$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}} \tag{1}$$

$$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}} \tag{2}$$

$$\tan\theta = \frac{\text{opposite}}{\text{adjacent}} \tag{3}$$

$$\mathbf{a} = \frac{\mathbf{F}_{net}}{m} \tag{4}$$

$$F_{grav} = mg \tag{5}$$

$$\mathbf{p} = m\mathbf{v} \tag{6}$$

$$\mathbf{F}\Delta t = m\Delta\mathbf{v} \tag{7}$$

$$F_{spring} = kx \tag{8}$$

$$U_{grav} = mgy \tag{9}$$

$$K = \frac{1}{2}mv^2 \tag{10}$$

$$U_{spring} = \frac{1}{2}kx^2 \tag{11}$$

$$W = F\Delta x\cos\theta \tag{12}$$

$$P = \frac{\Delta E}{\Delta t} \tag{13}$$

$$\ell = r\theta \tag{14}$$

$$v_{tangential} = r\omega \tag{15}$$

$$a_{tangential} = r\alpha \tag{16}$$

$$\omega = \frac{\Delta\theta}{\Delta t} \tag{17}$$

$$\alpha = \frac{\Delta\omega}{\Delta t} \tag{18}$$

$$\omega_f^2 = \omega_o^2 + 2\alpha\Delta\theta \tag{19}$$

$$\Delta\theta = \omega_0\Delta t + \frac{1}{2}\alpha\Delta t^2 \tag{20}$$

$$\tau = rF\sin\theta \tag{21}$$

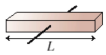
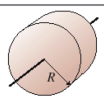
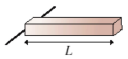
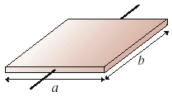
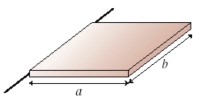
$$I = \sum_i m_i r_i^2 \tag{22}$$

$$\sum_i \tau_i = I\alpha \tag{23}$$

$$L = I\omega \tag{24}$$

$$K = \frac{1}{2}I\omega^2 \tag{25}$$

TABLE 12.2 Moments of inertia of objects with uniform density

Object and axis	Picture	I	Object and axis	Picture	I
Thin rod, about center		$\frac{1}{12}ML^2$	Cylinder or disk, about center		$\frac{1}{2}MR^2$
Thin rod, about end		$\frac{1}{3}ML^2$	Cylindrical hoop, about center		MR^2
Plane or slab, about center		$\frac{1}{12}Ma^2$	Solid sphere, about diameter		$\frac{2}{5}MR^2$
Plane or slab, about edge		$\frac{1}{3}Ma^2$	Spherical shell, about diameter		$\frac{2}{3}MR^2$