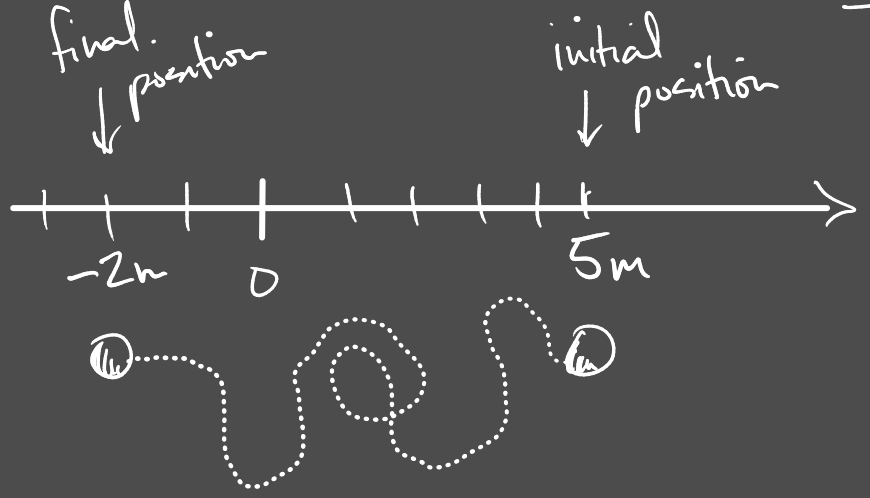
Chapter 2 - Describing Motion

position - where an object is relative to some other place.

change in position
- → distance travelled
- → **displacement** → distance + direction
  - east/west
  - 30° north of west
  - +/−



displacement = final position − initial position

displacement = −2m − (+5m) = −7m

time interval - t → time to get from initial position to final position

rate of change of position
- ratio of distance/displacement and time
- → **speed** = $\frac{\text{distance}}{\text{time}}$
  - units → $\left[\frac{\text{miles}}{\text{hour}}\right]$
  - $\left[\frac{\text{meters}}{\text{second}}\right]$
- **velocity** → speed and direction

Average speed → ratio between long distances long times

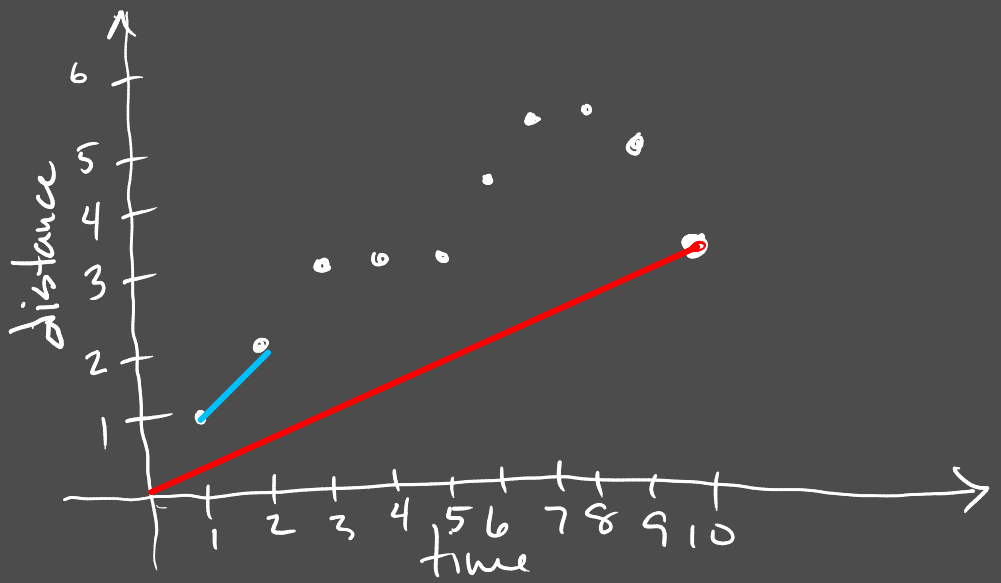
$\frac{85 \text{ miles}}{2 \text{ hours}} = 42.5 \text{ miles/hour}$ } trip to Montgomery

$\frac{150 \text{ miles}}{2.25 \text{ hours}} = 67 \text{ miles/hour}$ } trip to Atlanta

Instantaneous speed → speedometer speed

→ ratio of the distance and the smallest time interval possible

having ratios makes comparing the trips easy



final position = 3 m

initial position = 0 m

time interval = 10 s

$$\text{speed} = \frac{\text{displacement}}{\text{time}}$$

$$\text{speed} = \frac{\text{final position} - \text{initial position}}{\text{time}}$$

$$\text{speed} = \frac{3\text{m} - 0\text{m}}{10\text{s}} = \frac{3\text{m}}{10\text{s}}$$

$$\text{speed} = 0.3\ \text{m/s}$$