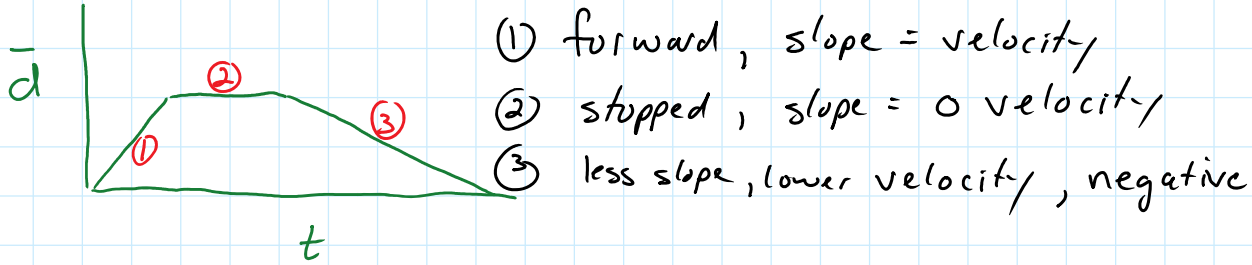


Velocity $\begin{cases} \text{constant} \\ \text{average} \\ \text{relative} \end{cases}$

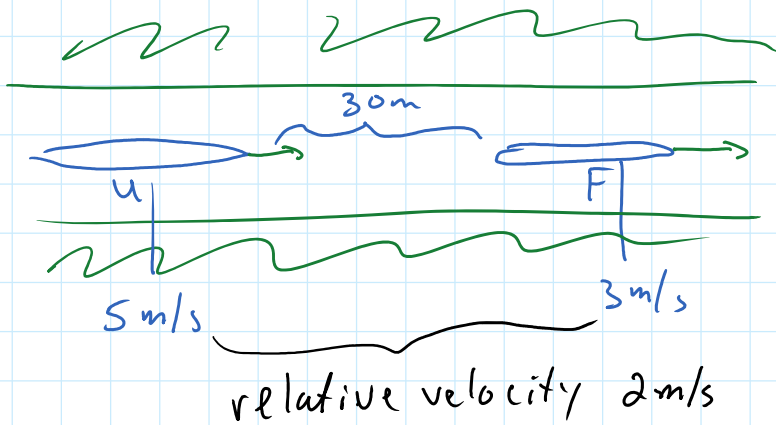
$$v = \frac{\Delta \text{disp}}{\Delta \text{time}}, \quad v = \frac{d}{t}, \quad \text{speed} = \frac{\text{dist}}{\text{time}}$$



Relative Velocity: velocity relative to ... some reference pt



What is your velocity relative to the water? 5m/s
 " " " " " " " " friend a) upstream 2m/s
 b) downstream 8m/s



How long to catch friend?

$$v = \frac{d}{t} \quad 2\text{m/s} = \frac{30\text{m}}{t}, \quad t = \frac{30}{2} = 15\text{s}$$

going toward each other rel vel = 8m/s $v = \frac{d}{t}, \quad t = \frac{d}{v} = \frac{30}{8} = 3.75\text{s}$

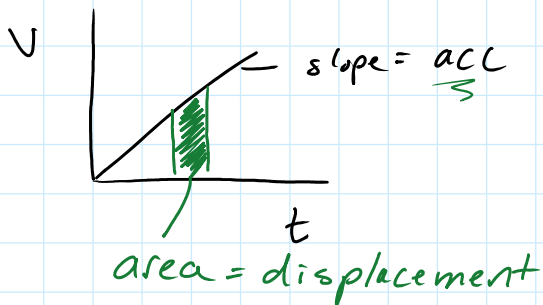
Ave. velocity = $\frac{\text{total disp}}{\text{total time}}, \quad \left\{ \begin{array}{l} \frac{9}{10}, \frac{4}{5}, \frac{30}{50} = \frac{43}{65} = 66\% \\ 90\%, 80\%, 60\% = \frac{230}{3} = 77\% \end{array} \right.$

Ex Cycling trip: Ave velocity for whole trip

Day 1 ride	75km	at	25km/h	3hrs
Day 2 ride	120km	at	30km/h	4hrs
Day 3 ride	160km	at	32km/h	5hrs
	<u>355km</u>			<u>12hrs</u>

$$\left. \begin{array}{l} V_{ave} = \frac{\text{total } d}{\text{total } t} \\ V_{ave} = \frac{355}{12} \\ = 29.6 \text{ km/h} \end{array} \right\}$$

Acceleration



$$a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_0}{t}$$

final - initial

$$v_f = v_0 + at$$

$$v_f^2 = v_0^2 + 2ad$$

$$d = v_0 t + \frac{1}{2} at^2$$

$$\frac{1}{2} at^2 + v_0 t - d = 0$$
$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$