Equations of Motion, Projectile

- **Equation of Motion** gives position of a particle as a function of time.

- Motion with constant velocity is called **_uniform._** **Equations of Uniform Motion in 1D**:

$$a(t) = 0$$
$$v(t) = v_0$$
$$x(t) = x_0 + v_0 t$$

Here $x_0 = x(0)$ and $v_0 = v(0)$ are coordinate x and velocity v at time $t = 0$.

- Equations of **Constant-Acceleration Motion in 1D**:

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

Homework 6

A stone is thrown from the ground with initial velocity $v_0=30m/s$, directed at angle $\alpha=60°$ with respect to the horizon.

a) Write the equations of its motion both in "x" and "y" directions. Note that these two motions are independent, one of them is uniform, and the other is at constant acceleration. You may use trigonometry (*sin* and *cos*) or basic geometry to determine the "x" and "y" components of the initial velocity.

From your equations, determine the following:
b) The total time of flight (till the stone hits the ground).
c) The horizontal distance **d** that the stone will travel.
d) The maximum height of the trajectory, **h**.