PHYS 1050 Tutorial 1: Formula Sheet

Mathematics

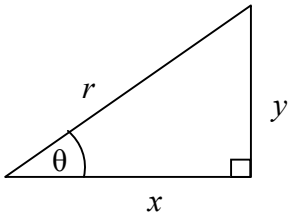
Quadratic equation:

$$ax^2 + bx + c = 0$$

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

Trigonometry:

$$x^2 + y^2 = r^2$$



$$\sin\theta = y/r$$
$$\cos\theta = x/r$$
$$\tan\theta = y/x$$

Vectors:

$$a \cdot b = ab\cos\theta$$
$$= a_x b_x + a_y b_y + a_z b_z$$

Calculus:

$$\frac{d}{dt}\left(t^n\right) = nt^{n-1}$$

$$\int x^n dx = \frac{x^{n+1}}{n+1}$$

Constants and Units

$k = 10^3$, $\mu = 10^{-6}$, $n = 10^{-9}$

2π rad = 360°

Translational Kinematics

One dimension:

$$v_{avg} = \frac{\Delta x}{\Delta t} = \frac{x_2 - x_1}{t_2 - t_1} \qquad v = \lim_{\Delta t \to 0} \frac{\Delta x}{\Delta t} = \frac{dx}{dt}$$

$$a_{avg} = \frac{\Delta v}{\Delta t} = \frac{v_2 - v_1}{t_2 - t_1} \qquad a = \lim_{\Delta t \to 0} \frac{\Delta v}{\Delta t} = \frac{dv}{dt}$$

Constant acceleration in one dimension:

$$x = x_0 + v_0 t + \tfrac{1}{2} a t^2$$
$$v = v_0 + at$$
$$v^2 = v_0^2 + 2a(x - x_0)$$