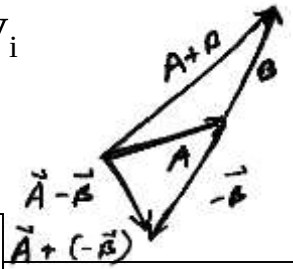
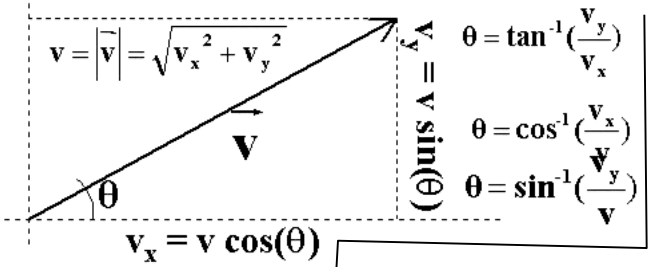
$\Delta x = x_f - x_i \qquad \Delta v = v_f - v_i$

$\bar{v} = \frac{\Delta \vec{r}}{\Delta t} \qquad \bar{a} = \frac{\Delta \vec{v}}{\Delta t}$





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

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

1D

$\Delta x = \bar{v}\,\Delta t$

$\bar{v} = (v_f + v_i)/2$

$v = v_o + at$

$x = x_o + v_o t + \frac{1}{2} a t^2$

$v^2 - v_o^2 = 2a(x - x_o)$

2D

$x \to x,y \qquad x_o \to x_o, y_o$

$v \to v_x, v_y \qquad v_o \to v_{ox}, v_{oy}$

$a \to a_x, a_y$

$x = r\theta$

$v = \omega r$

$a = \alpha r$

$\omega = \omega_o + \alpha t$

$\theta = \theta_o + \omega_o t + \frac{1}{2}\alpha t^2$

$\omega^2 - \omega_o^2 = 2\alpha(\theta - \theta_o)$

$\bar{\omega} = \frac{\omega_f + \omega_i}{2}$

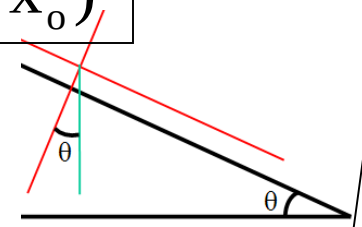
$I = \sum_i^{all} m_i r_i^2$

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

$\tau = r_\perp F = r F_\perp$

$\tau = I\alpha$

$\vec{F}_{tot} = m\vec{a}$



$\tau = 0 \Rightarrow \Delta L = 0$

$L = r_\perp p = mvr_\perp \qquad \tau = \frac{\Delta L}{\Delta t}$

$L = I\omega$

$W = F\,d_{\parallel} = F_{\parallel}\,d \qquad a = \frac{v^2}{R} \qquad \mu N$

$W_{tot} = \Delta(KE) \qquad KE = \frac{1}{2}mv^2 \qquad \Delta U = -W_{if}$

$E = K + U \qquad U = mg(y - y_0) \qquad U = \frac{1}{2}kx^2$

$\vec{p} = m\vec{v}$

$\vec{P}_{init} = \vec{P}_{final} \qquad \left(\sum_j^{all} m_j \vec{v}_j\right)_{init} = \left(\sum_j^{all} m_j \vec{v}_j\right)_{final}$

$\rho = m / V$

$P = F / A$

$\Delta P = \rho g h$

$B = \rho_{liq} V_{disp} g$

$Av = const.$

$P + \frac{1}{2}\rho v^2 = const.$

$\sum_i^{all} \vec{F}_i = 0$

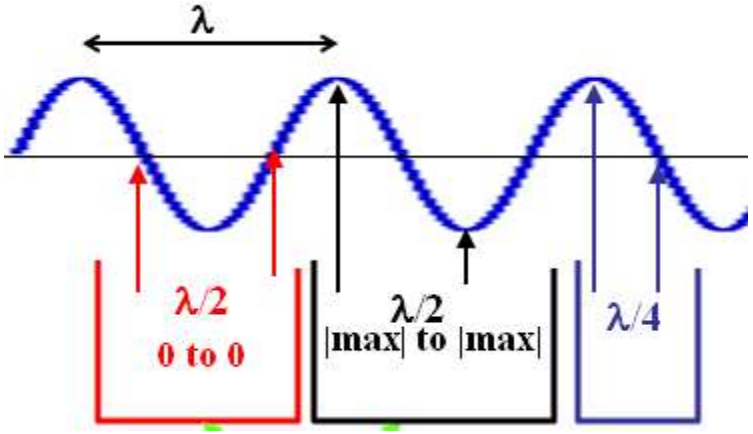
$\sum_i^{all} \vec{\tau}_i = 0$

$$x = A\sin(\omega t + \delta)$$

$$v = A\omega\cos(\omega t + \delta)$$

$$a = -A\omega^2\sin(\omega t + \delta)$$

$$\omega = \sqrt{k/m} \qquad \omega = \sqrt{g/\ell}$$



$$v = \lambda f$$

$$v = \sqrt{\frac{T}{\mu}}$$

$$\frac{GMm}{r^2}$$

$$-\frac{GMm}{r}$$

$$\frac{GM_e}{R_e} = gR_e$$

$$M_e = 5.97(10)^{24}\ \text{kg}$$

$$R_e = 6.37(10)^{6}\ \text{m}$$

$$G = 6.67(10)^{-11}\ \text{Nm}^2/\text{kg}^2$$

$$\Delta Q = \ell\ \Delta(\text{quant.})$$

$$\Delta Q_{into} = \Delta W_{by} + \Delta U$$

$$\Delta Q = (\text{quant.})C_{cond}\ \Delta T$$

For IG $\begin{cases} \Delta W_{by} = P\Delta V \\ \Delta U\ \alpha\ \Delta T \\ C_P = C_V + R \end{cases}$

$$R = 8.31\ \text{J}/(\text{mole K})$$

$$\frac{RT}{2}\Big|_{\text{deg. freedom}}$$

$$e = \frac{W}{Q_H}$$

$$W = Q_H - Q_L$$

$$e = 1 - \frac{T_L}{T_H}$$

$$\Delta S \geq 0$$