4.

$dM = dF_f R = -\mu g R\, dm$

$\int dM = -\int \mu g R\, dm$

$M = I\varepsilon$

$-\mu g R = R^2 \varepsilon$

$\varepsilon = \frac{\mu g}{R}$

$\omega_0 - \frac{\mu g t}{R} = 0$

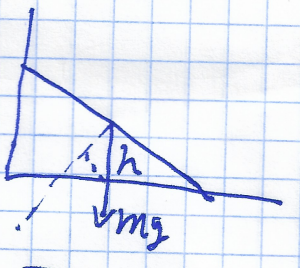
$t = \frac{\omega_0 R}{\mu g}$

~~$t = \omega_0$~~

$\varphi = \frac{\omega_0 + \omega}{2} t = \frac{\omega_0^2 R}{2\mu g}$

$n = \frac{\varphi}{2\pi} = \frac{\omega_0^2 R}{4\pi \mu g}$

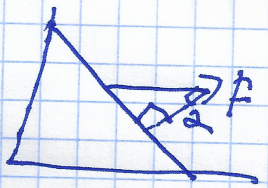
5. 对 mg



$T_{mg} = mg\sin\alpha \cdot \frac{h}{\cos\alpha}$

$= mgh\tan\alpha$

对 F



$T_F = \frac{Fl\cos\alpha}{2}$

$h = T_F = T_{mg}$

$h = \frac{Fl\cos^2\alpha}{2mg\cos\alpha} = \frac{1}{4} \times 1.25\ m$