For stepping forward in time, we must use differential equation solvers, Euler is the simplest one which we may choose to start with.

Euler: $v_{new} = (v_{old}) + (a*dt, pos_{new}) = (pos_{old}) + (v_{old}*dt) + (.5*a*dt)$

It should be noted, however, that acceleration (a) is not constant, so a small *dt* must be chosen to keep accuracy.

Some equations for the simulator:

$$F_{gravity} = m_{satellite} \frac{Gm_{planet}}{r^2_{planet}}$$

$$a_{gravity} = g = \frac{Gm_{planet}}{r^2_{planet}}$$

$$a_j = \sum_i \frac{Gm_i}{r^2} \quad , \text{ i != j}$$

Vec3d a
assuming that a is constant over dt

Vec3d x = x + v*dt + 1/2a*dt^2
Vec3d v = v + a * dt

Vec3d x = x + v*Δt + 1/2a*$(\Delta t)^2$
Vec3d v = v + a * Δt