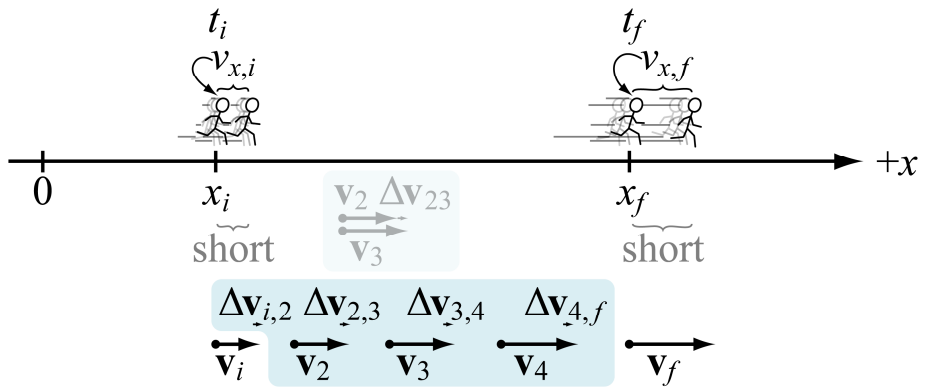
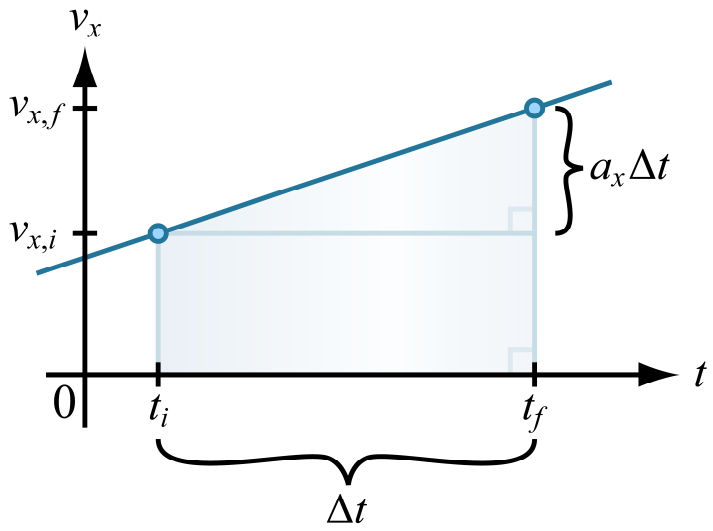
Uniformly-accelerated motion: Derivation of position formula





Δx = Signed area under graph of v vs. t

Δx = Signed area of rectangle + Signed area of triangle

$$\Delta x = (\Delta t)(v_{x,i}) + \frac{1}{2}(\Delta t)(a_x \Delta t)$$

$$\Delta x = v_{x,i}\Delta t + \frac{1}{2}a_x \Delta t^2$$

$$x_f - x_i = v_{x,i}\Delta t + \frac{1}{2}a_x \Delta t^2$$

$$x_f = x_i + v_{x,i}\Delta t + \frac{1}{2}a_x \Delta t^2$$

$$x_i + v_{x,i}\Delta t + \frac{1}{2}a_x \Delta t^2 = x_f$$