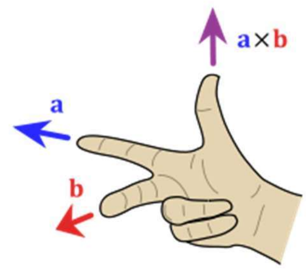
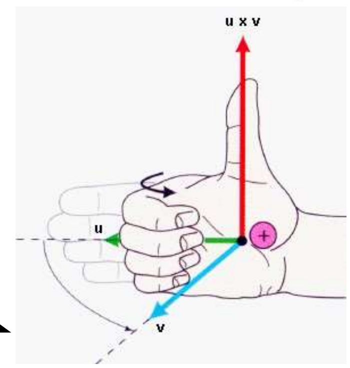
Vectors, trigonometry and math:





$\vec{A} = A_x\hat{\imath} + A_y\hat{\jmath} + A_z\hat{k}$; $A = \|\vec{A}\| = |\vec{A}| = \sqrt{{A_x}^2 + {A_y}^2 + {A_z}^2}$

$\vec{A} + \vec{B} = (A_x + B_x)\hat{\imath} + (A_y + B_y)\hat{\jmath} + (A_z + B_z)\hat{k}$

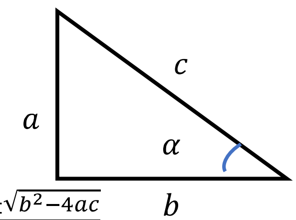
$\hat{A} = \frac{\vec{A}}{\|\vec{A}\|}$; $\vec{A}\cdot\vec{B} = ABcos\theta$; $\vec{A}\cdot\vec{B} = A_xB_x + A_yB_y + A_zB_z$;

$\vec{A} \times \vec{B} = AB\ sin\theta\ \hat{n}$;

$\vec{A} \times \vec{B} = \hat{\imath}(A_yB_z - A_zB_y) - \hat{\jmath}(A_xB_z - A_zB_x) + \hat{k}(A_xB_y - A_yB_x)$

Derivative: $\frac{d(ct^n)}{dt} = c\ n\ t^{n-1}$; where c is a constant

Trigonometry: $\sin\alpha = \frac{a}{c}$; $\cos\alpha = \frac{b}{c}$; $\tan\alpha = \frac{a}{b}$



$c^2 = a^2 + b^2$

Quadratic equation $ax^2 + bx + c = 0$; $x = \frac{-b\pm\sqrt{b^2-4ac}}{2a}$

Prefixes and abbreviations for Powers of 10:

$10^{-12}\ pico\ (p)$; $10^{-9}\ nano(n)$; $10^{-6}\ micro(\mu)$; $10^{-3}\ mili(m)$; $10^{-2} centi(c)$; $10^{3}\ kilo(k)$

International System of Units: Mass: kg; Length: m; Time: s

Chapter 2

Average velocity $v_{av-x} = \frac{\Delta x}{\Delta t} = \frac{x_2 - x_1}{t_2 - t_1}$; Instantaneous velocity $v_x = \lim_{\Delta t \to 0}\frac{\Delta x}{\Delta t} = \frac{dx}{dt}$

Average acceleration $a_{av-}\ = \frac{\Delta v_x}{\Delta t} = \frac{v_{x2} - v_{x1}}{t_2 - t_1}$; Instantaneous acceleration $a_x = \frac{dv_x}{dt}$

Equations of motion with constant acceleration:

$v_x = v_{0x} + a_xt$; $x = x_0 + v_{0x}t + \frac{1}{2}a_xt^2$

$v_x^2 = v_{0x}^2 + 2\ a_x(x - x_0)$; $x - x_0 = \frac{1}{2}(v_{0x} + v_x)t$

Free falling bodies, $a = g = 9.8\ {}^{m}/_{s^2}$

$v_x = v_{0x} + \int_0^t a_x\ dt$; $x = x_0 + \int_0^t v_x\ dt$

Chapter 3

Average velocity $\vec{v}_{av} = \frac{\Delta\vec{r}}{\Delta t} = \frac{\vec{r}_2 - \vec{r}_1}{t_2 - t_1}$

Instantaneous velocity $\vec{v} = \lim_{\Delta t \to 0}\frac{\Delta\vec{r}}{\Delta t} = \frac{d\vec{r}}{dt}$; $v_x = \frac{dx}{dt}$; $v_y = \frac{dy}{dt}$; $v_z = \frac{dz}{dt}$

Average acceleration $\vec{a}_{av} = \frac{\Delta\vec{v}}{\Delta t} = \frac{\vec{v}_2 - \vec{v}_1}{t_2 - t_1}$

Instantaneous acceleration $\vec{a} = \lim_{\Delta t \to 0} \frac{\Delta\vec{v}}{\Delta t} = \frac{d\vec{v}}{dt}; a_x = \frac{dv_x}{dt}; a_y = \frac{dv_y}{dt}; a_z = \frac{dv_z}{dt}$

Projectile motion: $x = x_0 + (v_0 cos\alpha_0)t$; $y = y_0 + (v_0 sin\alpha_0)t - \frac{1}{2}gt^2$

$$v_x = v_0 cos\alpha_0 \text{ ; } v_y = v_0 sin\alpha_0 - gt$$

Circular motion: $a_{rad} = \frac{v^2}{R}$; $a_{rad} = \frac{4\pi^2 R}{T^2}$

Relative velocity: $\vec{v}_{P/A} = \vec{v}_{P/B} + \vec{v}_{B/A}$

Chapter 4

Force as a vector $\vec{R} = \sum \vec{F} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3 + \cdots$

Newton's 2nd law $\sum \vec{F} = m\vec{a}$; $\sum F_x = ma_x$; $\sum F_y = ma_y$; $\sum F_z = ma_z$

Weight $\vec{w} = m\vec{g}$

Newton's 3rd law $\vec{F}_{A\ on\ B} = -\vec{F}_{B\ on\ A}$

Chapter 5

Kinetic Friction Force $f_k = \mu_k n$; Static Friction Force $f_s \le (f_s)_{max} = \mu_s n$

Chapter 6

Work: $W = \vec{F} \cdot \vec{s} = Fscos\phi$

Kinetic Energy: $K = \frac{1}{2}mv^2$

Work-energy theorem: $W_{Total} = K_2 - K_1 = \Delta K$

Work done by a varying Force, straight line motion: $W = \int_{x_1}^{x_2} F_x dx$

Power: $P_{av} = \frac{\Delta W}{\Delta t}$; $P = \lim_{\Delta t \to 0} \frac{\Delta W}{\Delta t} = \frac{dW}{dt}$