Name_____

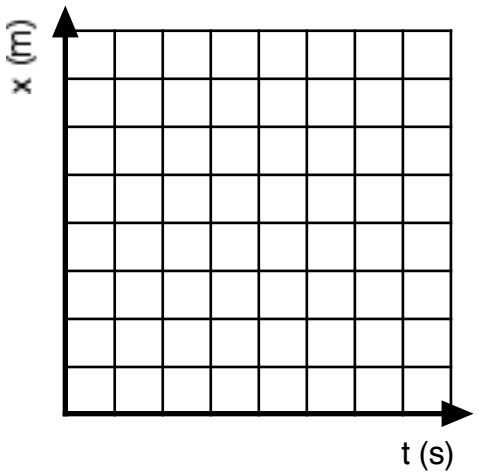
Date_____ Pd____

Constant Velocity Particle Model Worksheet 3:

Position vs. Time and Velocity vs. Time Graphs

1. Robin, rollerskating down a marked sidewalk, was observed at the following positions at the times listed below:

t (s)	x (m)
0.0	10.0
1.0	12.0
2.0	14.0
5.0	20.0
8.0	26.0
10.0	30.0



a. Plot a position vs. time graph for the skater.

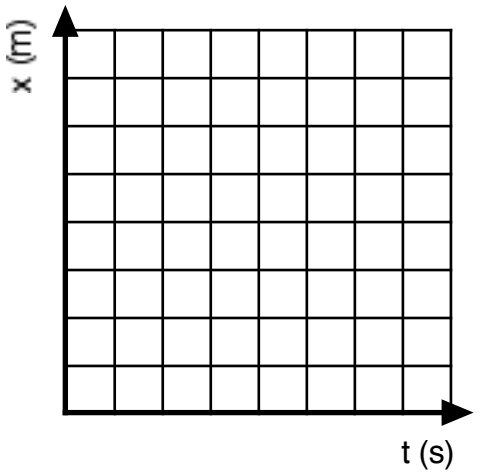
b. Explain how you can use the graph to determine how far he was from the origin at t = 6s.

c. Write a mathematical model that describes the skater's motion.

d. Was his speed constant over the entire interval? How do you know?

2. In a second trial, the timer started her watch a bit sooner. The following data were obtained:

t (s)	x (m)
0.0	4.0
2.0	10.0
4.0	16.0
6.0	22.0
8.0	28.0
10.0	34.0



a. Plot the position vs. time graph for the skater.

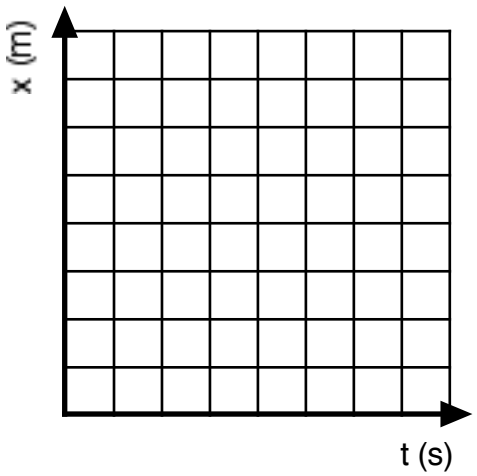
b. How far from the origin was the skater at t = 5s? How do you know?

c. Was the skater's speed constant? If so, what was it?

d. In the first trial, the skater was further along at 2s than he was in the second trial. Does this mean that he was going faster? Explain your answer.

3. Suppose now that our skater was observed in a third trial. The following data were obtained:

t (s)	x (m)
0.0	0.0
2.0	2.0
4.0	4.0
6.0	4.0
8.0	3.0
10.0	2.0
12.0	2.0
14.0	5.0
16.0	8.0



a. Plot the position vs. time graph for the skater.

b. What do you think is happening during the time interval: t = 4s to t = 6s? How do you know?

c. What do you think is happening during the time interval: t = 6s to t = 10s? How do you know?

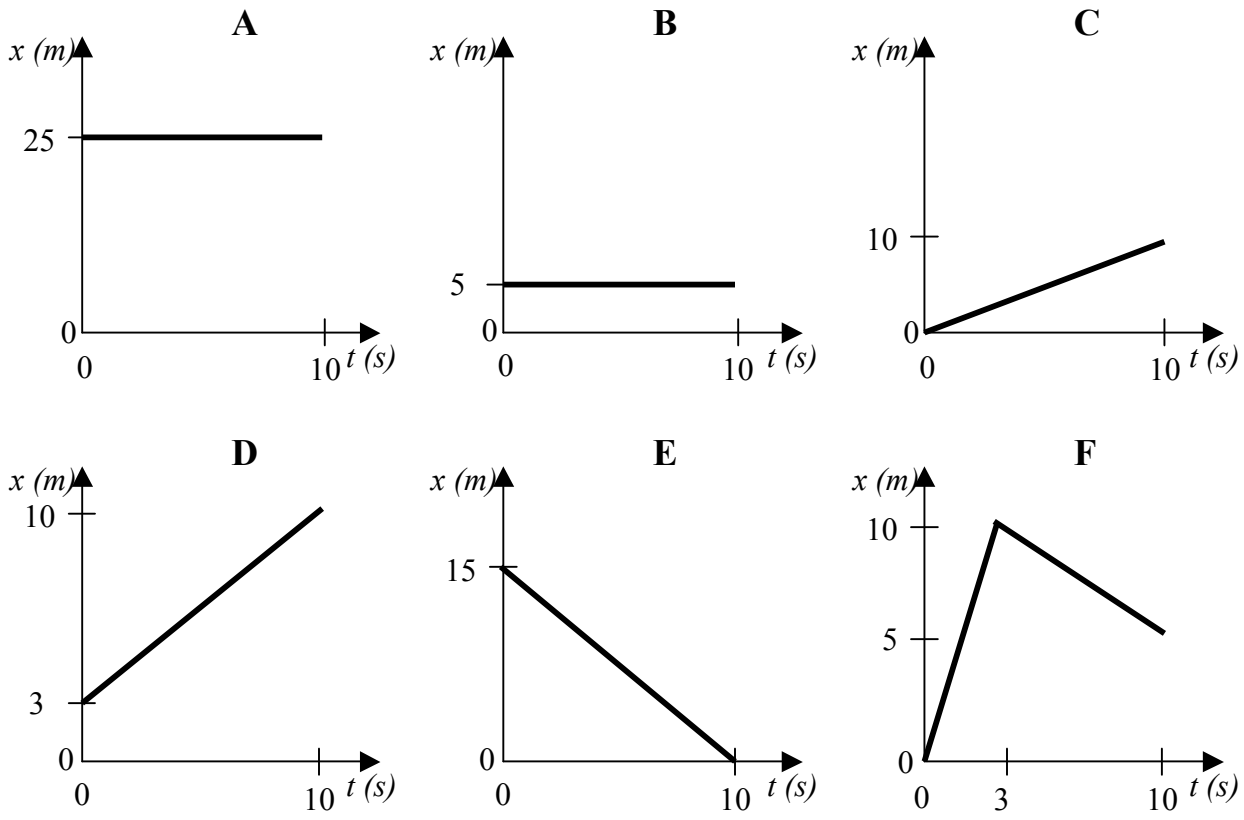
d. Determine the skater's average **velocity** from t = 0s to t = 16s. (Average **velocity** is the displacement (final position minus initial position) divided by time elapsed.)

e. Determine the skater's average **speed** from t = 0s to t = 16s. (Average **speed** path length divided by time elapsed.)

4a. In what situation might average **speed** be a better measure of motion than average velocity?

4b. In what situation might average **velocity** be a better measure of motion than average speed?

5. Rank the following:



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

Most pos. v 1_____ 2_____ 3_____ 4_____ 5_____ 6_____ Most neg. v

Explain your reasoning for your ranking:

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

Greatest 1_____ 2_____ 3_____ 4_____ 5_____ 6_____ Least

Explain your reasoning for your ranking: