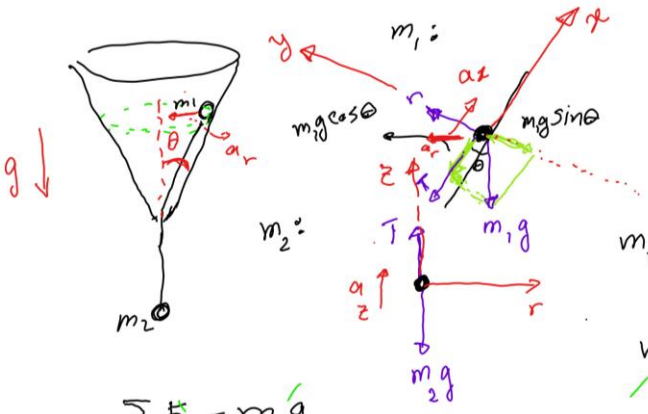


m_2 :

$\Sigma F_z = m_2 a_z$

$T - m_2 g = m_2 a_z$ ①

$T - m_2 g = m_2 \ddot{z}$

m_1 :

$\Sigma F_y = 0$

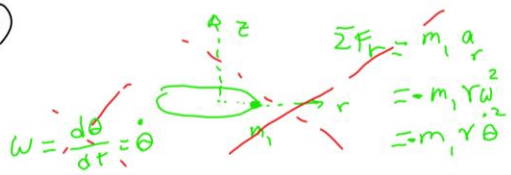
$n - m_1 g \sin\theta = 0$

$n = m_1 g \sin\theta$ ②

$\Sigma F_x = m_1 a_x$

$-T - m_1 g\cos\theta = m_1 a_x$ ③

$-T - m_1 g\cos\theta = m_1 \ddot{x}$



$\omega = \frac{d\theta}{dt} = \dot{\theta}$

$\Sigma F_r = m_1 a_r$

$= -m_1 r\omega^2$

$= -m_1 r\dot{\theta}^2$

$m\ddot{x} - 0 \rightarrow x$

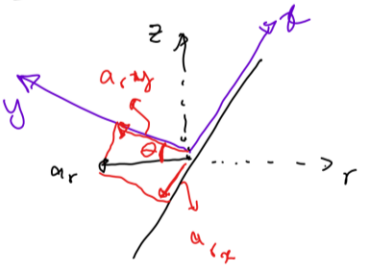
$\Sigma F_x = m a_x$ ✓

$-Kx = m a_x$

$-Kx = m\ddot{x}$ $\quad \omega^2 = \frac{K}{m}$

$\ddot{x} + \frac{K}{m} x = 0$

$\ddot{x} + \omega^2 x = 0$, where ↑



$a_{rx} = a_r \sin\theta$

$a_{ry} = a_r \cos\theta$

m_2 : $\Sigma F_z = m_2 a_z$

$T - m_2 g = m_2 a_z$

$T - m_2 g = m_2 \ddot{z}$ ①

m_1 : $\Sigma F_x = m_1 a_{xt}$

$-T - m_1 g\cos\theta = m_1 (a_x - a_r \sin\theta)$

$-T - m_1 g\cos\theta = m_1 (\ddot{x} - r\omega^2 \sin\theta)$ ②

$\Sigma F_y = m_2 (a_{yt})$

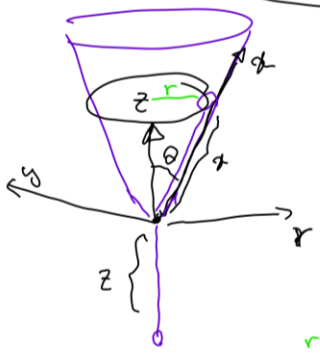
$n - m_1 g\sin\theta = m_1 a_r \cos\theta$

$n - m_1 g\sin\theta = m_1 r\omega^2 \cos\theta$ ③

① + ②

$$-m_2 g - m_1 g\cos\theta = m_2 \ddot{z} + m_1 \ddot{x} - m_1 r\omega^2 \sin\theta$$

$\ddot{z} \rightarrow \ddot{x}$



$$x + |z| = \ell$$

$z < 0 \quad |z| = -z$

$$x - z = \ell$$

$$\dot{x} - \dot{z} = 0$$

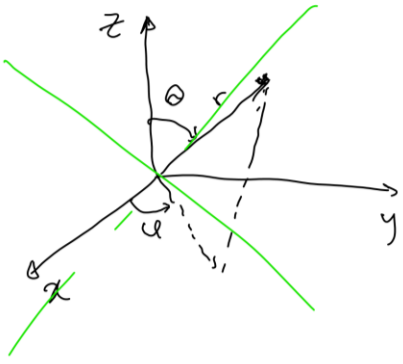
$$\dot{x} = \dot{z}$$

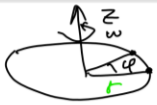
$$\ddot{x} = \ddot{z}$$

$\theta = \text{const}$

$\dot{\theta} = \ddot{\theta} = 0$

$$\sin\theta = \frac{r}{x} \Rightarrow r = x\sin\theta$$





$\omega = \dot{\varphi}$

$$\sum F_\varphi = 0 \Rightarrow a_\varphi = 0$$

$L = \text{Const}$ $\quad L = I_1 \omega$

↓ angular momentum

$I_1 = m_1 r^2$

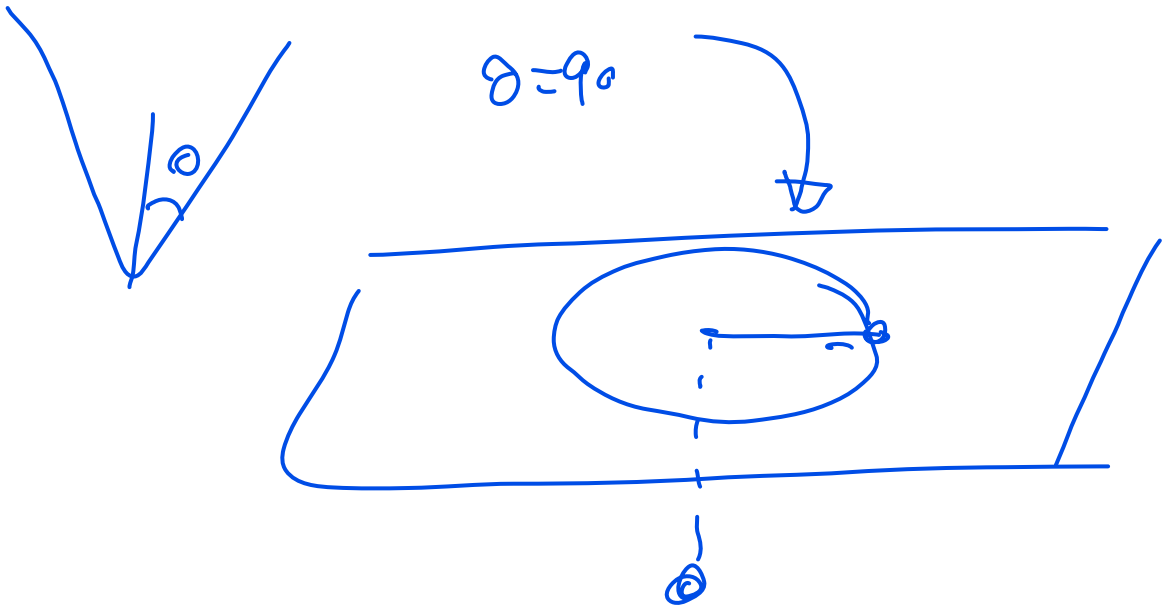
$p = mv$

$$L = m_1 r^2 \omega$$

$$\omega = \frac{L}{m_1 r^2}$$

$$\ddot{\varepsilon} + \Omega^2 \varepsilon = 0$$

$$T = \frac{2\pi}{\Omega}$$



$$\ddot{x} = \dots\dots$$

$$\begin{cases} \dot{x} = v \\ \dot{v} = \dots\dots \end{cases}$$

$$\ddot{x} + \nu \dot{x} + \omega_0^2 x = A\cos(\omega t)$$

$$\ddot{x} = A\cos(\omega t) - \nu \dot{x} - \omega_0^2 x$$

$$\dot{x} = v$$

$$\dot{v} = A\cos(\omega t) - \gamma v - \omega_0^2 x$$

$$\dot{x} = v$$

$$\dot{v} = -\omega_0^2 x$$

S.H.M