Chapter 8: Rotational Motion

Torques cause rotations. (This is similar to forces causing linear motion).

Torque = force x lever arm
Units of torque = Nm.

The lever arm is the distance from the axis of rotation to the point at which the force is applied.
Torques have rotational directions, e.g. clockwise and counter-clockwise.

Circular motion of a wheel:

a. The rotational speed, ω, is the same for all parts of the wheel; **typical units are rev/min (or rpm) or rev/sec**.
b. The linear speed, **v** (also called the tangential speed), of a part of the wheel depends on the distance, **r**, that the part is from the axis of rotation. As an equation, **v = ω r**. Of course, v is measured in m/s.

Rotational Inertia.
The rotational inertia, I, measures the object's resistance to being rotated.
The rotational inertia is increased if more mass is far from the axis of rotation.

Center of Mass is the average position of the mass of an object.

An object is in stable equilibrium if the line of its weight passes through its base.

"Centripetal Force." If an object moves along a curved path, then there must be a force that acts towards the center of curve to cause the curved motion. For example, if a ball is tied to a string and whirled in a horizontal circle, then the tension in the string causes the curved motion. (In this example, one would say that the tension is the centripetal force.)

Angular Momentum = rotational inertia x rotational velocity (like mom. = mass x vel.)
As an equation, **ang. mom. = Iω** (like the equation mom. = mv)

Conservation of Angular Momentum:
If there is no external torque on a system, then its angular momentum does not change.