**Definitions of Angular Displacement,
Velocity, and Acceleration:**

$$\theta = \frac{s}{r}$$

$$\Delta\theta = \theta_f - \theta_i$$

$$\vec{\omega}_{\text{avg}} = \frac{\Delta\theta}{\Delta t}$$

$$\vec{\alpha}_{\text{avg}} = \frac{\Delta\vec{\omega}}{\Delta t}$$

**Angular Velocity with Constant
Acceleration:**

$$\vec{\omega}_f = \vec{\omega}_i + \vec{\alpha}\Delta t$$

**Angular Displacement with Constant
Acceleration:**

$$\theta_f = \theta_i + \vec{\omega}_i\Delta t + \frac{\vec{\alpha}\Delta t^2}{2}$$

**Angular Velocity-Displacement
Relation with Constant Acceleration:**

$$\vec{\omega}_f^2 = \vec{\omega}_i^2 + 2\vec{\alpha}\Delta\theta$$

Angular to Linear Motion:

$$\Delta x = r\Delta\theta$$

$$\vec{v} = r\vec{\omega}$$

$$\vec{a}_T = r\vec{\alpha}$$

Torque:

$$\vec{\tau} = r\vec{F}\sin\theta$$

Archimedes's Law of Levers:

$$\frac{\vec{F}_2}{\vec{F}_1} = \frac{D_1}{D_2}$$

Moment of Inertia:

$$I = Cmr^2$$

$$I_{\text{sys}} = \sum C_i m_i r_i^2$$

Parallel Axis Theorem:

$$I' = I_{\text{cm}} + mx^2$$

**Newton's Second Law for Rotational
Motion:**

$$\vec{\alpha} = \frac{\vec{\tau}_{\text{net}}}{I_{\text{sys}}}$$

**Newton's Third Law for Rotational
Motion:**

$$\Delta\vec{L}_{a\to b} = -\Delta\vec{L}_{b\to a}$$

Rotational Kinetic Energy:

$$k_{\text{rot}} = \frac{I\vec{\omega}^2}{2}$$

Rotational Work:

$$w = \vec{\tau}\Delta\theta$$

Rotational Work-Energy Theorem:

$$w = \Delta k_{\text{rot}}$$

Angular Momentum:

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

Orbital Angular Momentum:

$$\vec{L} = rm\vec{v}\sin\theta$$

Angular Impulse-Momentum Theorem:

$$\Delta\vec{L} = I\Delta\vec{\omega} = \vec{\tau}\Delta t$$

Conservation of Angular Momentum:

$$\vec{L}_f - \vec{L}_i = 0$$