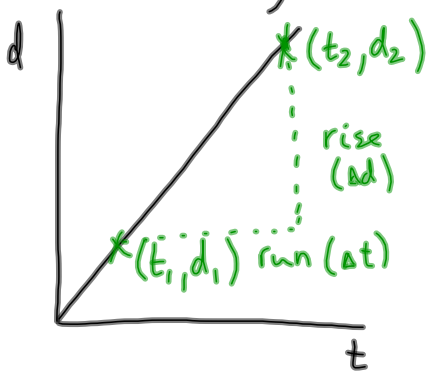
Position-Time Graphs & Velocity

Constant Velocity (Uniform Motion)



$$\text{slope} = \frac{\text{rise}}{\text{run}}$$

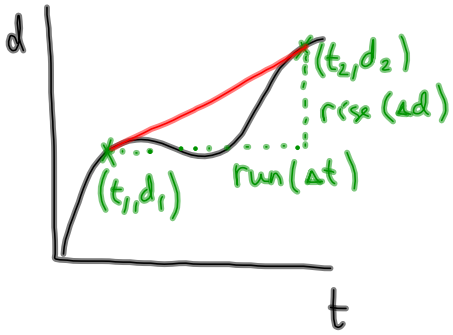
$$\text{slope} = \frac{\Delta d}{\Delta t}$$

from the demo the other day:

$$\text{slope}_{(d\text{-}t)} = \text{velocity}$$

$$\therefore \quad V = \frac{\Delta d}{\Delta t}$$

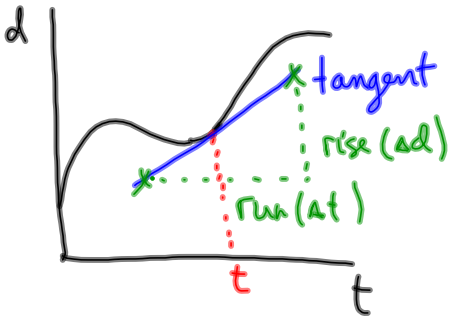
Non-Constant Velocity (Non-Uniform Motion)



$$\text{slope} = \frac{\Delta d}{\Delta t}$$

$$V_{ave} = \frac{\Delta d}{\Delta t}$$

Average Velocity is the slope of the line between t_1 and t_2

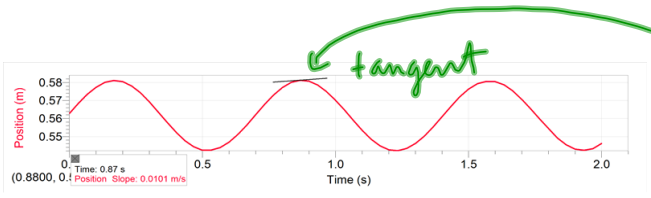


$$\text{slope} = \frac{\Delta d}{\Delta t}$$

$$V_{inst} = \frac{\Delta d}{\Delta t}$$

Instantaneous Velocity is the slope of the tangent drawn at time, t.

(can only be done graphical unless you use Calculus or Logger Pro)



Velocity Equation

$\vec{v} = \frac{\Delta \vec{d}}{\Delta t}$ ← velocity ($\Delta \vec{d}$ → displacement)

$v = \frac{\Delta d}{\Delta t}$ ← speed (Δd → distance)

You need to be able to rearrange the equation for any variable:

Solve for Δd:

$$v = \frac{\Delta d}{\Delta t}$$

$$\Delta d = v \Delta t$$

Solve for Δt:

$$v = \frac{\Delta d}{\Delta t}$$

$$\frac{v \Delta t}{v} = \frac{\Delta d}{v}$$

$$\Delta t = \frac{\Delta d}{v}$$

Working with word problems: GRASP

- Given
- Required
- Analysis
- Solution
- Paraphrase

Watch sd! + units!

Show your work!