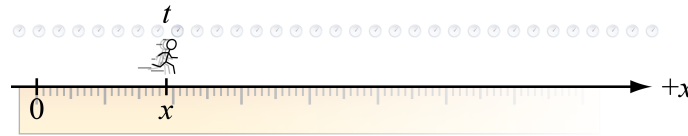


Describe 1-dimensional motion by labeling snapshots with times and positions

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

Time t $[t] = \text{s}$
x-position x $[x] = \text{m}$



x-displacement

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

Distance

$$|\Delta x|$$

Until-now traveled path length

$$\begin{aligned} \ell &:= \int_{t'=0}^{t'=t} |v_x| dt' \\ &= \sum_{\text{SEGMENTS THUS FAR}} |\Delta x_j| \end{aligned}$$

Average x-velocity

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

Average speed

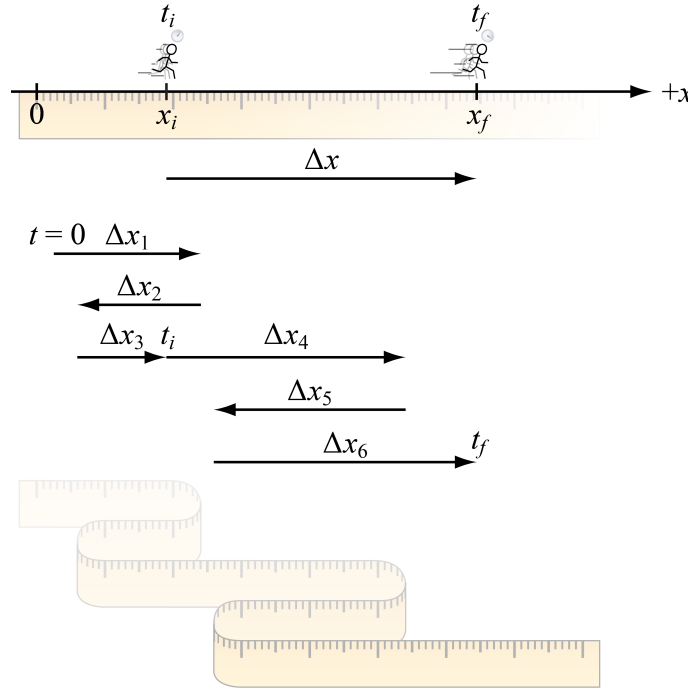
$$v_{AVG} := \frac{\Delta \ell}{\Delta t}$$

Instantaneous x-velocity

$$v_x := \lim_{\Delta t \rightarrow 0} \frac{\Delta x}{\Delta t} = \frac{dx}{dt}$$

Instantaneous speed

$$v := |v_x|$$



UAM/Relationships

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

Unmentioned

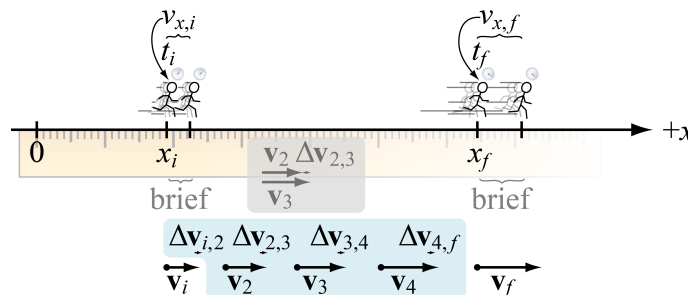
a

Average x-acceleration

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

Instantaneous x-acceleration

$$a_x := \lim_{\Delta t \rightarrow 0} \frac{\Delta v_x}{\Delta t} = \frac{dv_x}{dt}$$



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

x

$$v_{x,AVG} = \frac{v_{x,i} + v_{x,f}}{2}$$

t, x, a

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

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

t