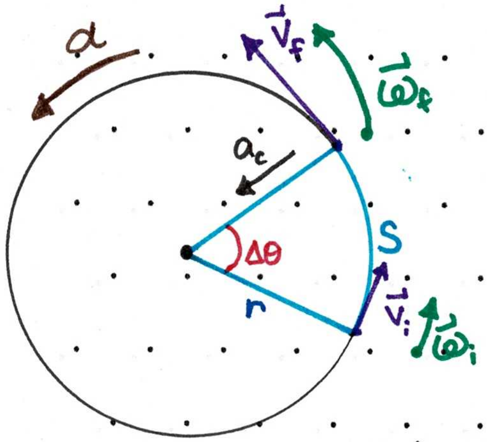


$s = r\Delta\theta$ $\quad V_t = r\omega$

$a_t = r\alpha$ $\quad a_c = \frac{v^2}{r} = \omega^2 r$

Period $T = \frac{2\pi}{\omega}$ $\quad \alpha = \frac{\Delta\omega}{\Delta t} = \frac{\tau}{I}$

$$\omega = \frac{\Delta\theta}{\Delta t} = \frac{2\pi}{T} = 2\pi f = \frac{v^2}{r^2}$$

α: angular acceleration r = radius ω: angular velocity

a_c = centripetal acceleration a_t = tangential acceleration

s = linear distance Δθ = angular distance

$$\tau = \underbrace{r}_{\text{radial distance, distance from pivot point}} \overbrace{F_\perp}^{\text{perpendicular component of force}} = I\alpha$$

I = moment of inertia

Rolling w/out slipping

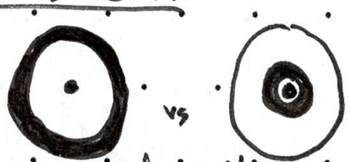
$$K_{net} = K_{rot} + K_{trans} = \frac{1}{2}I\omega^2 + \frac{1}{2}mv^2$$

angular momentum $L = I\omega$

conservation of L $\quad L_i = L_f$

if no external net torque is added to system

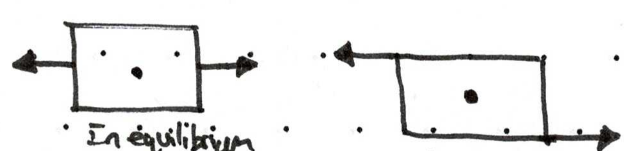
Moment of Inertia



Mass concentrated around rim
Larger I
Harder to get moving

Mass concentrated around center
Smaller I
easier to get moving

Static Equilibrium



In equilibrium
Net
$\tau = 0$
$F = 0$

Not in equilibrium
Net
$\tau \neq 0 \neq F$