5) $W = F \cdot d$ $W = \Delta E$ $E_k = \frac{1}{2}mv^2$

$E_{k_1} = \frac{1}{2}(80kg)(9.2m/s)^2$

$E_{k_1} = 3385.6\ J$

$E_{k_2} = \frac{1}{2}(80kg)(12.7m/s)^2$

$E_{k_2} = 6451.6\ J$

$\Delta E = E_{k_2} - E_{k_1} \rightarrow 6451.6 - 3385.6$

$\Delta E \rightarrow 3066\ J = W$ **3100 J = W**

$m = 12\ kg + 68\ kg = 80\ kg$

$V_1 = 9.2\ m/s$

$V_2 = 12.7\ m/s$

6) A molecule could have

a) translational kinetic nrg

b) rotational kinetic nrg

c) vibrational kinetic nrg

7) $c = 4200\ J/kg/°C$ $m = 50.0\ kg$ $\Delta t = 70°C$

$\Delta E = mc\Delta t$

$\Delta E = (50)(4200)(70)$

$\Delta E = 1.5 \times 10^7\ J$

heat needed / heat is nrg

Chapter 5
Physics Review For Final Exam

Formulas

$\Delta E = mc\Delta T$ c = specific heat capacity

$0°K = -273°C$ $0°C = 273°K$

$W = F \cdot d$ $W = \Delta E$ $E_p = mgh$

Joules = Newtons · metres

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

$P = \frac{W}{\Delta t} = \frac{\Delta E}{\Delta t}$ $\text{efficiency} = \frac{W_{out}}{W_{in}}$ or $\frac{P_{out}}{P_{in}}$

Power units = watts $[1\ J/s]$

1) $m = 10.0\ kg$ $F = ma$

$d = 5.0\ m$ $F = (10)(9.81)$

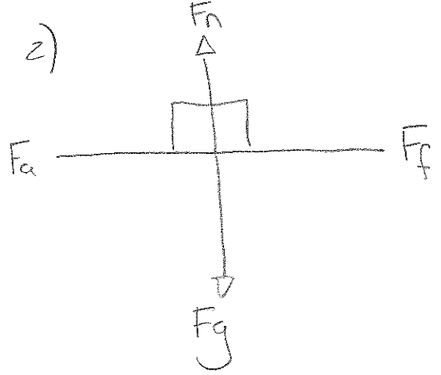
$g = 9.81\ m/s^2$ $F = 98.1\ N$

$W = F \cdot d \rightarrow (98.1)(5)$

$W = 490.5\ J$

$W = 490\ J$ or $4.9 \times 10^2\ J$

2)



$F_g = F_n = 100\,N$

$F_f = \mu F_n$

$\mu = 0.25$

$F_f = (0.25)(100)$

$F_f = 25\,N$

$d = 15.0\,m$

$W = F \cdot d = (25\,N)(15.0\,m)$

$\boxed{W = 375\,J}$

3) $P = \frac{W}{\Delta t}$ $W = F \cdot d$ $F = mg$

$m = 500\,kg$

$F = (500)(9.81)$

$F = 4905\,N$

$d = 12.0\,m$

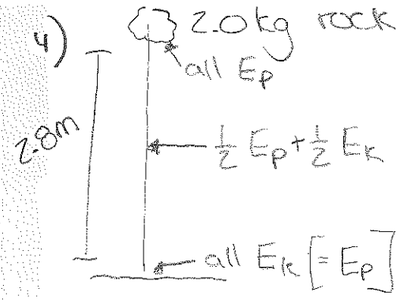
$t = 12\,s$

$P = \frac{(4905)(12)}{12}$

$P = 4905\,W$

$\boxed{P = 4900\,W}$

4)



$E_p = mgh$ $E_k = \frac{1}{2}mv^2$

$m = 2.0\,kg$

$g = 9.81\,m/s^2$

$h = 2.8\,m$

$E_p = (2)(9.81)(2.8)$

$E_p = 54.936\,J$

[E_k] $\frac{1}{2}mv^2 = 54.936$ [E_p]

$\frac{1}{2}(2)(v^2) = 54.936$

$1(v^2) = 54.936$

$\sqrt{v^2} = \sqrt{54.936}$ $v = 7.411$ @ bottom

b) $\boxed{V_b = 7.4\,m/s \text{ @ bottom}}$

a) $\frac{1}{2}E_p + \frac{1}{2}E_k = E_p$ @ top

$\frac{1}{2}[54.936] + \frac{1}{2}mv^2 = 54.936$

$27.468 + \frac{1}{2}mv^2 = 54.936$

-27.468

$\frac{1}{2}mv^2 = 27.468$

$\frac{1}{2}(2)v^2 = 27.468$

$\sqrt{v^2} = \sqrt{27.468} = 5.24$

a) $\boxed{V_m = 5.2\,m/s \text{ @ middle}}$

Ch 5 cont...

8) $m = 1.00\,kg$ $\quad P = \frac{W}{\Delta t}$ $\quad W = \Delta E = mc\Delta T$

$\Delta T = 70^\circ C$ $\quad c(H_2O) = 4200\ J/kg/^\circ C$

time $= 3.6\ min \times \frac{60\ s}{1\ min} = 216\ s$

$(P_{in} = 1500\ W)$ $\quad W = (1)(4200)(70)$

$W = 294\,000$

$P = \frac{W}{\Delta t} = \frac{294\,000}{216} = 1361\ W$

efficiency $\frac{P_{out}}{P_{in}} = \frac{1361}{1500} \times 100 =$ 91% efficient

9) $m = 10.0\,kg$ $\quad W = \Delta E = mc\Delta T$

$c = 4200\ J/kg/^\circ C$ $\quad P = \frac{W}{\Delta t} \rightarrow P\Delta t = W$

$\Delta T = ?$

$t = 5.00\ min \times \frac{60\ s}{1\ min} = 300\ s$ $\quad W = (1500)(300_s)$

$P = 1500\ W$ $\quad \Delta E = W = 450\,000\ J$

$\Delta E = mc\Delta T$

$450\,000\ J = (10.0)(4200)(\Delta T)$ $\quad 0^\circ C = 273^\circ K$

$\frac{450\,000}{\div 42\,000} = \frac{42\,000}{\div 42\,000}(\Delta T)$ $\quad 10.7^\circ C = 283.7^\circ K$

$10.7^\circ C = \Delta T$

10) $0°C = 273°K$

a) $97°C = 370°K$

b) $0°C = 273°K$

$-35°C = 238°K$

c) $0°C = 273°K$

$-243°C = 30°K$

d) $0°C = 273°K$

e) $0°K = -273°C$

$62°K = -211°C$

f) $0°K = -273°C$

$378°K = 105°C$