

$$g = 9.8 \text{ m/s}^2$$

$$G = 6.67 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2$$

$$\vec{v}(t) = \frac{d}{dt}\vec{r}(t) \quad \vec{a}(t) = \frac{d}{dt}\vec{v}(t) \quad |a_r| = \frac{v^2}{r} \quad \Sigma\vec{F} = m\vec{a} \quad \vec{F}_{2on1} = -\vec{F}_{1on2}$$

$$\Sigma W = \Delta K$$

$$\Delta U_{sys} = -W_C$$

$$W_{NC} = \Delta E_{sys}$$

$$\int_{t_i}^{t_f} \Sigma\vec{F} dt = \Delta\vec{p}$$

$$\Sigma\vec{F}_{ext} = M_{sys}\vec{a}_{cm}$$

$$I_o = I_{cm} + M_{sys}R_{o\rightarrow cm}^2$$

$$\Sigma\tau_{ext,o} = I_o\alpha$$

$$\Sigma\tau_{ext,cm} = I_{cm}\alpha$$

$$K_{sys} = K_{rot,cm} + K_{trans,cm}$$

$$\Sigma\vec{\tau}_{ext,O} = \frac{d}{dt}\vec{L}_{sys,O}$$

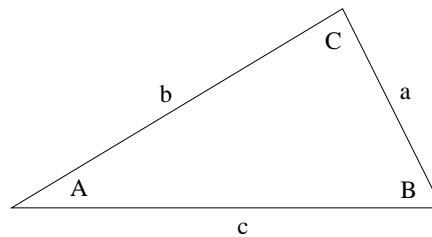
$$\Sigma\vec{\tau}_{ext,cm} = \frac{d}{dt}\vec{L}_{sys,cm}$$

$$F_G = G\frac{m_1m_2}{r^2}$$

QUADRATIC FORMULA: The solutions of $ax^2 + bx + c = 0$ are

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

TRIGONOMETRY:



$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b} = \frac{\sin(C)}{c}$$

$$c^2 = a^2 + b^2 - 2ab \cdot \cos(C)$$

DIFFERENTIAL EQUATIONS

$$x(t) = x_{max}\cos(\omega t + \phi) \quad \text{solves} \quad \frac{d^2}{dt^2}x(t) = -Cx(t) \quad \text{with} \quad \omega = \sqrt{C}$$

EXPANSIONS:

$$(1 + x)^n = 1 + nx + \frac{n(n-1)x^2}{2!} + \dots$$

$$\sin(\theta) = \theta - \frac{\theta^3}{3!} + \dots$$

$$\cos(\theta) = 1 - \frac{\theta^2}{2!} + \dots$$