105. 2-11.

(1) $-E_{p_1} = \int_{\infty}^{R} -\frac{Gm_em}{r^3}\vec{r}\,d\vec{r} = \frac{Gm_em}{R_e} \Rightarrow E_{p_1} = -\cancel{\frac{Gm}{R_e}}\ -\frac{Gm_e}{R_e}\cdot m$

(2) $E_{p_2} - 0 = \int_{\infty}^{R} -\frac{Gm_em}{r^3}\vec{r}\,d\vec{r} = \frac{Gm_em}{R_e}$ $\quad \Delta(\Delta E_p) = 0$ 因为是保守力 势能差相等

105. 2-12

(1) $\begin{cases} -\frac{GMm}{R} + \frac{1}{2}mV_0^2 = \frac{1}{2}mV_1^2 - \frac{GMm}{2R} \\ m\frac{V_1^2}{2R} = \frac{GMm}{(2R)^2} \end{cases}$

$\Rightarrow \quad V_0 = \sqrt{\frac{3}{2}\frac{GM}{R}}$

(2) $\begin{cases} -\frac{GMm}{R} + \frac{1}{2}mV^2 = 0 \\ A = \frac{1}{2}mV^2 - 0 \end{cases}$

$\Rightarrow \quad A = \frac{GMm}{R}$

105. 2-13

$mg\cdot\sin\alpha = kx_0 \Rightarrow k = \frac{mg}{x_0}\sin\alpha$

$mg\cdot 2x_0\cdot\sin\alpha = A_{外}$.

$\therefore A_{外} = 2mgx_0\cdot\sin\alpha$

105. 2-14

$k\cdot(l-l_0) = mg \Rightarrow k = \frac{mg}{R}$

$\frac{1}{2}mV_C^2 - \frac{1}{2}mV_B^2 = A_{弹} + mg\cdot ah$

$ah = 0.72R$, $\quad A_{弹} = \cancel{\frac{1}{2}k(1.6R)^2 - \frac{1}{2}k(2R)^2}\ \frac{1}{2}k(0.6R)^2 - \frac{1}{2}k(R)^2$.

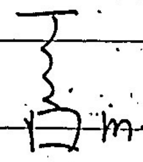
$\Rightarrow V_C = \sqrt{\frac{4}{5}gR}$.

到C处时. 只受竖直方向的力 $\therefore a_x = 0$

$a_n = \frac{V_C^2}{R} = \frac{4}{5}g$, $\quad F_T - mg + F_N = ma_n$ (向上为+).

$\Rightarrow F_N = \frac{4}{5}mg$

106. 2-5



慢：每时刻都平衡.

$\therefore\ k\cdot\Delta x_m = mg \Rightarrow \Delta x_m = \frac{mg}{k}$

快：

$mg\cdot\Delta x_m' = \frac{1}{2}k\Delta x^2 \Rightarrow \cancel{k=2mg}\ \Delta x_m' = \frac{2mg}{k}$

是一个简谐运动