# Chapter 9-11

# Circular Motion, Center of Gravity, Torque

## Tangential Velocity

$$v = \frac{2\pi r}{T} \quad or \quad v = 2\pi r f$$

T = period (sec) (time for one revolution)

f = frequency (rev/sec)

## Centripetal Acceleration

$$a_c = \frac{v^2}{r}$$

## Centripetal Force

$$F_c = ma_c = \frac{mv^2}{r}$$

## Torque

$$t = f \cdot d$$

f= force perpendicular to lever arm

d= distance of lever arm

unit is a **Nm**

## Rotational Inertia

$I = mr^2$

I = inertia m = mass r = radius

unit is a $kg \bullet m^2$

## Angular Momentum

Angular momentum = mvr

m = mass v = tangential velocity r = radius

unit is a $\frac{kg \bullet m^2}{s}$