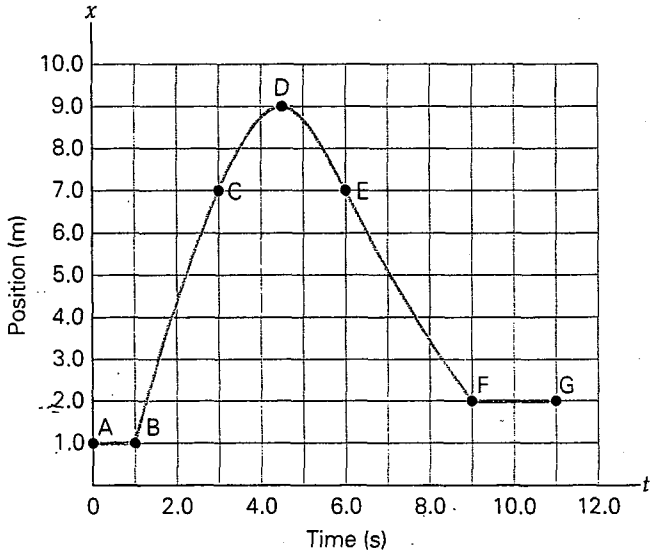
Note Construct X vs. t graphs for Fig 2.23 and Fig 2.24

Name Hoy

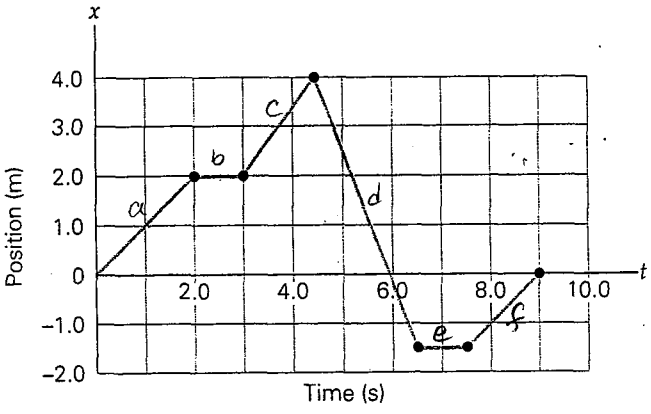
20. ■■ A plot of position versus time is in •Fig. 2.19 for an object in linear motion. (a) What are the average velocities



•**FIGURE 2.19** **Position versus time** See Exercise 20.

for the segments AB, BC, CD, DE, EF, FG, and BG? (b) State whether the motion is uniform or nonuniform in each case. (c) What is the instantaneous velocity at point D? 0 m/s

21. ■■ In demonstrating a dance step, a person moves in one dimension as shown in •Fig. 2.20. What are the (a) average speed and (b) average velocity for each phase of the motion? (c) What are the instantaneous velocities at t = 1.0 s, 2.5 s, 4.5 s, and 6.0 s? (d) What is the average velocity for the interval between t = 4.5 s and t = 9.0 s? [Hint: Recall that the overall displacement is the displacement between the starting point and the ending point.]



•**FIGURE 2.20** **Position versus time** See Exercise 21.

	Avg Speed	avg vel.
a	2/2 = 1 m/s	+1 m/s
b	0 m/s	0 m/s
c	2/1.5 = 1.33 m/s	+1.33 m/s
d	5.5/2 = 2.75 m/s	−2.75 m/s
e	0 m/s	0 m/s
f	1.5/1.5 = 1 m/s	+1 m/s

c) $V_1 = +1$ m/s; $V_{2.5} = 0$ m/s; $V_{4.5} = 0$ m/s; $V_6 = -2.75$ m/s

a) ↑ b) ↑ d) $\bar{V}_{4.5-9} = \frac{0-4}{9-4.5} = -.89$ m/s

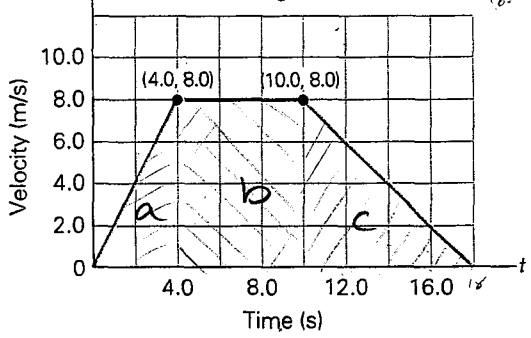
39. ■■ What is the acceleration for each graph segment in •Fig. 2.23? Describe the motion of the object over the total time interval.

$a_{0-4} = \frac{8-0}{4-0} = 2\ m/s^2$

$a_{4-10} = 0\ m/s^2$

$a_{10-18} = \frac{0-8}{18-10} = -1\ m/s^2$

accelerates from 0 m/s to 8 m/s in 4 s for 6 sec then at 8 m/s then decelerates to 0 m/s after 8 more sec



•**FIGURE 2.23** **Velocity versus time** See Exercises 39 and 61.

ΔX = area = $\frac{1}{2}bh = \frac{1}{2}(4s)(8\ m/s) = 16$ m

ΔX = area = $l \cdot w = (6s)(8\ m/s) = 48$ m

$\Delta X = \frac{1}{2}bh = \frac{1}{2}(8s)(8\ m/s) = 32$ m

61. ■■ Compute the distance traveled for the motion represented by Fig. 2.23.

$X_{total} = 16 + 48 + 32 = 96$ m

16
48
64
+32
96

40. ■■ •Figure 2.24 shows a plot of velocity versus time for an object in linear motion. (a) Compute the acceleration for each phase of motion. (b) Describe how the object moves during the last time segment.

a) $a_{0-1} = 0\ m/s^2$

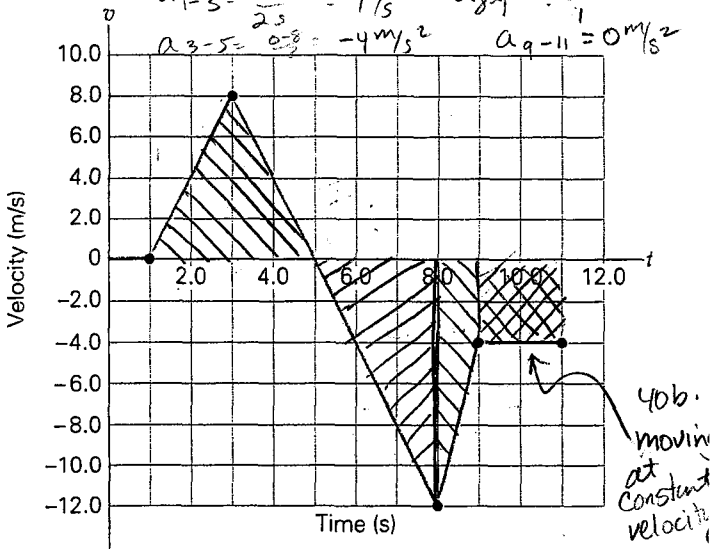
$a_{1-3} = \frac{8-0\ m/s}{2\ s} = 4\ m/s^2$

$a_{3-5} = \frac{0-8}{2} = -4\ m/s^2$

$a_{5-8} = \frac{-12-0}{8-5} = \frac{-12}{3} = -4\ m/s^2$

$a_{8-9} = \frac{-4-(-12)}{1} = +8\ m/s^2$

$a_{9-11} = 0\ m/s^2$



•**FIGURE 2.24** **Velocity versus time** See Exercises 40 and 62.

62. ■■■ Figure 2.24 shows velocity versus time for an object in linear motion. (a) What are the instantaneous velocities at t = 8.0 s and t = 11.0 s? (b) Compute the total displacement of the object. (c) Compute the total distance the object travels.

a) $V_8 = -12.0$ m/s $V_{11} = -4.0$ m/s

b) see graph page