Ch. 10 Worksheet 1

(1.) $F = 100.0\,N$, $\theta = 60.0°$, $\Delta d = 200.0\,m$

$W = Fd\cos\theta$

$= (100.0)(200.0)\cos 60.0°$

$= 1.00 \times 10^4\,J$

(2.) $F_g = 1.50 \times 10^3\,N$, $F = 345\,N$, $\Delta d = 24.0\,m$, $\mu = .220$

a) $W = Fd\cos\theta$

$= (345)(24.0)\cos 0°$

$= 8280\,J$

b) $W = F_f d\cos\theta$

$= \mu_k F_N d\cos\theta$

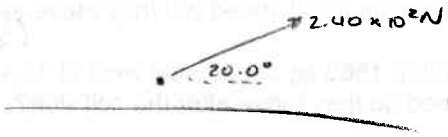
$= (.220)(1.50\times10^3)(24.0)\cos 180°$

$= -7920\,J$

c) $W_{net} = 8280 - 7920$

$= 360\,J$

(3.) $F = 2.40 \times 10^2\,N$, $m = 85.0\,kg$, $\theta = 20.0°$, $\mu_k = .200$, $\Delta d = 8.00\,m$



a) $W = Fd\cos\theta$

$= (2.40\times10^2)(8.00)\cos 20.0°$

$= 1.80 \times 10^3\,J$

b) $W = F_f d\cos\theta$

$= \mu_k F_N d\cos\theta$

$= (.200)(751)(8.00)\cos$

$= -1.20 \times 10^3\,J$

$\Sigma F_y = F_N + F_g + T_y = 0$

$F_N = -T_y - F_g$

$= -(2.40\times10^2)(\sin 20.0°) - (-(85.0)(9.80))$

$= 751\,N$

(4) $m = 6.0\,kg$, $V = 10.0\,m/s$

$KE = \frac{1}{2}mv^2$

$= \frac{1}{2}(6.0)(10.0)^2$

$= 300\,J$

a) $m = .100\,kg$ $KE = \frac{1}{2}(.100)(10.0)^2$

$= 5.00\,J$

b) $m = 24\,kg$

$300\,J = \frac{1}{2}(24)v^2$

$= 5.0\,m/s$

(5.) $m = .003\,kg$, $V_{b1} = 40.0\,m/s$, $V_{b2} = 80.0\,m/s$

$KE_{b1} = \frac{1}{2}mv^2$

$= \frac{1}{2}(.003)(40.0)^2$

$= 2.4\,J$

$KE_{b2} = \frac{1}{2}mv^2$

$= \frac{1}{2}(.003)(80.0)^2$

$= 9.6\,J$

$\frac{KE_{b2}}{KE_{b1}} = \frac{\frac{1}{2}mv^2}{\frac{1}{2}mv^2} = \frac{(80.0)^2}{(40.0)^2}$ 4:1

(6.) A) $Fd = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$

$v_i = 0\,m/s$, $v_f = 40.0\,m/s$, $m_A = 1.20\times10^3\,kg$

$Fd_A = \frac{1}{2}(1.20\times10^3)(40.0)^2 - 0$

$= 9.60 \times 10^5\,J$

B) $Fd = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$ $m_B = 2.00\times10^3\,kg$

$= \frac{1}{2}(2.00\times10^3)(40.0)^2$

$= 1.60 \times 10^6\,J$

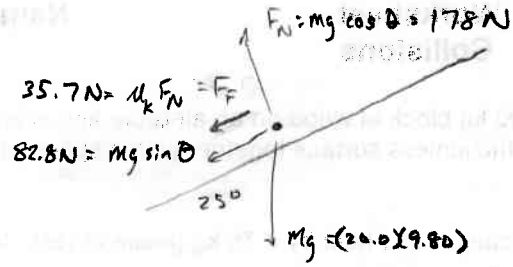
$1.60\times10^6\,J - 9.60\times10^5\,J = 6.40 \times 10^5\,J$

(7.) $V_i = 4.0\ m/s$

$\theta = 25°$

$m = 20.0\ kg$

$\mu_k = .20$



$Fd\cos\theta = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$

$d = \frac{\frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2}{F}$ $\quad v_f = 0\ m/s$

$= \frac{-\frac{1}{2}mv_i^2}{F\cos\theta}$

$\Sigma F_x = 35.7 + 82.8$
$= 118.5$

$= \frac{-\frac{1}{2}(20.0)(4.0)^2}{(118.5)\cos 180°}$

$= 1.35\ m$

(8.) $m = .005\ kg$

$v_i = 600.0\ m/s$

$v_f = 0\ m/s$

$\Delta d = .04\ m$

$Fd\cos\theta = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$

$F = \frac{\frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2}{d\cos\theta}$

$= \frac{-\frac{1}{2}mv_i^2}{d\cos\theta}$

$= \frac{-\frac{1}{2}(.005)(600.0)^2}{(.04)\cos 180°}$

$= 2.25 \times 10^4\ N$

(9.) Lifting:

$\Delta d = 1.5\ m$

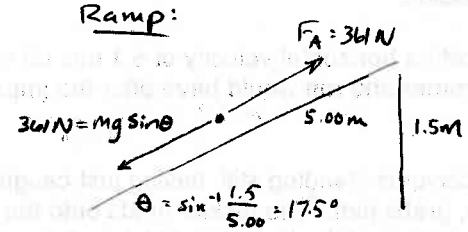
$F_g = 1200.0\ N$

$W = Fd\cos\theta$

$= (1200.0)(1.5)\cos 0°$

$= 1800\ J$

Ramp:



$W = Fd\cos\theta$

$= (361)(5.00)\cos 0°$

$= 1800\ J$

(10.) $m_F = .00055\ kg$

$m_c = 1250\ kg$

$v = 11\ m/s$

$KE = \frac{1}{2}mv^2$

$\frac{1}{2}(1250)(11)^2 = \frac{1}{2}(.00055)v^2$

$v = 1.7 \times 10^4\ m/s$

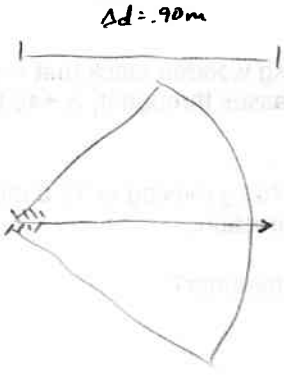
(11.) $m = .075\ kg$

$F = 65\ N$

$\Delta d = .90\ m$

$v_f = ?$

$v_i = 0\ m/s$



$Fd\cos\theta = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$ $\quad v_i = 0\ m/s$

$v_f = \sqrt{\frac{2Fd\cos\theta}{m}}$

$= \sqrt{\frac{2(65)(.90)\cos 0°}{.075}}$

$= 39\ m/s$