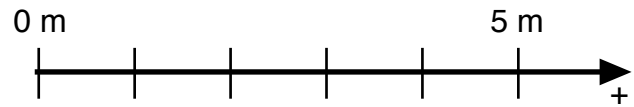
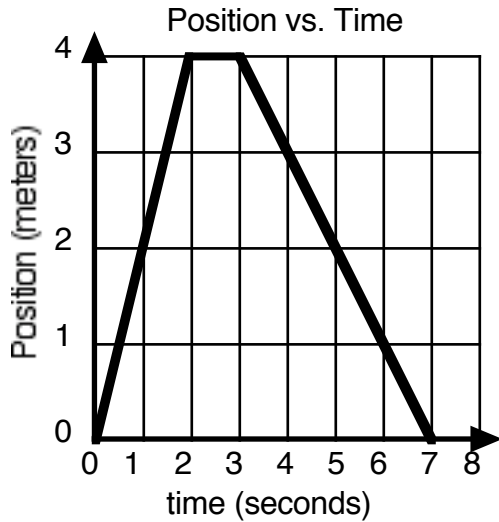


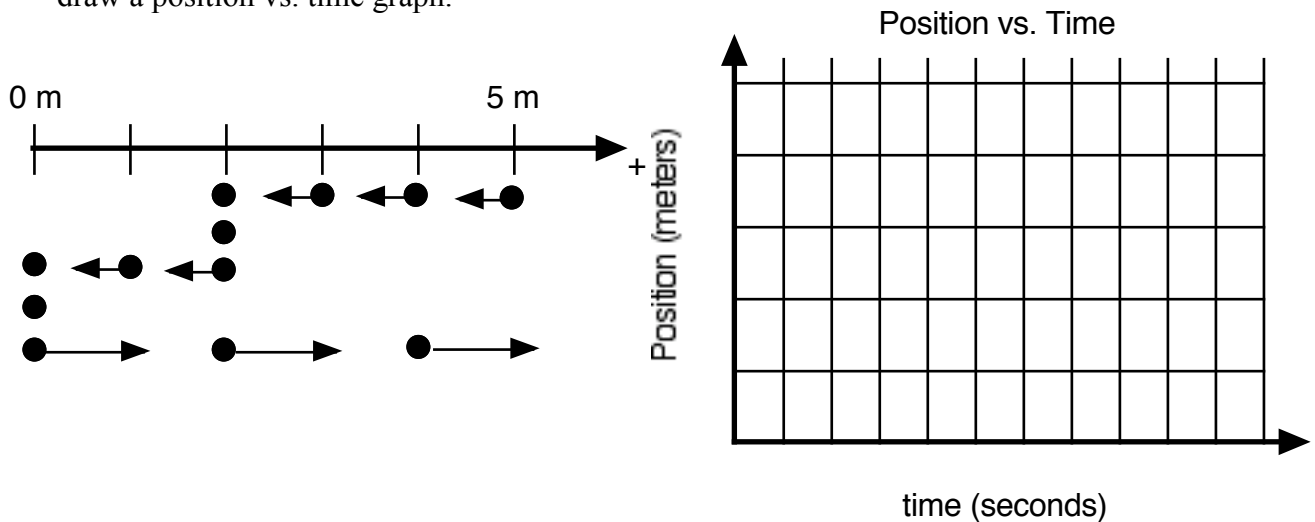
# Constant Velocity Particle Model Worksheet 1: Motion Maps and Position vs. Time Graphs

1. Given the following position vs. time graph, draw a motion map with one dot for each second.



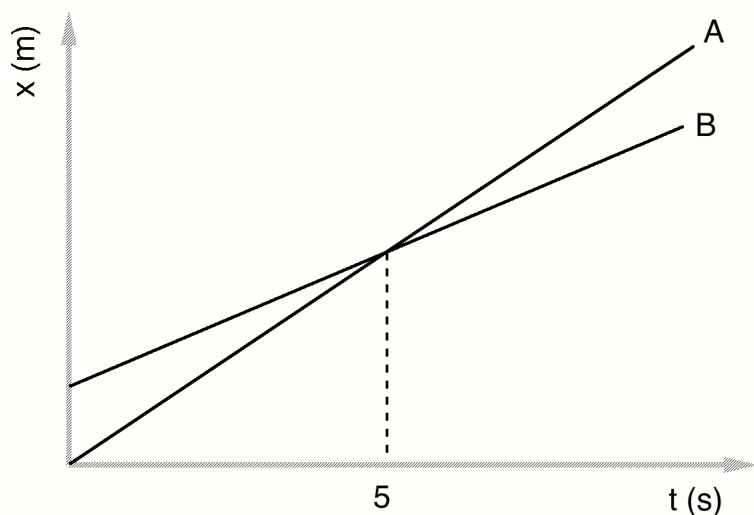
Describe the motion of the object in words:

2. Given the following motion map, where positions have been recorded with one dot each second, draw a position vs. time graph.



Describe the motion of the object in words:

3. Consider the position vs. time graph below for cyclists A and B.



a. Do the cyclists start at the same point? How do you know? If not, which is ahead?

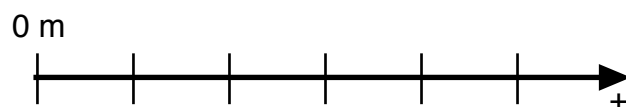
b. At  $t = 7$ s, which cyclist is ahead? How do you know?

c. Which cyclist is traveling faster at 3s? How do you know?

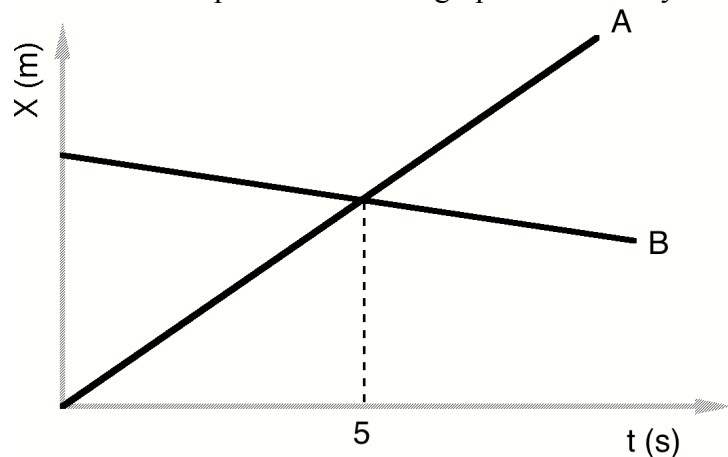
d. Are their velocities equal at any time? How do you know?

e. What is happening at the intersection of lines A and B?

f. Draw a motion map for cyclists A and B.



4. Consider the position vs. time graph below for cyclists A and B.



a. How does the motion of the cyclist A in this graph compare to that of A in question 3?

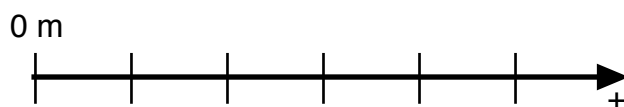
b. How does the motion of cyclist B in this graph compare to that of B in question 3?

c. Which cyclist has the greater speed? How do you know?

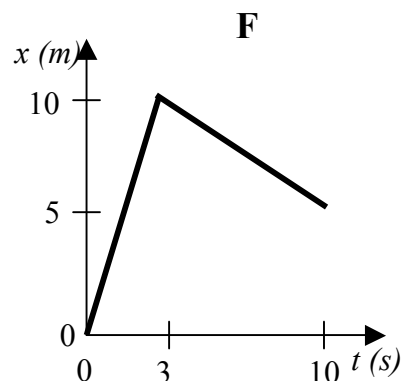
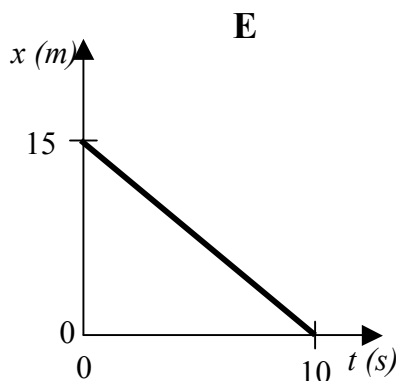
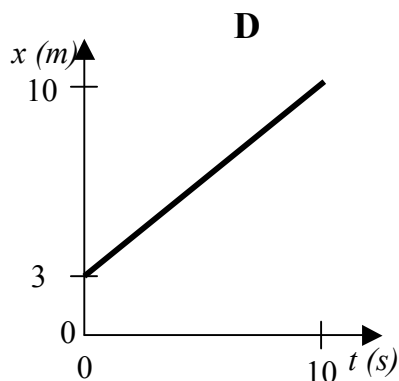
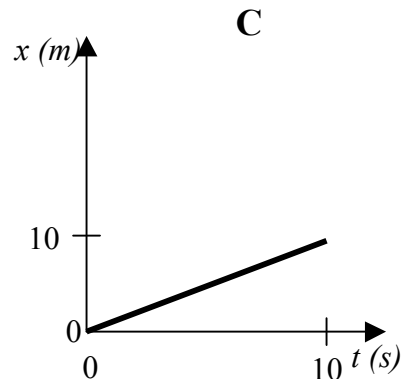
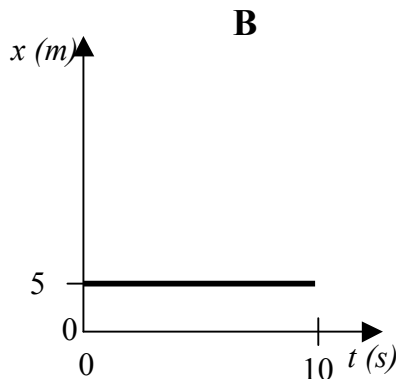
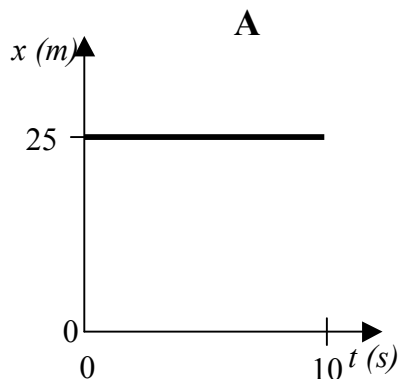
d. Describe what is happening at the intersection of lines A and B.

e. Which cyclist has traveled further during the first 5 seconds? How do you know?

f. Draw a motion map for cyclists A and B.



5. To rank the following, you may need to look at the key ideas sheet for the difference between *displacement* and *odometer reading*.



a. Rank the graphs according to which show the greatest **displacement** from the beginning to the end of the motion. (Zero is greater than negative, and ties are possible.)

Greatest 1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5 \_\_\_\_\_ 6 \_\_\_\_\_ Least

Explain your reasoning for your ranking:

b. Rank the graphs according to which show the greatest **odometer reading** from the beginning to the end of the motion.

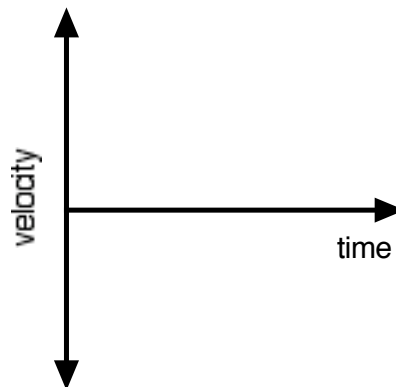
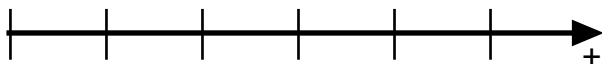
Greatest 1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ 5 \_\_\_\_\_ 6 \_\_\_\_\_ Least

Explain your reasoning for your ranking:

6. Sketch **velocity vs. time** graphs and **motion maps** corresponding to the following descriptions of the motion of an object.

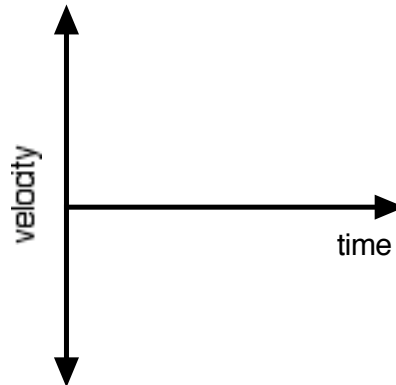
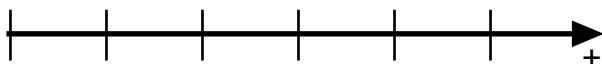
a. The object is moving in the positive direction at a constant (steady) speed.

Motion Map:  
0 m



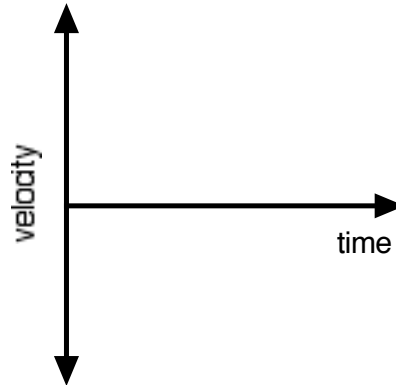
b. The object is standing still.

Motion Map:  
0 m



c. The object moves in the negative direction at a steady speed for 10s, then stands still for 10s.

Motion Map:  
0 m



d. The object moves in the positive direction at a steady speed for 10s, reverses direction and moves back toward the negative direction at the same speed.

Motion Map:  
0 m

