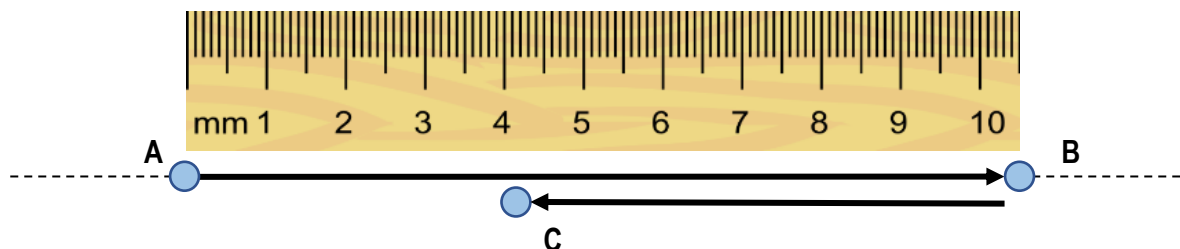


CONCEPT: INTRO TO VELOCITY AND SPEED

- Remember: Distance & Displacement describe **how FAR** something moves:



DISTANCE $d =$ _____
[SCALAR | VECTOR]

DISPLACEMENT $\Delta x =$ _____
[SCALAR | VECTOR]

- Like Distance vs. Displacement, there are two terms to describe **how FAST** something moves:

SPEED

$$= \frac{\text{distance}}{\text{time elapsed}} = \text{---} \left[\frac{\text{m}}{\text{s}} \right]$$

→ [SCALAR | VECTOR]

- Speed always ___ or ___ (cannot be negative)

VELOCITY

$$= \frac{\text{displacement}}{\text{time elapsed}} = \text{---} \left[\frac{\text{m}}{\text{s}} \right]$$

→ [SCALAR | VECTOR]

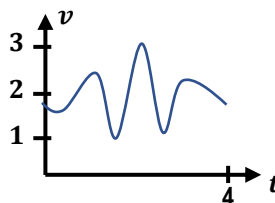
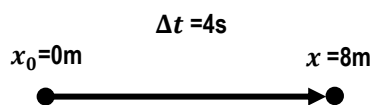
- Velocity can be _____
- Negative Velocity: _____ to positive direction

EXAMPLE: You jog 15m in 2s, then 9m backwards in another 2s. Calculate your speed & velocity for the total trip.

PRACTICE: Beginning from a signpost, you run 60m to the right, then 60m back. The entire trip takes 24 seconds. What is your speed and velocity for the whole trip?

CONCEPT: SOLVING CONSTANT AND AVERAGE VELOCITY PROBLEMS

- Velocity is measured between two points (initial $\rightarrow$ final), so it is often called an _____ velocity.

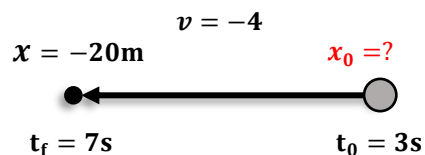
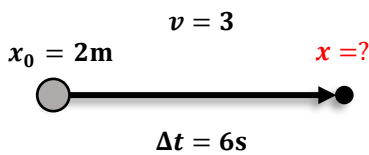
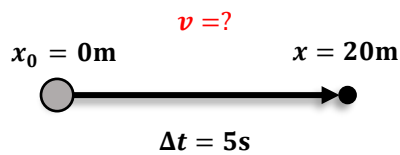


- **Average** velocity behaves like a _____ velocity (**NO acceleration**), so there's only 1 equation:

$$v_{avg} = v = \frac{\Delta x}{\Delta t} \rightarrow \Delta x = v_{avg} \Delta t \rightarrow$$



EXAMPLE: Solve for the unknown variable in each of the following diagrams:



PRACTICE: A baseball pitcher can throw a baseball at 44 m/s. How long does it take for the baseball to travel the roughly 18.5 m to the home plate?

CONCEPT: CONSTANT VELOCITY WITH MULTIPLE PARTS

- Many problems will have an object moving with *different*, but **constant** velocities in multiple parts.
 - Remember: For constant velocity, there's only ONE equation $\Rightarrow v = \frac{\Delta x}{\Delta t}$



EXAMPLE: A car travels at a constant 50 m/s forward for 10s, and then at 30m/s for 600m. Calculate:

- a) the total distance traveled
- b) the average velocity from start to finish

STEPS
1) Draw diagram & list variables
2) Write equations for each interval
3) Solve



PRACTICE: You walk to the right at 3m/s for 8s , then turn around and walk backwards at 2m/s for some unknown time. You end up 16m to the right from where you started. For long (in seconds) did you walk backwards?

STEPS
1) Draw diagram & list variables
2) Write equations for each interval
3) Solve

EXAMPLE: A runner hopes to complete a 100-m race in 20s. After running at a constant 4m/s for 14s, the runner realizes they need to run faster to win. What must the average velocity of the runner be for the rest of the race to complete it in 20s?

STEPS
1) Draw diagram & list variables
2) Write equations for each interval
3) Solve