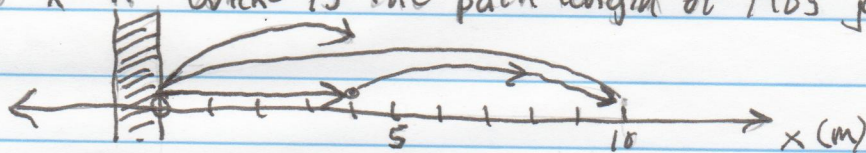


Path length (d, s, l): the sum of all distances making up a path

Ex) Mo walks to Flo, to the wall (in shame), and back to $x=4$. What is the path length of Mo's journey?



$$d = 6 + 10 + 4 = 20 \text{ m}$$

* path length is like your car's odometer reading, it only increases

Displacement ($\Delta \vec{x}, \Delta \vec{y}, \Delta \vec{z}$): the difference between the final position vector and the starting position vector

$$\Delta \vec{x} \equiv \vec{x}_f - \vec{x}_i$$

Ex) What was Mo's displacement?

$$\Delta \vec{x}_{Mo} = \vec{x}_{f, Mo} - \vec{x}_{i, Mo} = +4\hat{i} - 4\hat{i} = 0 \text{ m}$$

Another sol'n: $\Delta \vec{x}_{Mo} = \sum \Delta \vec{x}_i = +6\hat{i} - 10\hat{i} + 4\hat{i} = (6 - 10 + 4)\hat{i} = 0\hat{i} \text{ m}$

Ex) If Flo walks to Mo, what is her displacement?

$$\Delta \vec{x}_{Flo} = \vec{x}_f - \vec{x}_i = +4\hat{i} - (+10\hat{i}) = -6\hat{i} \text{ m}$$

Speed & velocities

Average Speed: path length of journey / time

$$v_{avg} = \bar{v} \equiv \frac{s}{\Delta t} \quad \leftarrow \text{only positive} \quad s \neq |\Delta \vec{x}|$$

* scalar * dimensions: L/T

* units: m/s (MKS) ft/s , etc.

* textbook: $v_{avg} \equiv \frac{d}{\Delta t} \quad \leftarrow \text{only positive}$

Ex) Doing chores, Mo starts at $x=0$, walks 5' left, 6' right, 1' left, and 8' right in 40 sec.

Q: What was Mo's average speed?

$$v_{avg} = \frac{s}{\Delta t} = \frac{5+6+1+8}{40} = \frac{20 \text{ ft}}{40 \text{ s}} = 0.5 \text{ ft/sec}$$

