Some physical constants:

$$|\vec{\mathbf{g}}| = 9.80\frac{\mathrm{m}}{\mathrm{s}^2}$$

Motion with constant acceleration:

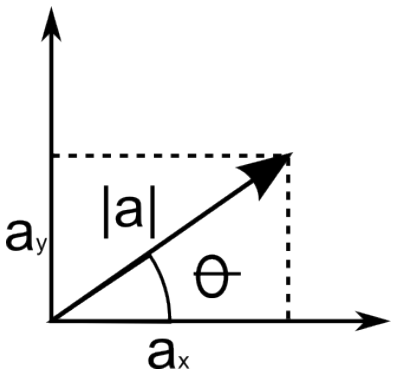
$$\vec{\mathbf{r_f}} = \vec{\mathbf{r_0}} + \vec{\mathbf{v_0}}\Delta t + \frac{\vec{\mathbf{a}}\,(\Delta t)^2}{2}$$

$$\vec{\mathbf{v_f}} = \vec{\mathbf{v_0}} + \vec{\mathbf{a}}\Delta t$$

$$2\vec{\mathbf{a}} \cdot \Delta\vec{\mathbf{r}} = |\vec{\mathbf{v_f}}|^2 - |\vec{\mathbf{v_0}}|^2$$

$$\Delta\vec{\mathbf{r}} = \frac{\Delta t}{2}\left(\vec{\mathbf{v_f}} + \vec{\mathbf{v_0}}\right)$$

Vector Related formulae:



$$a_x = |a|\cos\theta \qquad |\vec{\mathbf{a}}| = \sqrt{a_x^2 + a_y^2}$$
$$a_y = |a|\sin\theta \qquad \theta = \tan^{-1}\left(\tfrac{a_y}{a_x}\right)$$

$$\begin{aligned}\vec{\mathbf{a}} \cdot \vec{\mathbf{b}} &= a_x b_x + a_y b_y + a_z b_z \\ &= |\vec{\mathbf{a}}||\vec{\mathbf{b}}|\cos\theta_{ab}\end{aligned}$$

$$\begin{aligned}\vec{\mathbf{a}} \times \vec{\mathbf{b}} &= \begin{vmatrix} \hat{\mathbf{i}} & \hat{\mathbf{j}} & \hat{\mathbf{k}} \\ a_x & a_y & a_z \\ b_x & b_y & b_z \end{vmatrix} \\ &= (a_y b_z - a_z b_y)\hat{\mathbf{i}} - (a_x b_z - a_z b_x)\hat{\mathbf{j}} + (a_x b_y - a_y b_x)\hat{\mathbf{k}} \\ |\vec{\mathbf{a}} \times \vec{\mathbf{b}}| &= |\vec{\mathbf{a}}||\vec{\mathbf{b}}|\sin\theta_{ab}\end{aligned}$$

Circular motion.

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

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

$$f = \frac{1}{T}$$

$$\text{arclength}: \quad \Delta s = R\Delta\theta \ (\theta \text{ in radians})$$

$$|\vec{\mathbf{v}}| = \omega R$$

$$|\vec{\mathbf{a}}| = \frac{v^2}{R} = \omega^2 R$$

$$\begin{aligned}\vec{\mathbf{r}} &= R\left[\cos(\theta)\hat{\mathbf{i}} + \sin(\theta)\hat{\mathbf{j}}\right] \\ \vec{\mathbf{v}} &= \omega R\left[-\sin(\theta)\hat{\mathbf{i}} + \cos(\theta)\hat{\mathbf{j}}\right] \\ \vec{\mathbf{a}} &= \omega^2 R\left[-\cos(\theta)\hat{\mathbf{i}} - \sin(\theta)\hat{\mathbf{j}}\right]\end{aligned}$$