Energy #2

p 221 MC 2, 3, 7, 10
p 222 Prob 7, 10, 14, 22

p 221 - Multiple Choice (8)

2) • system: Earth, 2 carts, compressed spring
• release spring one uphill, other horizontal

c) ~~PEs → KE + PEg~~
$U_s \rightarrow K + U_g$

3) description: $KE \rightarrow PE_g$ $K \rightarrow U_g$

(4)

X a) pendulum released from height - bob + string ~~PEg → KE~~ $W_{ext} \rightarrow K$
X b) pendulum released from height. $PE_g \rightarrow KE$ bob + Earth
✓ (c) pendulum bottom to top - bob + Earth
X d) pendulum bottom to top - bob + string (no PE_g)

7) Estimate ΔPE_g bed to stand ΔU_g

$\Delta PE_g = mg\Delta h = (60\,kg)(10\,m/s^2)(\frac{1}{4}\,m) = 600\,J$

b) About 250 J (60 to 100 kg; $\frac{1}{4}$ to $\frac{1}{2}$ m)

10) One spring - stretch 3 cm, then 3 more

$W = \Delta PE_s = \frac{1}{2}kx^2$

c) more work to stretch second 3cm

p222 - Problems

7) $m_1 = 5.0\,kg$ Same KE
$m_2 = 12\,kg$
$v_2 = 4.0\,m/s$
$v_1 = ?$

① $K = \frac{1}{2}mv^2$
$= \frac{1}{2}(12\,kg)(4.0\,m/s)^2$
$= 96\,J$

② $v = \sqrt{\frac{2K}{m}} = \sqrt{\frac{2(96J)}{5.0kg}}$

$= 6.2\,m/s$

(1)

10) When K change more? $0\,m/s \rightarrow 10\,m/s$ or $30\,m/s \rightarrow 40\,m/s$

$K = \frac{1}{2}mv^2$ $\Delta K = \frac{1}{2}m\Delta(v^2)$

$10^2 - 0^2 = 100$ $40^2 - 30^2 = 700$

(1) ΔK based on change in v^2 not the square of Δv

Compare as fraction $\frac{100}{700} = .14$

p 222 14) a) $V_{bottom} = ?$

$y = 35.4\,m$

$E_o = E_f$

a) $U_g = K$

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

$v = \sqrt{2gh}$

$= \sqrt{2(9.81\,m/s^2)(35.4\,m)}$

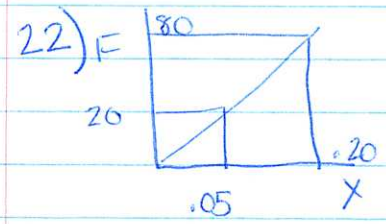
$= 26.4\,m/s$

b) Assumption?
no friction

(1)

b) c) Car w/ twice m have twice v?

No because mass cancels out

22) 

Force to stretch slingshot

a) $k = ?$ $k = \text{Slope} = \frac{\Delta F}{\Delta x}$

$= \frac{80N - 20N}{.20m - .05m} = 400\,N/m$

(1)

b) $W = ?$ stretch slingshot
$x = 15cm$ from equilibrium

$W = \Delta U_s = \frac{1}{2}kx^2$

$= \frac{1}{2}(400\,N/m)(.15m)^2$

$= 4.5J$