Work and Power

Translation	Rotation
$W = \int F_{(x)}\, dx$	$W = \int \tau_{(\theta)}\, d\theta$
$W = F_x \Delta x$	$W = \tau_x \Delta \theta_x$
$P = \frac{dW}{dt}$	$P = \frac{dW}{dt}$
$P = F_x V_x$	$P = \tau_x \omega_x$

Angular Momentum (L)

General Equation for particle

$$\vec{L} = \vec{r} \times \vec{p} = \vec{r} \times m\vec{v}$$

Cross product

$$L = mvr\sin\phi$$

ϕ = angle between line of action of $\vec{r}$ and $\vec{v}$

$$\frac{d\vec{L}}{dt} = \vec{r} \times \vec{F} = \vec{\tau}$$

linear form

$$\frac{d\vec{p}}{dt} = \vec{F}$$

Change in angular momentum is produced by a torque just as Change in linear momentum is produced by a force.

General Equation for rotating non-particle bodies

$$\vec{L} = I\vec{\omega}$$

$$\frac{d\vec{L}}{dt} = \Sigma\vec{\tau}$$

$\uparrow$

Net torque produces a change in momentum.

Angular Momentum is a conserved quantity just as Linear Momentum.

* Systems without a net torque (or $\Sigma\tau = 0$) will conserve angular momentum

This result can be used in collisions that involve rotating objects.