Analogous Quantities between Linear and Rotational motion.

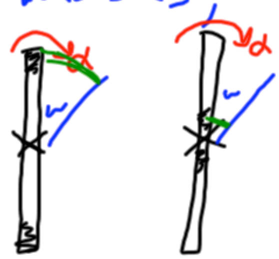
Linear		Rotational	
x		θ	
v	$v = r\omega$	ω	
a	$a = r\alpha$	α	
F	$a = \frac{\Sigma F}{m}$	τ	$\alpha = \frac{\Sigma \tau}{I}$

m tells us how hard it is to accelerate

I → Rotational Inertia
Moment of Inertia

Something other then mass determines how hard it is to rotate

- same masses, different rotational Inertias



Further out masses travel a larger arc ⇒ The masses need to get to a larger v in order to have the same ω

What is I ?

$$a = \frac{\Sigma F}{m} \qquad v = r\omega \qquad a = r\alpha$$

$$\Sigma F = ma$$

$$\Sigma \tau = I\alpha$$

$$F \cdot r = I\alpha$$

$$F = \frac{I\alpha}{r}$$

$$ma = \frac{I\alpha}{r}$$

$$mr\alpha = \frac{I\alpha}{r}$$

$$r \cdot mr = \frac{I}{r} \cdot r$$

$$\boxed{mr^2 = I}$$

The distance of the masses from the axis of rotation is super important