Name_____

Date _____

Per _____

Constant Speed and Constant Velocity

Conceptual Questions

1. What are the differences between velocity and speed?

2. Can two different objects have the same speed, but different velocities? Explain.

3. Can two different objects have the same velocities, but different speeds? Explain.

4. Can you have a constant speed, but not a constant velocity? Explain.

5. Can you have a constant velocity, but not a constant speed? Explain.

6. When are speed and velocity the same?

7. If you are told an object's velocity, can you figure out its speed? Explain.

8. If you are told an object's speed, can you figure out its velocity? Explain.

9. In the equation $x_f = vt + x_o$ what do each of the variables represent? What does the quantity $x_f - x_o$ represent?

Computational Problems - show all work

1. Car A moves 20 meters every 2 seconds while Car B moves 40 meters every 4 seconds. Which car moving faster? Support your answer.

2. Person A travels 40 meters every 20 seconds while Person B travels 60 meters every 40 seconds. Which person is moving faster? How do you know?

3. Mr. Premvaree runs one lap around a 400 m track in 2.2 minutes.
    a. What is his speed in m/s?
    b. If he continues at the same pace, how long will it take him to complete 1600 meters?
    c. How long will it take Mr. Premvaree to run one kilometer at this pace?

4. A car travels with a constant speed of 30 m/s for 1/2 hour. How far away is the car from its starting position?

5. A hiker travels for 40 minutes at a constant speed of 1.25 m/s.
    a. What distance does she cover during this time?
    b. If the hiker walked twice as fast, how long would it take her to walk the same distance?

6. Mr. Eisenstadt stands at the rim of the Grand Canyon and yodels down to the bottom. He hears his yodel echo back from the canyon floor 5.20 s later. Assume that the speed of sound is 340 m/s. How deep is the canyon at this location?

7. You walk 200 m down school's hallway at 1.2 m/s and then run another 200 m at 2.5 m/s.
    a. How many seconds does it take you to travel the entire 400 m?
    b. What was your average speed for this entire trip?

8. You drive down the highway at 30 m/s for 20 minutes and then drive for an additional 10 km at a speed of 15 m/s.
    a. What was the total distance you traveled?
    b. What was the total time you traveled?
    c. What was your average speed for the entire trip?

9. If all you know is the distance someone traveled and the total time it took them to travel:
    a. Can you determine the person's speed or velocity? Explain.
    b. Can you tell if they had a constant speed? Explain.

10. Mr. Klein is running with a constant speed of 6 m/s. How long will it take him to run 100 m?

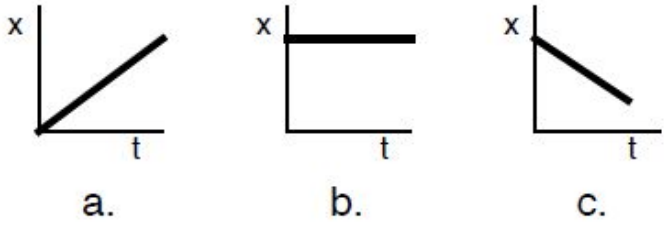
11. You are standing at the edge of a large field. At the opposite end of the field is a huge building. You yell at the building, and hear an echo 2.5 seconds later. If the speed of sound is 340 m/s, how far away from the building are you?

12. Ms. Brown walks 20 meters down a hall with a constant speed of 2 m/s. Then she walks another 20 meters down the hall, this time with a constant speed of 4 m/s. What was her average speed down the hall?

3. a) 3.03 m/s b) 8 min. 48 s c) 5 min 30 s
4. 54 km
5. a) 3 km b) 20 min.
6. 884 m
7. a) 247 s b) 1.62 m/s
8. a) km b) 31 min 6 s c) 24.65 m/s
9. 425 m

Motion Graphs

1. What kind of motion would create each graph? Explain why.

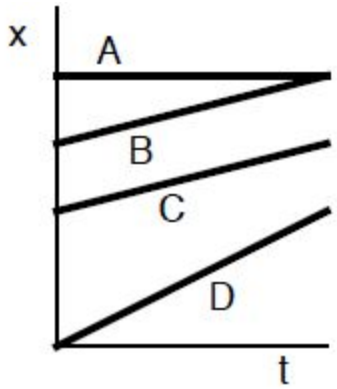


2. Based on the position v.s time graphs below:

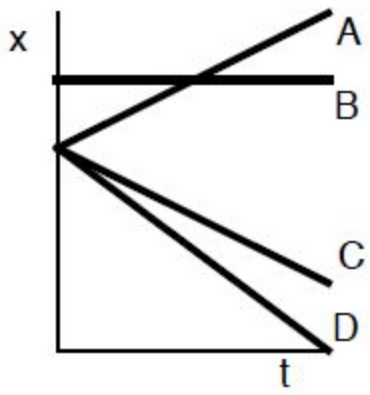
   a. Which of the graphs would be going the fastest?

   b. Which two graphs have the same speed? What is different between these two graphs?

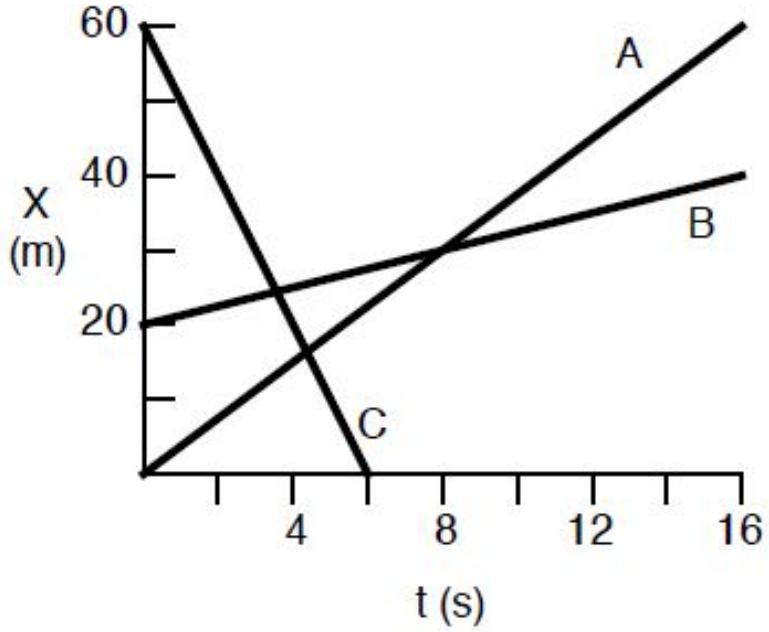
   c. Which graph shows a zero velocity? What does this mean about the object's motion?



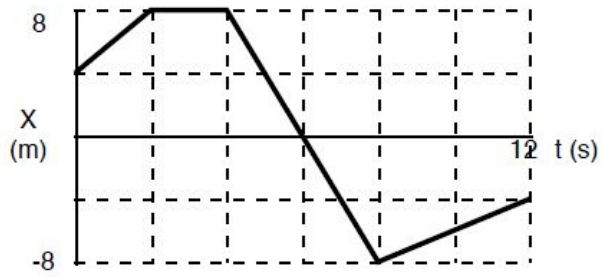
3. Based on the position vs time graphs to the right:
    a. Which of the graphs would be going the fastest?
    b. Which of the graphs have the same speed? Do they have the same velocity? Why or why not?
    c. Which of the graphs is moving towards the ref. pt?

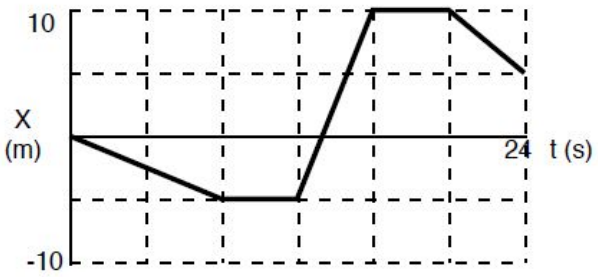


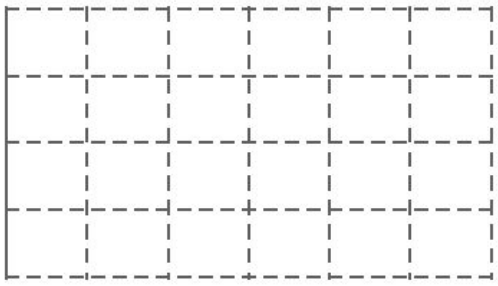
4. There are three different motions in the graph below. For each motion, calculate the velocity.

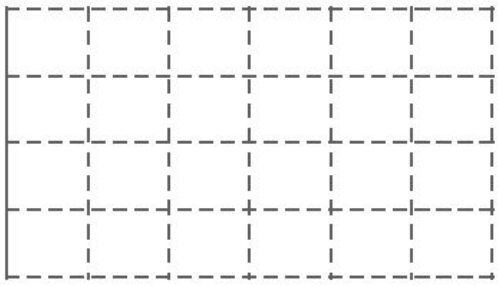


5. For the following position versus time graphs make an appropriate velocity versus time graph. Assume any velocity changes happen in too small a time interval to graph.

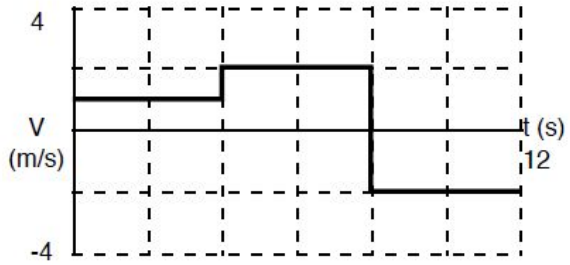


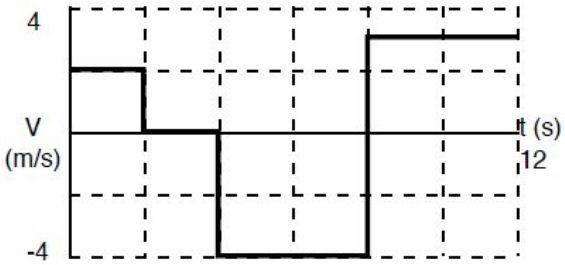


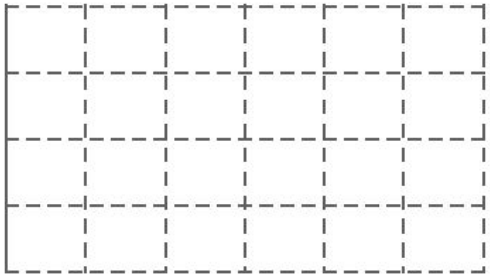


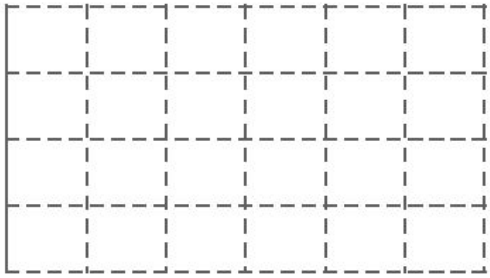


6. For the following velocity versus time graphs, make an appropriate position versus time graph. Assume any velocity changes happen in too small a time to graph. Assume the initial position was x=0 for each graph.

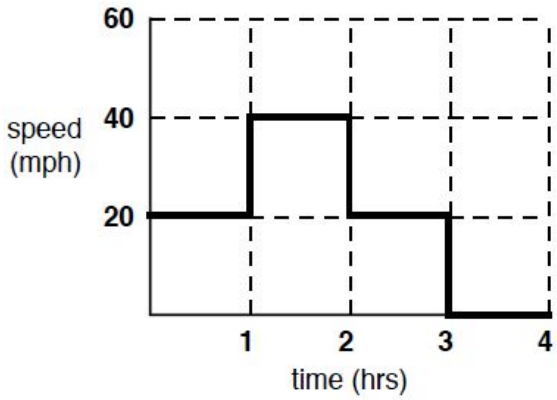








7. The graph shown below represents the speed of car as it travels down a straight road. Make a corresponding position vs. time graph. Could there be more than 1 correct position vs. time graphs for this speed vs. time graph? Explain.



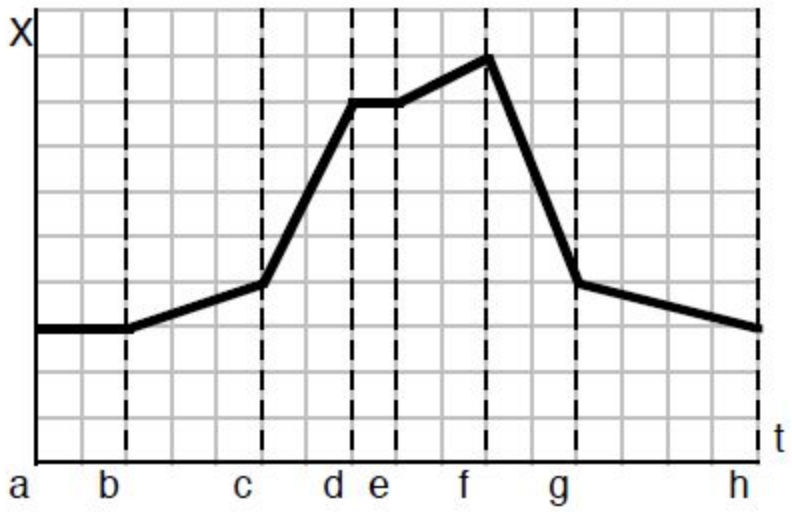
8. For the **position vs. time** graph below:
   a. Where (which intervals) is the object at rest?

   b. Where (which intervals) is the object moving away the reference point?

   c. Where (which intervals) is the object moving towards the reference point?

   d. Where (which interval) is the object going the fastest?

   e. Where (which interval) is the object moving the slowest (but not at rest)

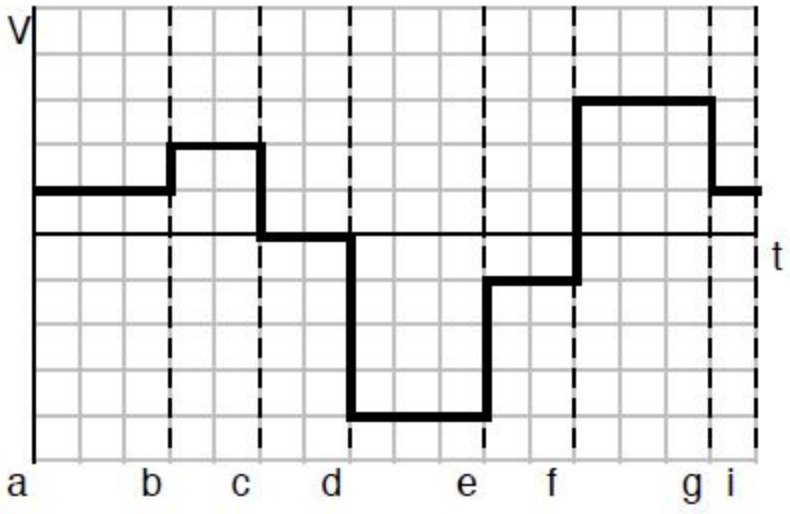


9. For the **velocity vs. time** graph below:
   a. Where (which intervals) is the object at rest?

   b. Where (which intervals) is the object moving away the reference point?

   c. Where (which intervals) is the object moving towards the reference point?

   d. Where (which intervals) is the object going the fastest?



1. a) moving away from the ref point at a constant rate
   b) stopping / not moving
   c) moving towards the ref point at a constant rate
2. a) D
   b) B C, the starting points are different
   c) A, stopped/not moving
3. a) D
   b) A C, different velocities since different direction
   c) C D
4. A = 3.75 m/s
   B = 1.25 m/s
   C = -10 m/s

8. a) AB, DE
   b) BC, CD, EF
   c) FG
   d) BC, GH
9. a) CD
   b) DE, EF
   c) AB, BC, FG, GI
   d) FG