PRACTICE EXAM 1 – SOLUTIONS TO WORD PROBLEMS

Problem 1

$R_x = 4.00\cos135° + 5.00\cos245° + 7.00\cos(-35°) = 0.792$ km

$R_y = 4.00\sin135° + 5.00\sin245° + 7.00\sin(-35°) = -5.718$ km

(A) $R = \sqrt{R_x^2 + R_y^2}$ = **5.77 km** (B) $\theta = \tan^{-1}\left(\frac{R_y}{R_x}\right)$ = **82.1° south of east**

Problem 2

(A) $\Delta x = v_i t + \frac{1}{2}at^2$

$200 = 0 + 0.5(3.00)t^2 \rightarrow t =$ **11.5 sec**

(B) $v_f = v_i + at$

$v_f = 0 + (3.00)(11.6) =$ **34.6 m/s**

(C) $\Delta x = vt$

$300 = (34.6)t \rightarrow t =$ **8.66 sec**

Problem 3

(A) $f = \mu n = 0.64(2.00)(9.8) =$ **12.5 N**

(B) $F_{net} = ma$ ("super-block")

$28.0\cos37° - 12.5\text{ N} = (6.00)a \rightarrow a =$ **1.64 m/s^2**

(C) $F_{net} = ma$ (2.00-kg block only)

$T - 12.5\text{ N} = (2.00)(1.64) \rightarrow T =$ **15.8 N**

Problem 4

$v_{ix} = 1.20\cos(-30°) = 1.04$ m/s

$v_{iy} = 1.20\sin(-30°) = -0.60$ m/s

(A) $\Delta y = v_{iy}t - \frac{1}{2}gt^2$

$-9.00 = -0.600t - 4.9t^2 \rightarrow 4.9t^2 + 0.600t - 9.00 = 0$ use quadratic formula to solve

$t =$ **1.30 sec**

(B) $d = \Delta x = v_{ix}t = (1.04)(1.30) =$ **1.35 m**

(C) $v_{fx} = v_{ix} = 1.04$ m/s

$v_{fy} = v_{iy} - gt = -0.600 - 9.8(1.30) = -13.3$ m/s

$v_f = \sqrt{v_{fx}^2 + v_{fy}^2} =$ **13.3 m/s**