

Simple Kinematics Problems: Distance/Displacement and Average Speed/Velocity

Below are some kinematics problems that describe some situations similar to those that you did in lab. Here you will not act out the situation but will use the descriptions to do calculations like those done in lab.

A. Define north to be the positive direction.

I take 7 steps north, moving a distance 6.59 m. Then, I take 4 steps south, moving an additional distance of 3.93 m.

1. Sketch my walk.
2. Compute the total distance I travel.
3. Compute my total displacement.
4. What is the magnitude of my total displacement?
5. Is the magnitude of my total displacement less than, greater than or equal to the total distance I travel?
6. Compute my average step length to the correct number of significant figures.

B. Define east to be the positive direction.

I drive my car 400.0 km east at 80.0 km/h. Then, I drive 150.0 km west at 50.0 km/h.

1. Sketch my drive.
2. What is the total displacement of the car I am driving?
3. What is the average velocity of the car during that entire displacement?
4. What is the total distance I travel?
5. What is my average speed for the entire trip?
6. Convert the average speed to m/s.

C. Define east to be the positive direction.

I drive my car 400.0 km east at 80.0 km/h. Then, I drive 400.0 km west at 50.0 km/h.

1. Sketch my drive.
2. What is the total displacement of the car I am driving?
3. What is the average velocity of the car during that entire displacement?
4. What is the total distance I travel?
5. What is my average speed for the entire trip?
6. Why is my average speed not $\frac{1}{2} (80.0 \text{ km/h} + 50.0 \text{ km/h}) = 65.0 \text{ km/h}$?