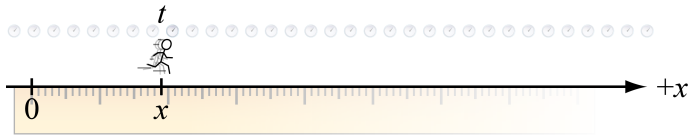
Describe 1-dimensional motion by labeling snapshots with times and positions

Frame of reference – placed meter stick(s) and fleet of synchronized clocks

Time t $[t] = \mathrm{s}$

x**-position** x $[x] = \mathrm{m}$



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x**-displacement**

$$\Delta x := x_f - x_i$$

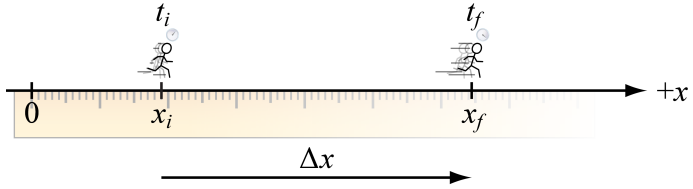
Distance

$$|\Delta x|$$

Until-now traveled path length

$$\ell := \int_{t'=0}^{t'=t} |v_x| \, \mathrm{d}t'$$

$$= \Sigma_{\substack{\text{SEGMENTS} \\ \text{THUS FAR}}} |\Delta x_j|$$



Average x**-velocity**

$$v_{x,\mathrm{AVG}} := \frac{\Delta x}{\Delta t} = \frac{x_f - x_i}{t_f - t_i} \quad [v] = \frac{\mathrm{m}}{\mathrm{s}}$$

Average speed

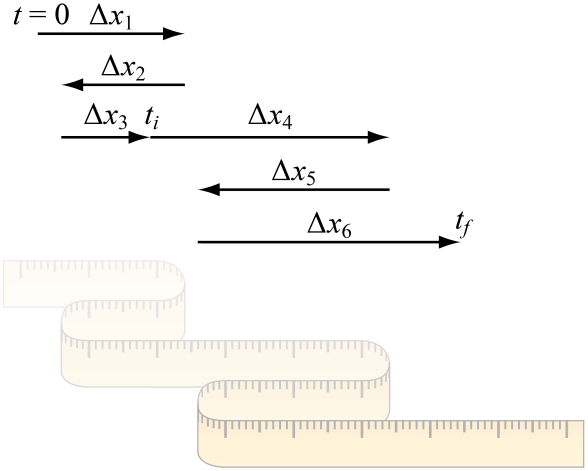
$$v_{\mathrm{AVG}} := \frac{\Delta \ell}{\Delta t}$$

Instantaneous x**-velocity**

$$v_x := \lim_{\Delta t \to 0} \frac{\Delta x}{\Delta t} = \frac{\mathrm{d}x}{\mathrm{d}t}$$

Instantaneous speed

$$v := |v_x|$$



UAM/Relationships | **Unmentioned**

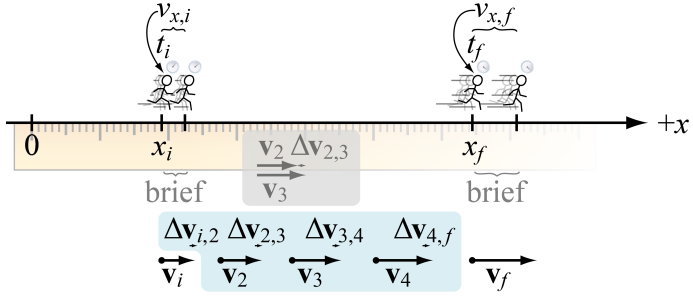
$x_i + v_{x,\mathrm{AVG}} \, \Delta t = x_f$ | a

Average x**-acceleration**

$$a_{x,\mathrm{AVG}} := \frac{\Delta v_x}{\Delta t} = \frac{v_{x,f} - v_{x,i}}{t_f - t_i} \quad [a] = \frac{\mathrm{m}}{\mathrm{s}^2}$$

Instantaneous x**-acceleration**

$$a_x := \lim_{\Delta t \to 0} \frac{\Delta v_x}{\Delta t} = \frac{\mathrm{d}v_x}{\mathrm{d}t}$$



$v_{x,i} + a_{x,\mathrm{AVG}} \, \Delta t = v_{x,f}$	x
$v_{x,\mathrm{AVG}} = \dfrac{v_{x,i} + v_{x,f}}{2}$	t, x, a
$x_i + v_{x,i}\Delta t + \dfrac{1}{2} a_x \Delta t^2 = x_f$	
$v_{x,i}^2 + 2a_x \Delta x = v_{x,f}^2$	t