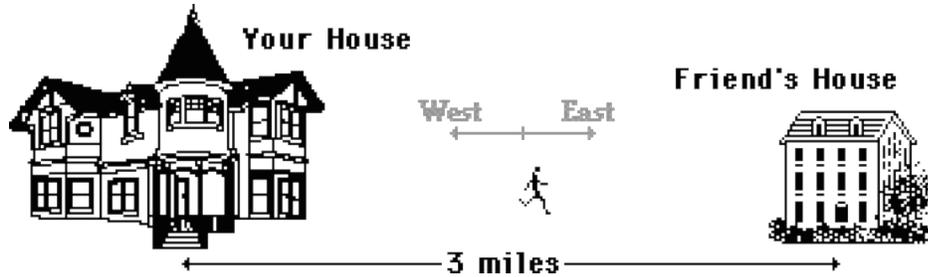


Motion in One Dimension

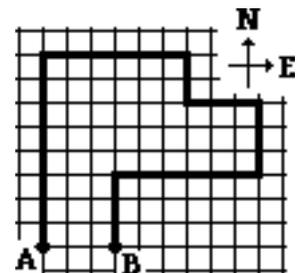
7. You run from your house to a friend's house that is 3 miles away. You then walk home.



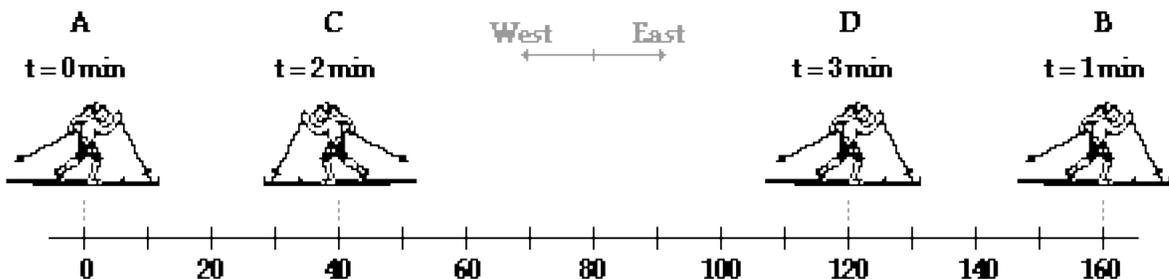
- What distance did you travel? _____
- What was the displacement for the entire trip? _____

Observe the diagram below. A person starts at A, walks along the bold path and finishes at B. Each square is 1 km along its edge. Use the diagram in answering the next two questions.

- This person walks a distance of _____ km.
- This person has a displacement of _____.
 - 0 km
 - 3 km
 - 3 km, E
 - 3 km, W
 - 5 km
 - 5 km, N
 - 5 km, S
 - 6 km
 - 6 km, E
 - 6 km, W
 - 31 km
 - 31 km, E
 - 31 km, W
 - None of these.



10. A cross-country skier moves from location A to location B to location C to location D. Each leg of the back-and-forth motion takes 1 minute to complete; the total time is 3 minutes. (The unit is *meters*.)



- What is the distance traveled by the skier during the three minutes of recreation?
- What is the net displacement of the skier during the three minutes of recreation?
- What is the displacement during the second minute (from 1 min. to 2 min.)?
- What is the displacement during the third minute (from 2 min. to 3 min.)?

Describing Motion Verbally with Speed and Velocity

Read from **Lesson 1** of the **1-D Kinematics** chapter at **The Physics Classroom**:

<http://www.physicsclassroom.com/Class/1DKin/U1L1d.html>

MOP Connection: Kinematic Concepts: sublevels 3 and 6

Review:

- A _____ quantity is completely described by magnitude alone. A _____ quantity is completely described by a magnitude with a direction.
 - scalar, vector
 - vector, scalar
- Speed is a _____ quantity and velocity is a _____ quantity.
 - scalar, vector
 - vector, scalar

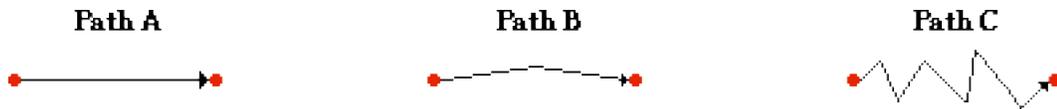
Speed vs. Velocity

Speed and velocity are two quantities in Physics that seem at first glance to have the same meaning. While related, they have distinctly different definitions. Knowing their definitions is critical to understanding the difference between them.

Speed is a quantity that describes how fast or how slow an object is moving.

Velocity is a quantity that is defined as the rate at which an object's position changes.

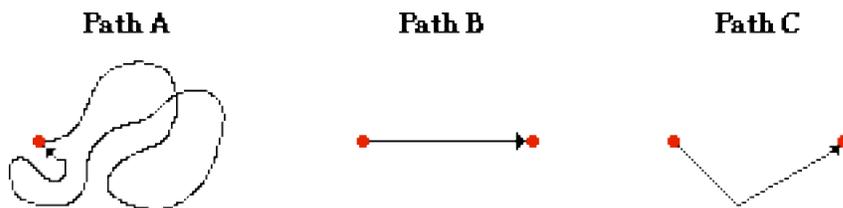
- Suppose you are considering three different paths (A, B and C) between the same two locations.



Along which path would you have to move with the greatest speed to arrive at the destination in the same amount of time? _____ Explain.

- True or False:** It is possible for an object to move for 10 seconds at a high speed and end up with an average velocity of zero.
 - True
 - False
- If the above statement is true, then describe an example of such a motion. If the above statement is false, then explain why it is false.

- Suppose that you run for 10 seconds along three different paths.



Rank the three paths from the lowest average speed to the greatest average speed. _____

Rank the three paths from the lowest average velocity to the greatest average velocity. _____

Calculating Average Speed and Average Velocity

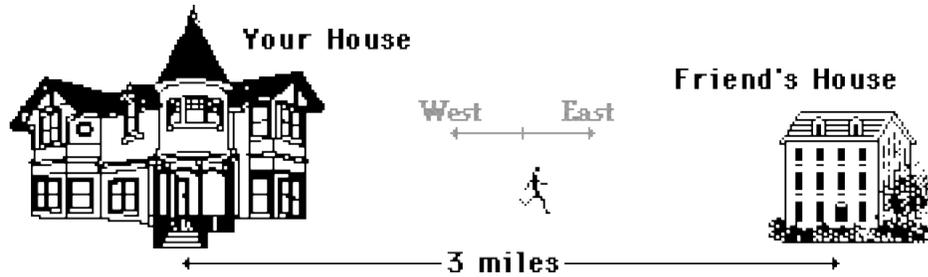
The average speed of an object is the rate at which an object covers distance. The average velocity of an object is the rate at which an object changes its position. Thus,

$$\text{Ave. Speed} = \frac{\text{distance}}{\text{time}}$$

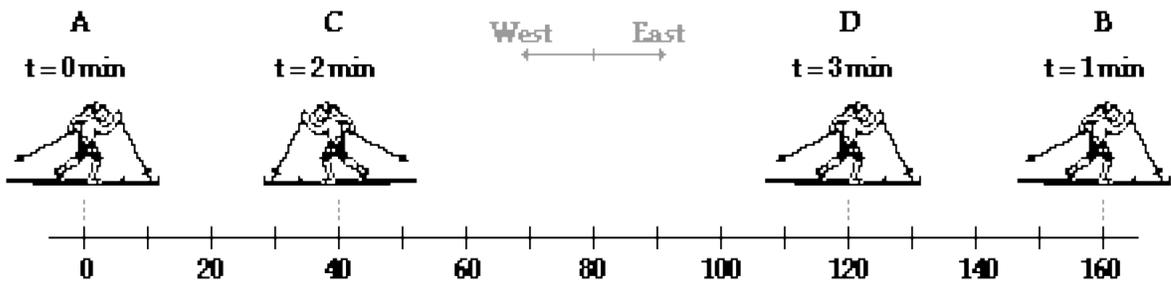
$$\text{Ave. Velocity} = \frac{\text{displacement}}{\text{time}}$$

Speed, being a scalar, is dependent upon the scalar quantity distance. Velocity, being a vector, is dependent upon the vector quantity displacement.

7. You run from your house to a friend's house that is 3 miles away in 30 minutes. You then immediately walk home, taking 1 hour on your return trip.



- a. What was the average speed (in mi/hr) for the entire trip? _____
- b. What was the average velocity (in mi/hr) for the entire trip? _____
8. A cross-country skier moves from location A to location B to location C to location D. Each leg of the back-and-forth motion takes 1 minute to complete; the total time is 3 minutes. The unit of length is meters.



Calculate the average speed (in m/min) and the average velocity (in m/min) of the skier during the three minutes of recreation. **PSYW**

Ave. Speed =

Ave. Velocity =