WEP PRE TEST SOLUTIONS

Note Title

28/01/2010

① (b) – within the context of physics (ie no chemical reactions that change the potential energy)

② (b) ③ (a) ④ $W = \Delta E_K = \frac{1}{2}mv^2 - \frac{1}{2}mv_0^2 = \frac{1}{2}(5)(15)^2 = \boxed{563\text{ J}}$

⑤ $W = \Delta E_p = mg\Delta h = 15(9.8)(12) = 1.764\times10^3\text{ J} = \boxed{1.8\times10^3\text{ J}}$ (2 sf.) (c)

⑥ a) $\Delta E_K = \frac{1}{2}mv^2 - \frac{1}{2}mv_0^2 = \frac{1}{2}42(5.5^2 - 2^2) = \boxed{551\text{ J}}$

b) $W = \Delta E_K = \boxed{551\text{ J}}$

⑦ $\Delta E_p = mg\Delta h = 4(9.8)(340-980) = \boxed{-2.51\times10^4\text{ J}}$

⑧ $\Delta E_K + \Delta E_p = 0 \quad \frac{1}{2}mv^2 - \frac{1}{2}mv_0^2 + mg\Delta h = 0$

$\frac{1}{2}v^2 - \frac{1}{2}v_0^2 + g\Delta h = 0$

$v^2 = v_0^2 - 2g\Delta h \quad \therefore v = \sqrt{0 - 2(9.8)(-62)}$

$\boxed{v = 34.9\text{ m/s}}$

⑨ $\Delta E_K + \Delta E_p + \Delta E_H = 0$

$\frac{1}{2}mv^2 - \frac{1}{2}mv_0^2 + mg\Delta h + 1600\text{ J} = 0$

$v^2 = v_0^2 - 2g\Delta h - \frac{2(1600)}{m} = 2.3^2 - 2(9.8)(-15) - \frac{2(1600)}{55}$

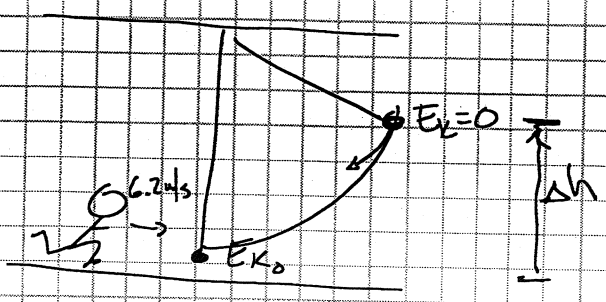
$\boxed{v = 15.5\text{ m/s}}$

⑩ a) $W = F\cdot d = 250\text{ N}\cdot 1.2\text{ m} = 300\text{ J} \quad \therefore W_{LIFT} = 300\text{ J} = \Delta E_p$

$\therefore mg\Delta h = 300\text{ J} \quad \therefore \Delta h = \frac{300}{0.5(9.8)} = 61.22\text{ m}$ $\boxed{61.2\text{ m}}$

b) energy "lost" = ½ Work done = **150 J**

(11)



$\Delta E_K + \Delta E_p = 0$

$\Delta E_p = -\Delta E_K$

$mg\Delta h = -\left(\frac{1}{2}mv^2 - \frac{1}{2}mv_0^2\right)$

$mg\Delta h = \frac{1}{2}mv_0^2$

$\Delta h = \frac{v_0^2}{2g} = \frac{6.2^2}{2(9.8)} = $ **1.96 m**

(12) $P = \frac{W}{t} = \frac{F \cdot d}{t} = \frac{mgd}{t} = \frac{23(9.8)(12)}{5.6} = $ **483 W**

(13) a) $W_{net} = \Delta E_K = \frac{1}{2}mv^2 - \frac{1}{2}mv_0^2 = \frac{1}{2}250\left(15^2 - 5^2\right) = $ **2.50×10^4 J**

b) $d = \left(\frac{v+v_0}{2}\right)t = \left(\frac{15+5}{2}\right)(8) = $ **80 m**

c) $W_{mower} = P \cdot t = 4500\text{ W} \times 8.0\text{ s} = $ **3.60×10^4 J**

d) $W_f = W_{mow} - W_{net} = 3.60 \times 10^4 - 2.50 \times 10^4 = $ **1.1×10^4 J**

e) $F_f = \frac{W_f}{d} = \frac{1.1 \times 10^4}{80} = $ **138 N**

(14) $\Delta E_H = mC\Delta T = 56.7(900)(340) = $ **1.74×10^7 J**

(15) $P = \frac{E}{t}$ $t = \frac{E}{P} = \frac{mC\Delta T}{350} = \frac{2.3(4200)(66)}{350} = $ **1.82×10^3 s** $= 30.4$ min

(16) $\Delta E_{H_1} = -\Delta E_{H_{soup}}$

$3.5(450)(T_f - 560) = -32(3900)(T_f - 34)$

$1575T_f - 882000 = -124800T_f + 4243200$

$T_f = \frac{5125200}{126375} = $ **40.6°C**