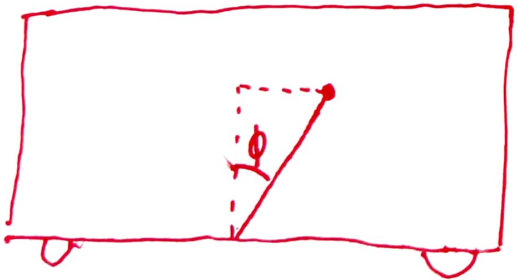
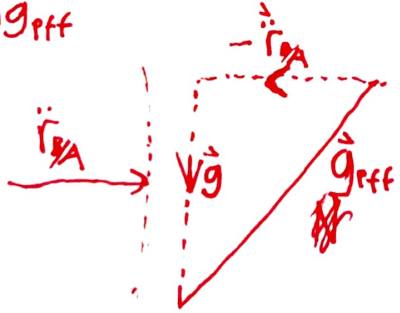
$$m\ddot{\vec{r}} = \vec{N} + m\vec{g} - m\ddot{\vec{r}}_{B/A} = \vec{N} + m\vec{g}_{eff} \quad (\vec{g}_{eff} = \vec{g} - \ddot{\vec{r}}_{B/A})$$

require $\ddot{r} = 0 \Rightarrow \vec{N} = -m\vec{g}_{eff}$





$$\Rightarrow \phi = \arctan\left(\frac{\ddot{r}_{B/A}}{g}\right)$$