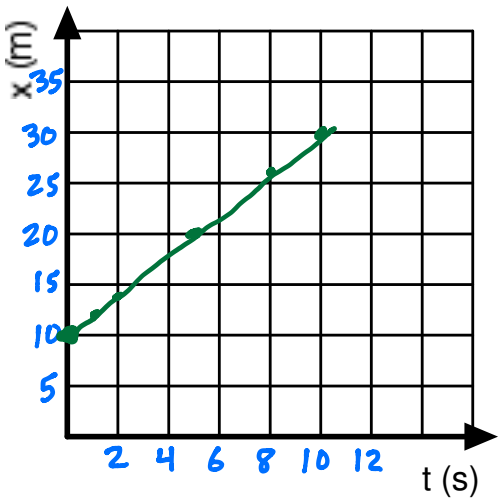
Name_____ Date_____ Pd____

UNIT I: Worksheet 3

1. Robin, roller skating down a marked sidewalk, was observed to be 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. Be sure to label the x and y axis.

b. Write a mathematical model (equation) to describe the curve in (a).

$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{30-10}{10-0} = 2\,m/s$

$y = mx + b$

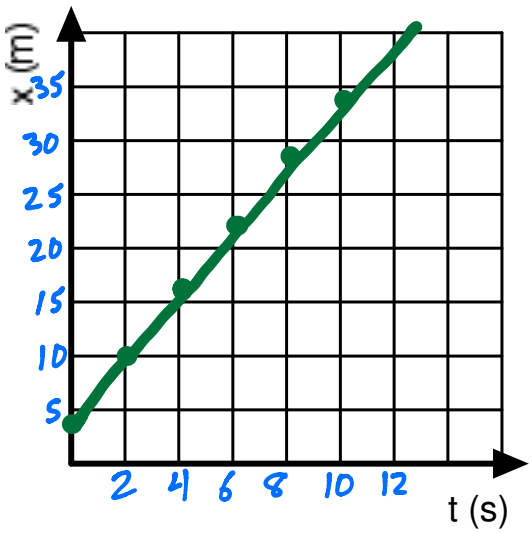
$x = 2\,m/s\,(t) + 10\,m$

c. How far from the starting point was she at t = 6s? How do you know?

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

2. The following data was obtained for a second trial:

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. Be sure to label the x and y axis.

b. How far from the starting point was she at t = 5s? How do you know?

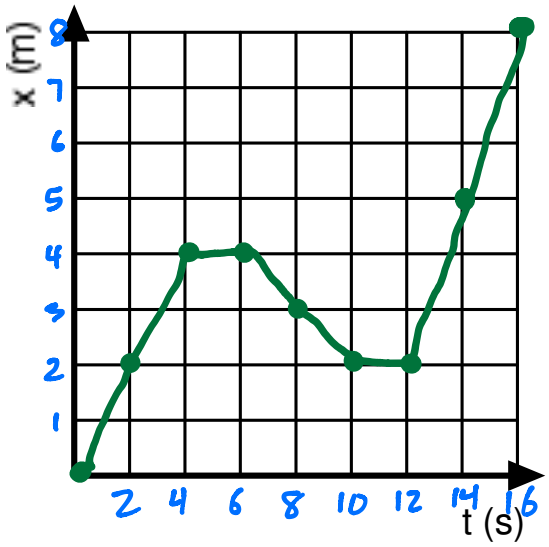
c. Was her speed constant? If so, what was it?

Yes ⇒ Constant slope

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

3. Suppose now that our skater was observed in a third trial. The following data was 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. Be sure to label the x and y axis.

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

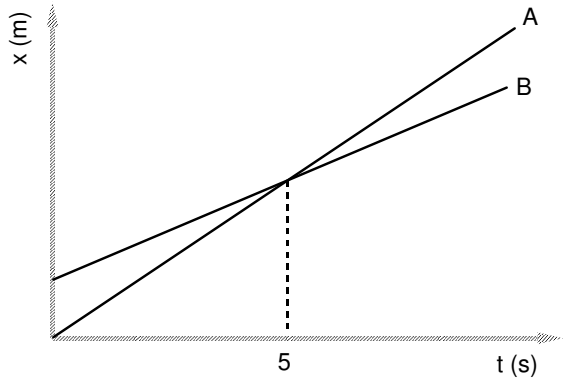
The skater isn't moving → the slope is zero

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

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

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

4. 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?

No, B starts ahead ⇒ B has a larger y-int.

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

c. Which cyclist is travelling faster at t = 3s? How do you know?

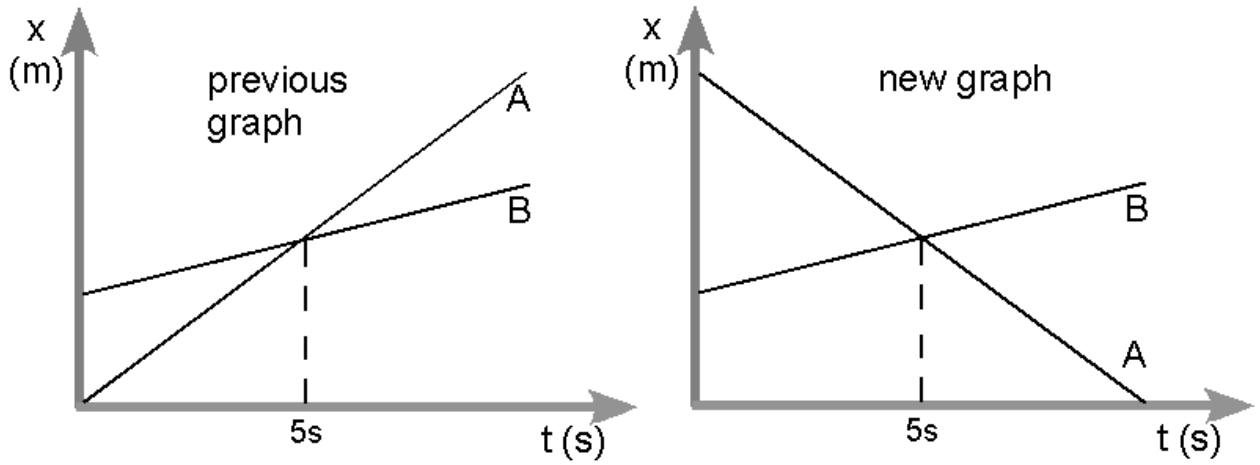
d. Are their velocities equal at any time? How do you know?

No, the slopes are always different

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

f. Add to the graph cyclist C & D. Cyclist C starts further from the origin than cyclist B and moves fast than cyclist A. Cyclist D starts farther away from the origin than cyclist C but doesn't move. Make sure to clearly label the cyclist on the graph.

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



a. How does the motion (starting point, speed & velocity) of the cyclist A in this graph compare to that of A in the previous graph on page one? Explain how you know.

b. How does the motion of cyclist B in this graph compare to that of B in the previous graph on page one?

c. Which cyclist, on the new graph, has the greater speed? How do you know?

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

e. Which cyclist traveled a greater distance during the first 5 seconds? How do you know?