PHY C-11 WS ENERGY #1, 3, 4, 6, 8, 9

1) $W_T = 530\,N$, $V = 1.2\,m/s$, $KE = ?$

$KE = \frac{1}{2}mv^2 = \frac{1}{2}\left(\frac{530\,N}{9.80\,m/s^2}\right)(1.2\,m/s)^2$

$KE = 39.9\,J \; (= 40.\,J)$

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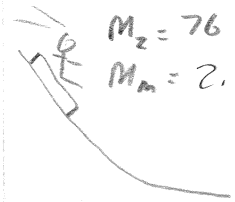
3) 

$m_2 = 76\,kg$, $m_m = 2.\,kg$

A) $\Delta PE = PE_2 - PE_1 = 0J - mgh = 0J - (78\,kg)(1.2\,m)(9.80\,m/s^2)$

$\Delta PE = 917.28J \; (= -920\,J)$

B) $920\,J$

C) $KE = \frac{1}{2}mv^2$ $\quad v = \sqrt{\frac{2KE}{m}} = \sqrt{\frac{2(920J)}{78kg}} \; (= 4.9\,m/s)$

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4) $\Delta PE = \Delta KE = W$

$h = 15.0\,cm = .150m$

$m = 5.0g = .0050\,kg$

$mgh = Fd$

A) $W = \Delta PE = mgh = 7.35\times10^{-3}J = 7.4\times10^{-3}J$

B) $W = Fd$ $\quad F = \frac{W}{d} = \frac{7.35\times10^{-3}J}{.06m} = .1225N$

$h = \frac{Fd}{mg} = \frac{(.1225N)(.10m)}{(.0050kg)(9.80m/s^2)} \; (= .25\,m)$

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6) 

$V_2 = 4.0\,m/s$

$mgh = \frac{1}{2}mv^2$ $\quad h = \frac{v^2}{2g} = \frac{(4.0m/s)^2}{2(9.80m/s^2)} = .816m \; (= .82\,m)$

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8) 

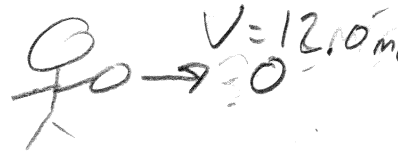
$m_B = 1.20\,kg$

$gPE = 3.00J$

A) $KE = PE = \frac{1}{2}mv^2$ $\quad v = \sqrt{\frac{2KE}{m}} = \sqrt{\frac{2(3.00J)}{1.20kg}} \; (= 2.24\,m/s)$

B) $Work = \Delta KE = \frac{1}{2}mv^2 - \frac{1}{2}m(.932v)^2 \; (= .396\,J)$

C) $\frac{.3965}{3.00J} \; (= 13.2\%)$

9) 

A) $GPE = mgh = (.200\,kg)(9.80\,m/s^2)(6.00\,m)$

$GPE = 11.8\,J$

B) $KE_0 = KE + mgh$

$\frac{1}{2}mv_0^2 = KE + mgh$

$KE = \frac{1}{2}mv^2 - mgh = \frac{1}{2}(.200\,kg)(12.0\,m/s)^2 - (.200\,kg)(9.80\,m/s^2)(6.00\,m)$

$KE = 2.64\,J$

C) $KE_I = KE_F + GPE$

$\frac{1}{2}mv_0^2 = \frac{1}{2}mv^2 + mgh$

$\sqrt{2\left(\frac{1}{2}v_0^2 - gh\right)} = v = \sqrt{2(6.5)(12\,m/s)^2 - (9.80\,m/s^2)(6.00\,m)(2)}$

$V = 5.13\,m/s\,@\,90^\circ$

D) Same Magnitude $= 5.13\,m/s\,@\,0^\circ$

E) $V_{0x} = 5.13\,m/s$

$V_{0y} = \sqrt{(10.84\,m/s)^2 + (5.13\,m/s)^2}$

$V_{0y} = 12.0\,m/s\,@\,64.7^\circ$

$V^2 = V_0^2 + 2a\Delta d$

$V_0 = \sqrt{2a\Delta d} = \sqrt{2(9.80\,m/s^2)(6.00\,m)}$

$V_{0y} = 10.84\,m/s$

$\theta = \tan^{-1}\left(\frac{(10.84\,m/s)}{5.13\,m/s}\right) = 64.7^\circ$