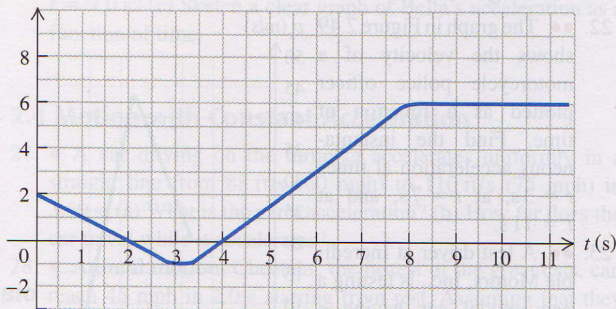


2. ●● A person is walking briskly in a straight line, which we shall call the  $x$  axis. Figure 2.40 shows a graph of the person's position  $x$  along this axis as a function of time  $t$ . (a) What is the person's displacement during each of the following time intervals: (i) between  $t = 1.0$  s and  $t = 10.0$  s, (ii) between  $t = 3.0$  s and  $t = 10.0$  s, (iii) between  $t = 2.0$  s and  $t = 3.0$  s, and (iv) between  $t = 2.0$  s and  $t = 4.0$  s? (b) What distance did the person move from (i)  $t = 0$  s to  $t = 4.0$  s, (ii)  $t = 2.0$  s to  $t = 4.0$  s, and (iii)  $t = 8.0$  s to  $t = 10.0$  s?

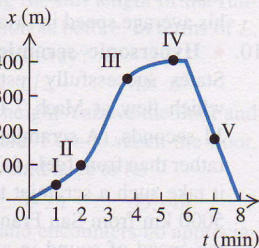
$x$  (m)



▲ FIGURE 2.40 Problem 2.

13. ● Sound travels at a speed of about 344 m/s in air. You see a distant flash of lightning and hear the thunder arrive 7.5 seconds later. How many miles away was the lightning strike? (Assume the light takes essentially no time to reach you.)

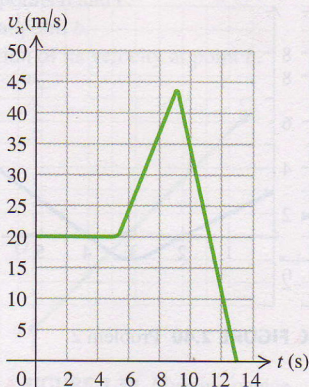
19. ●● A physics professor leaves her house and walks along the sidewalk toward campus. After 5 min, she realizes that it is raining and returns home. The distance from her house as a function of time is shown in Figure 2.46. At which of the labeled points is her velocity



▲ FIGURE 2.46 Problem 19.

- (a) zero? (b) constant and positive? (c) constant and negative? (d) increasing in magnitude? and (e) decreasing in magnitude?

22. ●● The graph in Figure 2.49 shows the velocity of a motorcycle police officer plotted as a function of time. Find the instantaneous acceleration at times  $t = 3$  s, at  $t = 7$  s, and at  $t = 11$  s.



▲ FIGURE 2.49 Problem 22.