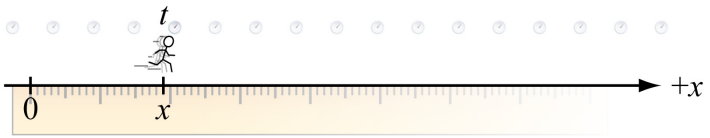
Describe 1-dimensional motion by labeling snapshots with times and positions

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

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

Position x $[x] = \text{m}$



Displacement

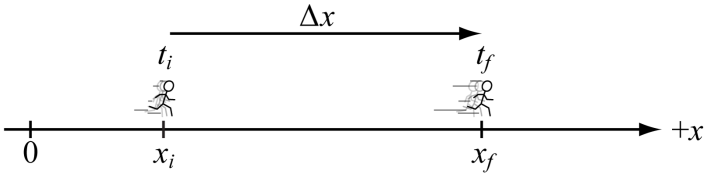
$$\Delta x := x_f - x_i$$

Distance

$$\Delta \ell := |\Delta x|$$

Total path length (tripometer length)

$$\ell := \Sigma_{\text{SEGMENTS}}\, \Delta \ell$$

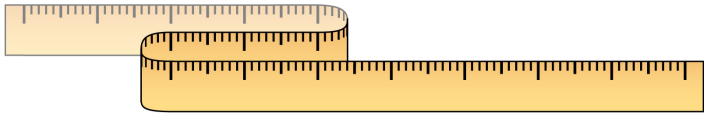


Average velocity

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

Average speed

$$\text{speed}_{\text{AVG}} := \frac{\ell}{\Delta t_{\text{ENTIRE PATH}}}$$



Instantaneous velocity

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

Instantaneous speed

$$\text{speed} := |v_x|$$

UAM/Relationships

$$x_i + v_{x,\text{AVG}}\, \Delta t = x_f$$

Unmentioned

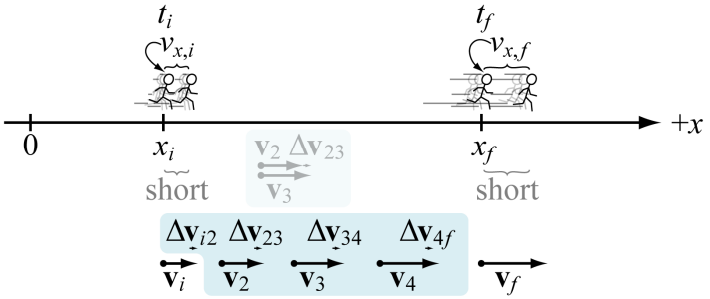
a

Average acceleration

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

Instantaneous acceleration

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



$$v_{x,i} + a_{x,\text{AVG}}\, \Delta t = v_{x,f} \qquad x$$

$$v_{x,\text{AVG}} = \frac{v_{x,i} + v_{x,f}}{2} \qquad t, x, a$$

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

$$v_{x,i}^2 + 2a_x \Delta x = v_{x,f}^2 \qquad t$$