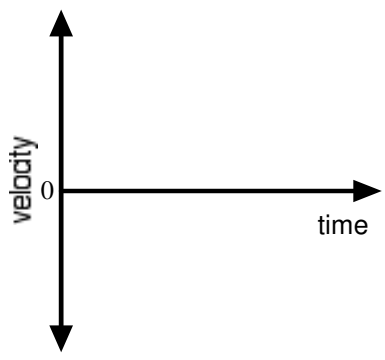
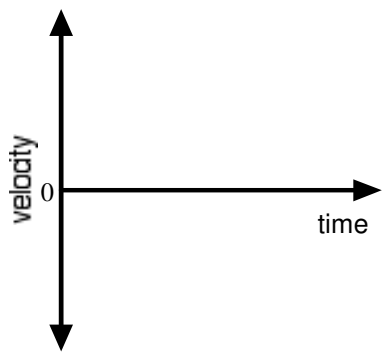
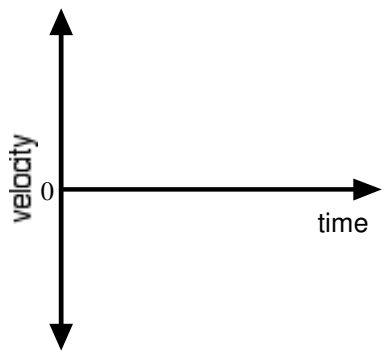
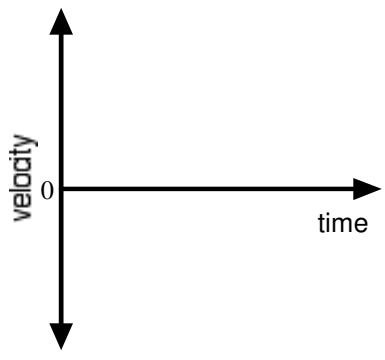


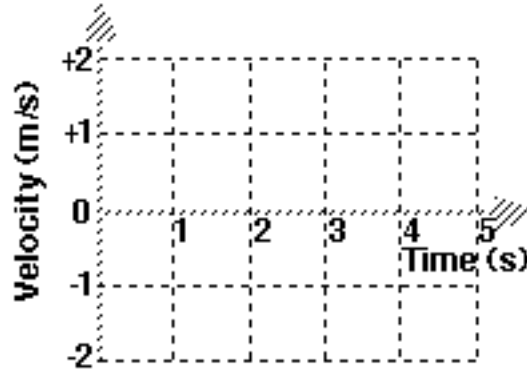
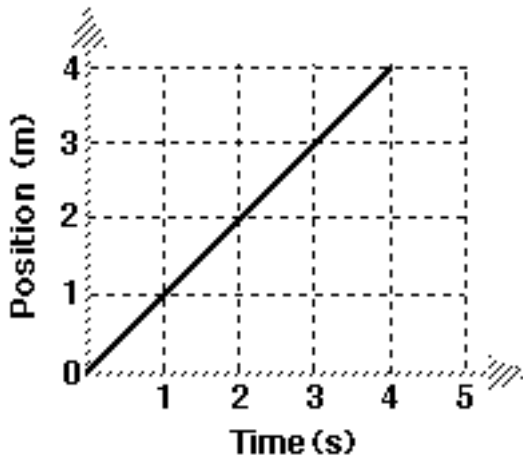
UNIT I Worksheet 4

Sketch velocity vs time graphs corresponding to the following descriptions of the motion of an object.

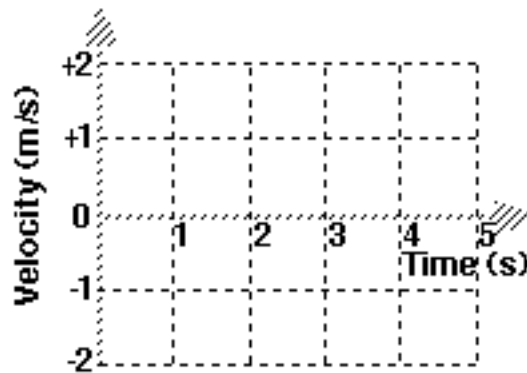
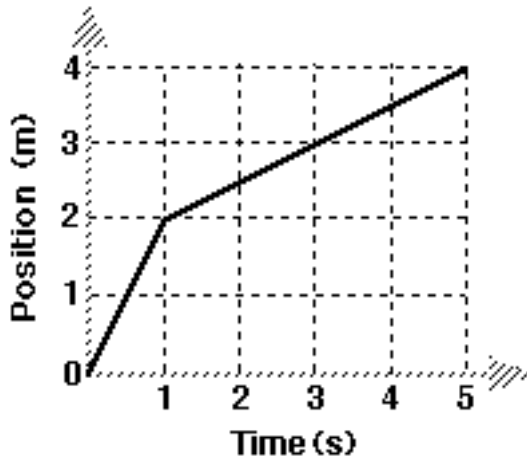
<p>1. The object is moving in the positive direction at a constant (steady) speed.</p>	 <p>A velocity vs time graph with a vertical axis labeled 'velocity' and a horizontal axis labeled 'time'. The origin is marked '0'. A horizontal line is drawn in the positive velocity region, extending to the right.</p>
<p>2. The object is standing still.</p>	 <p>A velocity vs time graph with a vertical axis labeled 'velocity' and a horizontal axis labeled 'time'. The origin is marked '0'. A horizontal line is drawn along the zero velocity axis, extending to the right.</p>
<p>3. The object moves in the negative direction at a steady speed for 10s, then stands still for 10s.</p>	 <p>A velocity vs time graph with a vertical axis labeled 'velocity' and a horizontal axis labeled 'time'. The origin is marked '0'. A horizontal line is drawn in the negative velocity region, extending to the right. After a certain time interval, the line drops to the zero velocity axis and continues horizontally to the right.</p>
<p>4. 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.</p>	 <p>A velocity vs time graph with a vertical axis labeled 'velocity' and a horizontal axis labeled 'time'. The origin is marked '0'. A horizontal line is drawn in the positive velocity region, extending to the right. After a certain time interval, the line drops to the zero velocity axis, then continues horizontally in the negative velocity region.</p>

Draw the velocity vs time graphs for an object whose motion produced the position vs time graphs shown below at left. **Remember the slope of the position vs. time graph is the velocity!!!!**

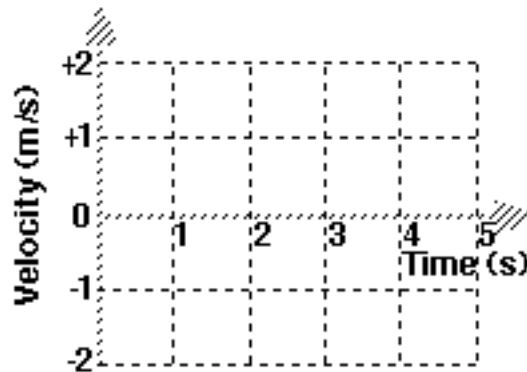
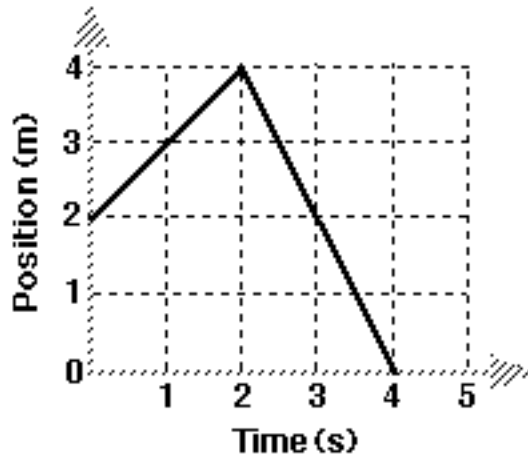
5.



6.



7.

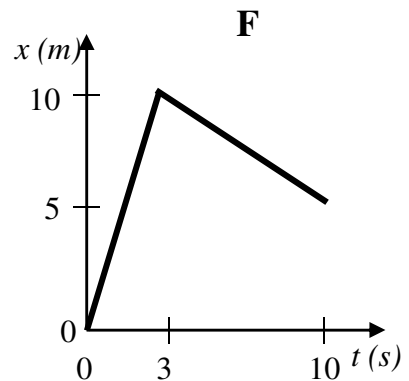
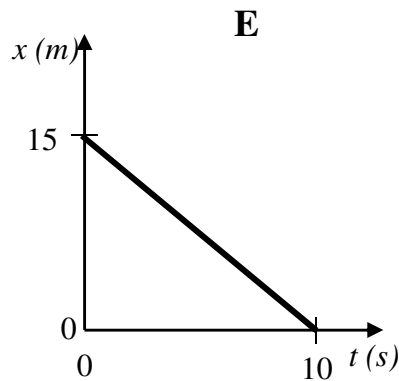
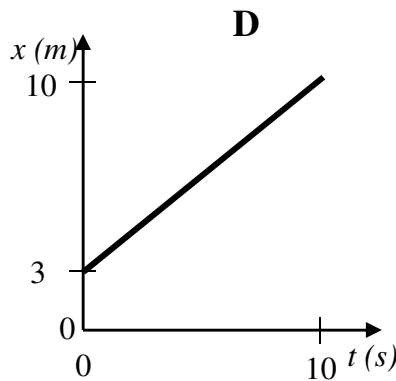
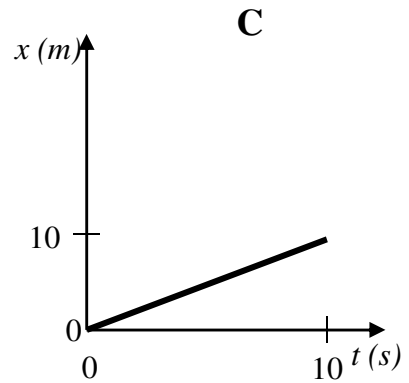
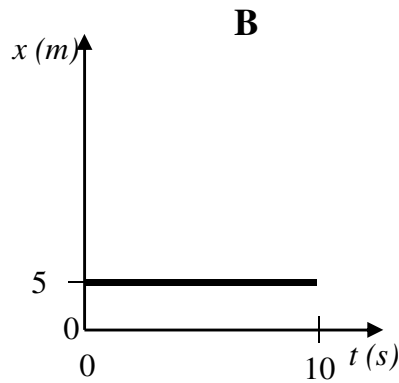
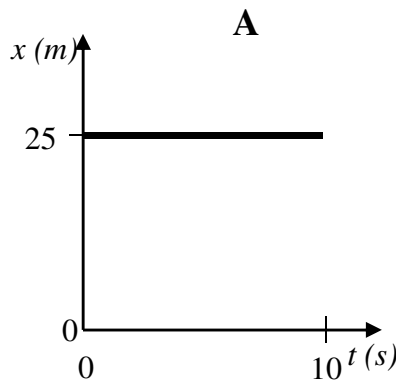


8. For many graphs, both the **slope** of the line and the **area** between the line and the horizontal axis have physical meanings.

a. What does the slope of a position time graph tell you about the motion of an object? _____

b. What does the area under the velocity-time graph tell you about the motion of an object? _____

9. 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.

Most positive \rightarrow 1_____ 2_____ 3_____ 4_____ 5_____ 6_____ \leftarrow Most negative

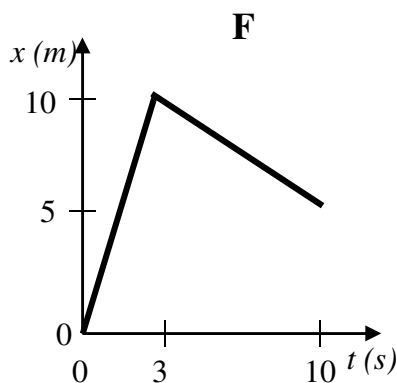
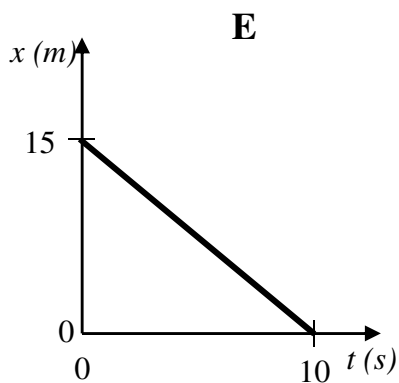
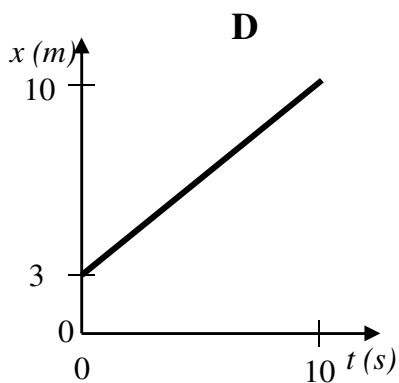
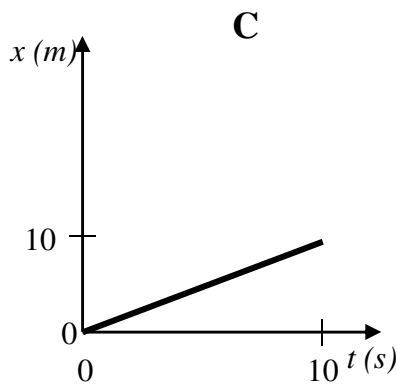
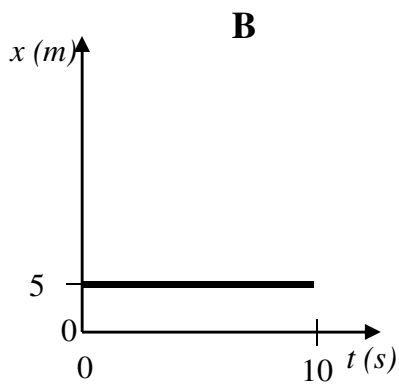
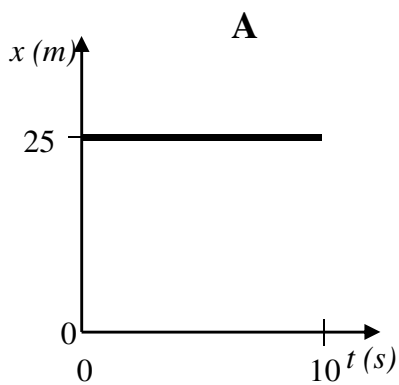
Explain your reasoning for your ranking:

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:

10. 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:

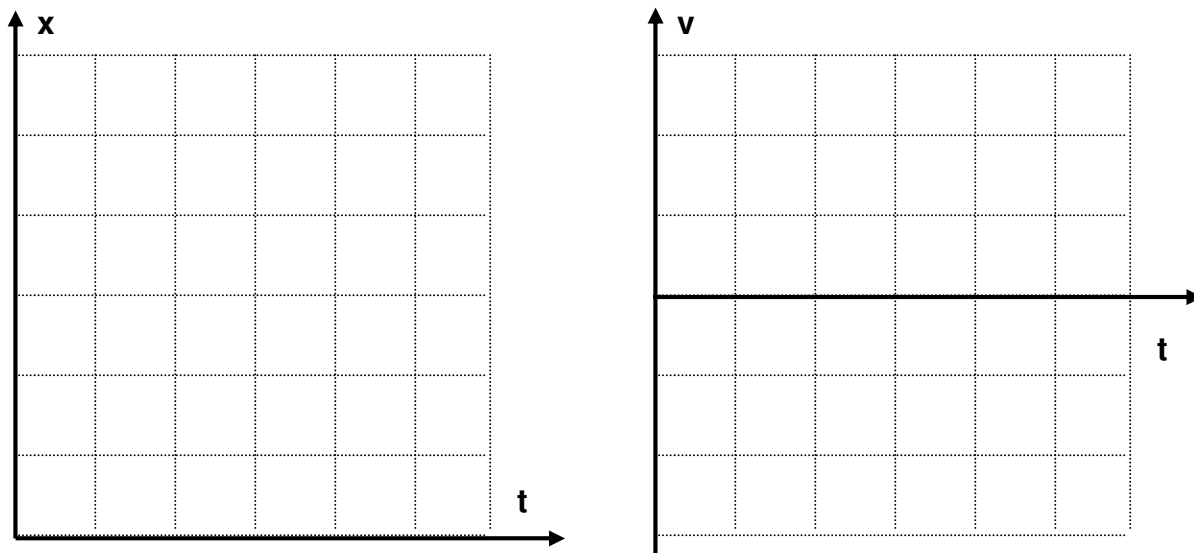
b. Rank the graphs according to which show the greatest **average speed** from the beginning to the end of the motion.

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

Explain your reasoning for your ranking:

11. An object moves at a constant rate from the origin and travels at 8 m/s for 5 seconds.

- a. Draw a **quantitative** graphical representation of x vs t (see below). Label the x & y axis.
- b. Draw a **quantitative** graphical representation of v vs t (see below). Label the x & y axis.



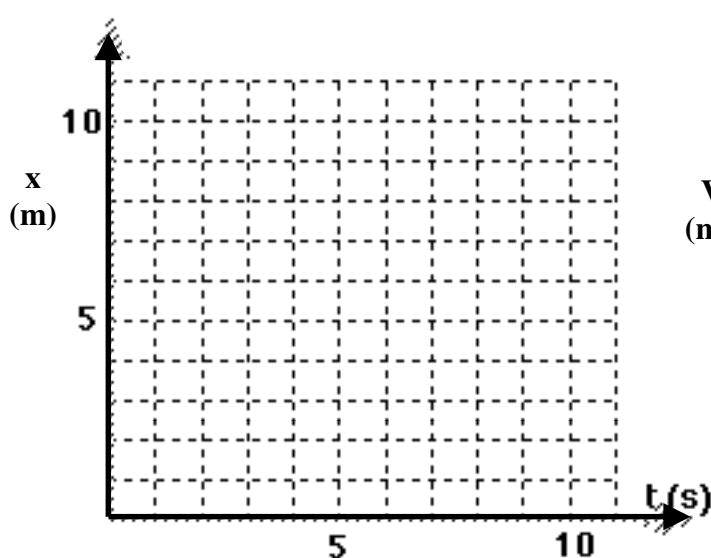
- c. Write a mathematical expression that represents the relationship between x and t .
- d. Cross hatch the area under the velocity-time graph. Describe what the area under the v - t graph represents and calculate its value.
- f. Now find the displacement using your equation from part c.

12. From the position vs time data below, complete a through e.

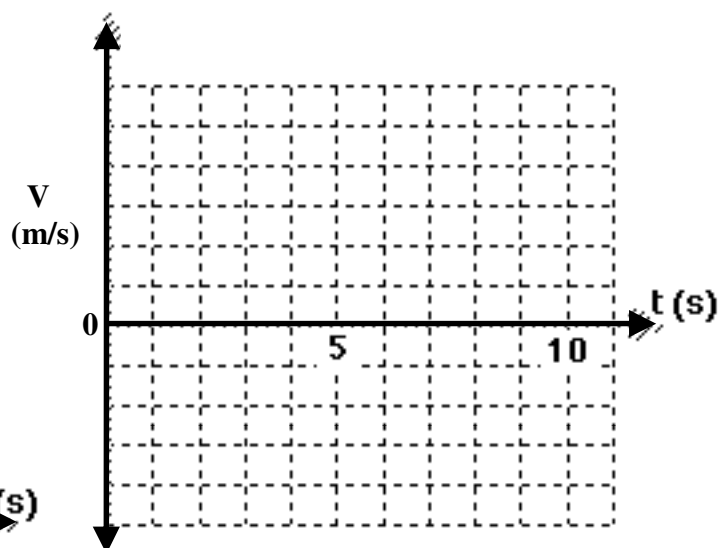
t (s)	x (m)
0	0
1	2
2	4
3	4
4	7
5	10
6	10
7	10
8	5
9	0

a. Construct a graph of position vs time.

b. Construct a graph of velocity vs time.



(A)



(B)

c. Determine the displacement from $t = 3.0\text{s}$ to 5.0s using graph B.

d. Determine the displacement from $t = 7.0\text{ s}$ to 9.0 s using graph B.

e. Determine the AVERAGE velocity from 0.0 s to 7.0 s .