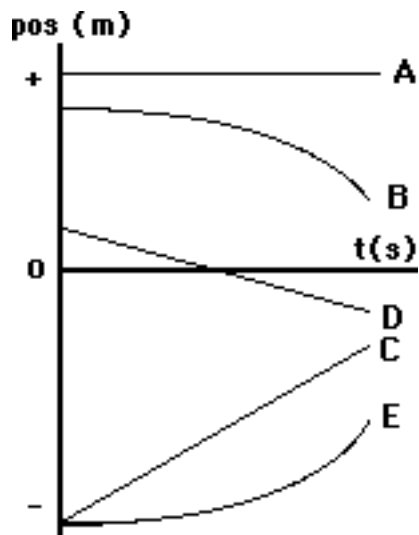


Questions 1-4 are for the position vs. Time graph below

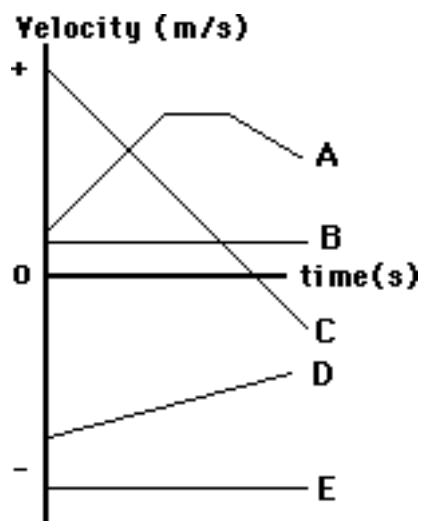
Pre-Test Lab

1. Which person(s) is/are moving with constant velocity?
2. Which person(s) is/are moving in the positive direction?
3. Which person(s) has/have a negative acceleration?
4. Which person(s) change direction during the course of motion?

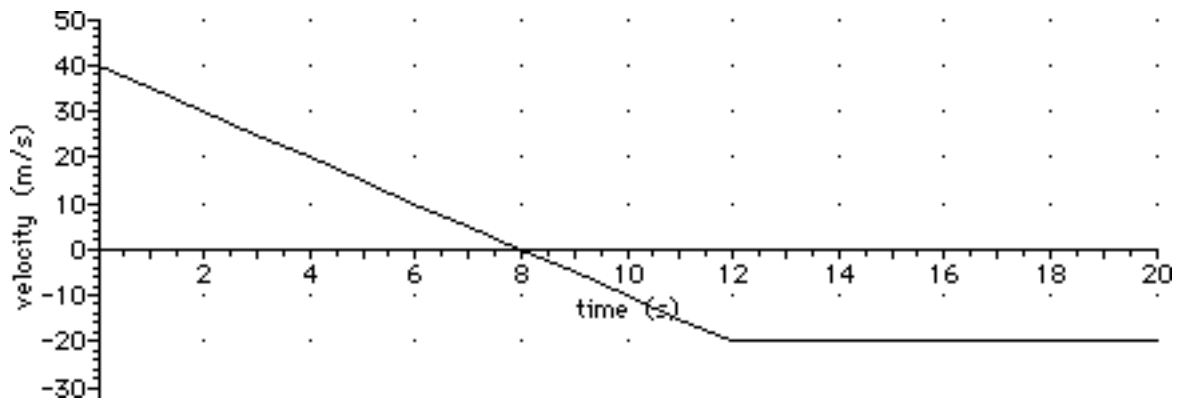


Questions 5-9 are for the Velocity vs. Time graph below

5. Which person(s) changes direction during the time of motion?
6. Which person(s) is/are not moving?
7. Which person has the greatest average speed?
8. Which person(s) has/have a constant, positive acceleration value?
9. Which person has the greatest magnitude of acceleration?



Mathematical Analysis of Graphs: The graph below represents an object's motion for twenty seconds. Use the graph to answer questions 1 - 6



1. Use the graph to calculate the acceleration of the object at 6 seconds.
2. Use the graph to calculate the displacement of the car during the first 8 seconds.
3. Use the graph to calculate the displacement of the object from 8 to 16 seconds.
4. Use the graph to calculate the displacement of the object during the entire 20 second interval.
5. Use the language of physics to describe what happened at  $t = 12$  seconds.
6. Use the language of physics to describe the motion during the entire 20 seconds.

## Vector Lab

Use graph paper or your own paper to show the following vector operations. Use an x-y coordinate system. All angles are measured from the +x axis and rotate ccw.

Let  $\mathbf{A} = 10$  meters, 30 degrees above x-axis  
 $\mathbf{B} = 5$  meters, 45 degrees above x-axis  
 $\mathbf{C} = 8$  meters, 180 degrees from the x-axis (on the negative x-axis)

Solve for

a)  $A_x =$   $A_y =$

b) Verify part 'a' using the Pythagorean Theorem.

b) Sketch vectors  $\mathbf{A}$ ,  $\mathbf{B}$ , and  $\mathbf{C}$  from the origin on a separate piece of graph paper.

c) Show the resultant vector  $\mathbf{R}$  of  $\mathbf{A} + \mathbf{B}$  both graphically (on graph paper) and mathematically (here). (use bracket **and** traditional notation in your answer)

e) Show the resultant vector of  $\mathbf{C} - 2\mathbf{A}$  both graphically (on graph paper) and mathematically (here). (use bracket **and** traditional notation in your answer)

*When done you may work on hw, upscale, or web assign in groups no larger than 3*