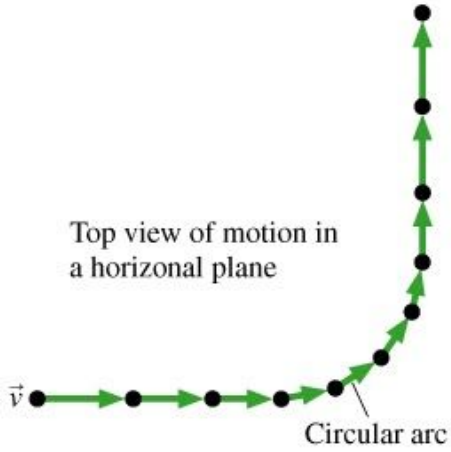
PAL Problem Set 3 for Phys 5A (Representing Motion)

Always explain your answers and show your work.

1. A car travels to the left at a steady speed for a few seconds, then brakes for a stop sign. Draw a motion diagram of the car for the entire motion described. Number the positions in order starting with zero.

2. A ball is dropped from the roof of a tall building and students in a physics class are asked to sketch a motion diagram for this situation. A student submits the diagram shown in the figure. Is the diagram correct? Explain.

3. Write a one or two sentence "story" about a real object that has the motion diagram in figure below. Your story should talk about people or objects by name and say what they are doing.



4. Give an example of a trip you might take in your car for which the distance traveled as measured on your car's odometer is not equal to the displacement between your initial and final positions.

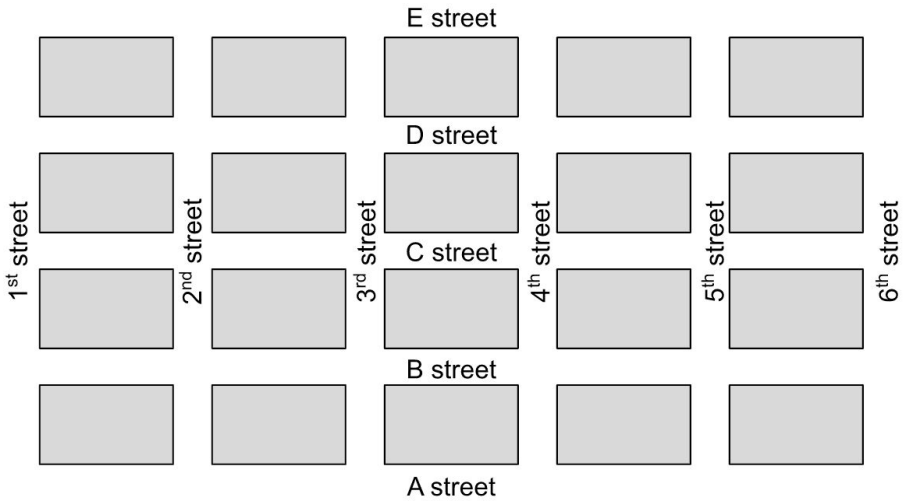
5. Write a sentence or two describing the difference between speed and velocity. Give one example of each.

6. A ladybug moves in a straight line. It starts with a negative position with respect to the origin and moves with negative velocity. Draw the horizontal axis, place the origin, and draw the ladybug's motion diagram showing at least 5-6 points.

7. David runs an ultramarathon that starts and ends at the same location in Auburn. He runs 50 miles in about 10 hours. Upon arrival he states that his average velocity was 5 mph. His girlfriend disagrees: "no honey, your average *speed* was 5 mph". Who is correct? Explain.

8. A ladybug moves in a circular path with constant speed. As seen from a person looking from above, it moves in the clockwise direction. Draw a motion diagram and the ladybug's velocity vectors as seen from a person above. The ladybug's motion diagram should show at least 5-6 points.

9. In a certain town the the east-west blocks are 400 ft long while the north-south blocks are 280 ft long. Because all the streets are one-way, it can be challenging to get around. Becca starts at the corner of B and 5th streets. She drives north on 5th street for 3 blocks and turns west on E street. She drives west for 3 blocks and turns south on 2nd street. Her final destination is two blocks south on the corners of C and 2nd streets. What is Becca's displacement (magnitude and direction)?



10. Luis is visiting a public garden that has a large, circular path. When he has walked one-quarter of the distance around the path, the magnitude of his displacement is 120 m. What is the diameter of the path?