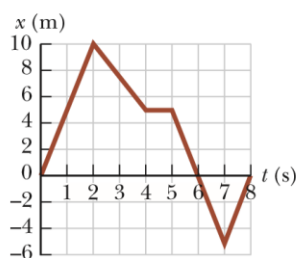


## Conceptual Questions

3. If a car is traveling eastward, can its acceleration be westward? Explain.
9. Two cars are moving in the same direction in parallel lanes along a highway. At some instant, the velocity of car A exceeds the velocity of car B. Does that mean that the acceleration of car A is greater than that of car B? Explain.

## Problems

1. The position versus time for a certain particle moving along the  $x$  axis is shown in Figure P2.1. Find the average velocity in the time intervals (a) 0 to 2 s, (b) 0 to 4 s, (c) 2 s to 4 s, (d) 4 s to 7 s, and (e) 0 to 8 s.



3. A person walks first at a constant speed of 5.00 m/s along a straight line from point A to point B and then back along the line from B to A at a constant speed of 3.00 m/s. (a) What is her average speed over the entire trip? (b) What is her average velocity over the entire trip?
7. A position–time graph for a particle moving along the  $x$  axis is shown in Figure P2.7. (a) Find the average velocity in the time interval  $t = 1.50$  s to  $t = 4.00$  s. (b) Determine the instantaneous velocity at  $t = 2.00$  s by measuring the slope of the tangent line shown in the graph. (c) At what value of  $t$  is the velocity zero?

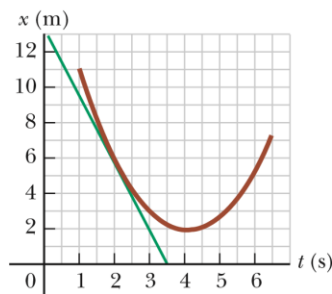


Figure P2.7

12. A car travels along a straight line at a constant speed of 60.0 mi/h for a distance  $d$  and then another distance  $d$  in the same direction at another constant speed. The average velocity for the entire trip is 30.0 mi/h. (a) What is the constant speed with which the car moved during the second distance  $d$ ? (b) **What If?** Suppose the second distance  $d$  were traveled in the opposite direction; you forgot something and had to return home at the same constant speed as found in part (a). What is the average velocity for this trip? (c) What is the average speed for this new trip?

19. A particle starts from rest and accelerates as shown in Figure P2.19. Determine (a) the particle's speed at  $t = 10.0$  s and at  $t = 20.0$  s, and (b) the distance traveled in the first 20.0 s.

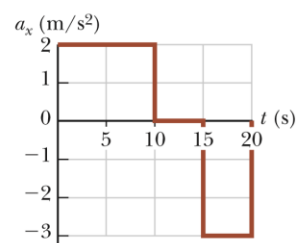


Figure P2.19

21. A particle moves along the  $x$  axis according to the equation  $x = 2.00 + 3.00t - 1.00t^2$ , where  $x$  is in meters and  $t$  is in seconds. At  $t = 3.00$  s, find (a) the position of the particle, (b) its velocity, and (c) its acceleration.
28. A truck covers 40.0 m in 8.50 s while smoothly slowing down to a final speed of 2.80 m/s. (a) Find its original speed. (b) Find its acceleration.
35. The driver of a car slams on the brakes when he sees a tree blocking the road. The car slows uniformly with an acceleration of  $-5.60$  m/s<sup>2</sup> for 4.20 s, making straight skid marks 62.4 m long, all the way to the tree. With what speed does the car then strike the tree?
38. A particle moves along the  $x$  axis. Its position is given by the equation  $x = 2 + 3t - 4t^2$ , with  $x$  in meters and  $t$  in seconds. Determine (a) its position when it changes direction and (b) its velocity when it returns to the position it had at  $t = 0$ .