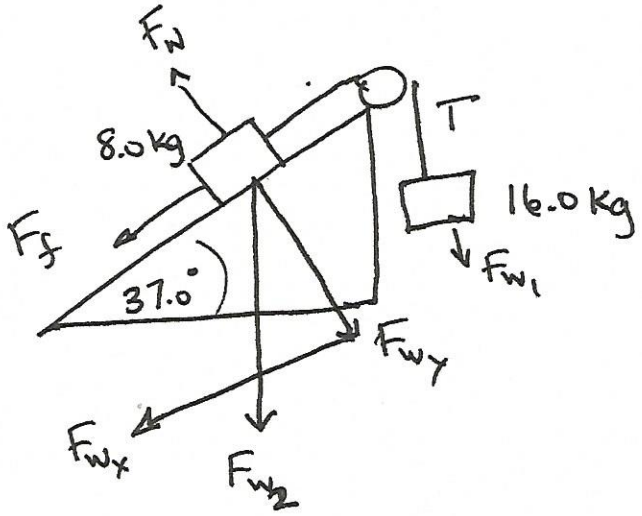


$F_W = 215\,N$

$F_{W_X} = F_W \sin\theta$; $F_{W_X} = 215 \sin 35°$

$F_{W_X} = 123\,N$

101.



$\mu = 0.23$

$F_{W_1} = (16.0)(9.80) = 157\,N$

$F_{W_2} = (8.0)(9.80) = 78\,N$

$F_{W_{2y}} = 78 \cos 37 = -62\,N$

$F_{W_{2x}} = 78 \sin 37 = -47\,N$

$F_{N_2} = F_{W_{2y}} = 62\,N$

$F_f = (0.23)(62) = 14.3\,N$

$\sum \vec{F} = F_{W_1} + F_{W_{2x}} + F_f = m_{total}\, a$

$$\frac{157 + (-47) + (-14.3)}{(8.0 + 16.0)} = a; \quad a = 4.0\ m/s^2$$

$F_{W_1} - F_T = m_1 a$; $F_T = F_{W_1} - m_1 a$

$F_T = 157 - (16.0)(4.0) = 93\,N$