$$v = r\omega$$

- v → velocity
- r → radius
- ω → angular velocity

$$\bar{L} = \bar{r} \times \bar{p} = I\omega$$

- $\bar{L}$ → angular momentum
- $\bar{r}$ → radius
- $\bar{p}$ → momentum
- I → moment of inertia
- ω → angular velocity

$$K = \frac{1}{2} I \omega^2$$

- K → kinetic energy of spinning object
- I → moment of inertia
- ω → angular velocity

$$\omega = \omega_0 + \alpha t$$

- ω → angular velocity
- ω_0 → initial angular velocity
- α → angular acceleration
- t → time

$$\theta = \theta_0 + \omega_0 t + \frac{1}{2}\alpha t^2$$

- θ → angle
- θ_0 → initial angle
- ω_0 → initial angular velocity
- t → time
- α → angular acceleration
- t → time

$$\bar{F}_s = -k\Delta\bar{x}$$

integrate to get below equation

- $\bar{F}_s$: Force (spring)
- k: spring constant
- $\Delta\bar{x}$: displacement

$$U_s = \frac{1}{2}k(\Delta x)^2$$

differentiate to get above equation

- U_s: Potential Energy (spring)
- k: spring constant
- Δx: displacement

$$x = x_{max}\cos(\omega t + \varphi)$$

- x: displacement
- x_{max}: maximum displacement
- ω: angular frequency
- t: time
- φ: phase shift

$$T = \frac{2\pi}{\omega} = \frac{1}{f}$$

- T → period
- ω → angular frequency
- f → frequency

$$\frac{d^2x}{dt^2} = -\omega^2 x$$

$$T_s = 2\pi\sqrt{\frac{m}{k}}$$

- T_s → period (spring-mass system)
- m → mass
- k → spring constant

$$T_p = 2\pi\sqrt{\frac{l}{g}}$$

- T_p → period (pendulum)
- l → length
- g → acceleration due to gravity

$$|\vec{F}_G| = \frac{G m_1 m_2}{r^2}$$

- $|\vec{F}_G|$ → force
- G → gravitation constant
- m_1, m_2 → masses
- r → radius (distance bet. masses)

$$U_G = -\frac{G m_1 m_2}{r}$$

- U_G → gravitational potential energy
- G → universal gravitation
- m_1, m_2 → masses
- r → radius