3.2 Concepts and Vocabulary *(page 236)*

3. vertical **4.** 5; −3 **5.** $a = -2$ **6.** False **7.** False **8.** True

3.2 Exercises *(page 236)*

9. **(a)** $f(0) = 3; f(-6) = -3$ **(b)** $f(6) = 0; f(11) = 1$ **(c)** Positive **(d)** Negative **(e)** $-3, 6,$ and 10 **(f)** $-3 < x < 6; 10 < x \le 11$
(g) $\{x | -6 \le x \le 11\}$ **(h)** $\{y | -3 \le y \le 4\}$ **(i)** $-3, 6, 10$ **(j)** 3 **(k)** 3 times **(l)** once **(m)** $0, 4$ **(n)** $-5, 8$

10. **(a)** $f(0) = 0; f(6) = 0$ **(b)** $f(2) = -2; f(-2) = 1$ **(c)** Negative **(d)** Positive **(e)** $0, 4,$ and 6 **(f)** $0 < x < 4$
(g) $\{x | -4 \le x \le 6\}$ **(h)** $\{y | -2 \le y \le 3\}$ **(i)** $0, 4, 6$ **(j)** 0 **(k)** twice **(l)** once **(m)** 5 **(n)** 2 **11.** Not a function

12. Function **(a)** Domain: all real numbers; Range: $\{y | 0 < y < \infty\}$ **(b)** $(0, 1)$ **(c)** None

13. Function **(a)** Domain: $\{x | -\pi \le x \le \pi\}$; Range: $\{y | -1 \le y \le 1\}$ **(b)** $\left(-\frac{\pi}{2}, 0\right), \left(\frac{\pi}{2}, 0\right), (0, 1)$ **(c)** y-axis

14. Function **(a)** Domain: $\{x | -\pi \le x \le \pi\}$; Range: $\{y | -1 \le y \le 1\}$ **(b)** $(-\pi, 0), (\pi, 0), (0, 0)$ **(c)** origin **15.** Not a function

16. Not a function **17.** Function **(a)** Domain: $\{x | x > 0\}$; Range: all real numbers **(b)** $(1, 0)$ **(c)** None

18. Function **(a)** Domain: $\{x | 0 \le x \le 4\}$; Range: $\{y | 0 \le y \le 3\}$ **(b)** $(0, 0)$ **(c)** None

19. Function **(a)** Domain: all real numbers; Range: $\{y | y \le 2\}$ **(b)** $(-3, 0), (3, 0), (0, 2)$ **(c)** y-axis

20. Function **(a)** Domain: $\{x | x \ge -3\}$; Range: $\{y | y \ge 0\}$ **(b)** $(-3, 0), (0, 2), (2, 0)$ **(c)** None

21. Function **(a)** Domain: all real numbers; Range: $\{y | y \ge -3\}$ **(b)** $(1, 0), (3, 0), (0, 9)$ **(c)** None

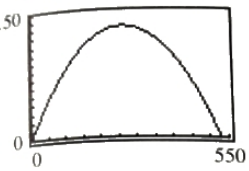
22. Function **(a)** Domain: all real numbers; Range: $\{y | y \le 5\}$ **(b)** $(-1, 0), (2, 0), (0, 4)$ **(c)** None

23. **(a)** Yes **(b)** $f(-2) = 9; (-2, 9)$ **(c)** $0, \frac{1}{2}; (0, -1), \left(\frac{1}{2}, -1\right)$ **(d)** All real numbers **(e)** $-\frac{1}{2}, 1$ **(f)** -1

24. **(a)** No **(b)** $f(-2) = -22; (-2, -22)$ **(c)** $-\frac{1}{3}, 2; \left(-\frac{1}{3}, -2\right), (2, -2)$ **(d)** All real numbers **(e)** $0, \frac{5}{3}$ **(f)** 0

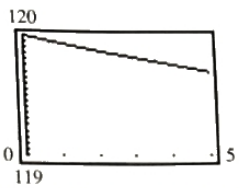
25. **(a)** No **(b)** $f(4) = -3; (4, -3)$ **(c)** $14; (14, 2)$ **(d)** $\{x | x \neq 6\}$ **(e)** -2 **(f)** $-\frac{1}{3}$ **26. (a)** Yes **(b)** $f(0) = \frac{1}{2}; \left(0, \frac{1}{2}\right)$ **(c)** $0, \frac{1}{2}; \left(0, \frac{1}{2}\right), \left(\frac{1}{2}, \frac{1}{2}\right)$ **(d)** $\{x | x \neq -4\}$ **(e)** none **(f)** $\frac{1}{2}$ **27. (a)** Yes **(b)** $f(2) = \frac{8}{17}; \left(2, \frac{8}{17}\right)$ **(c)** $-1, 1; (-1, 1), (1, 1)$ **(d)** All real numbers **(e)** 0 **(f)** 0 **28. (a)** Yes **(b)** $f(4) = 4; (4, 4)$ **(c)** $-2; (-2, 1)$ **(d)** $\{x | x \neq 2\}$ **(e)** 0 **(f)** 0

29. **(a)** About 81.07 ft **(b)** About 129.59 ft
(c) About 26.63 ft **(d)** About 528.13 ft
(e)



(f) 115.07 ft and 413.05 ft
(g) 275 ft; maximum height shown in the table is 131.8 ft
(h) 264 ft

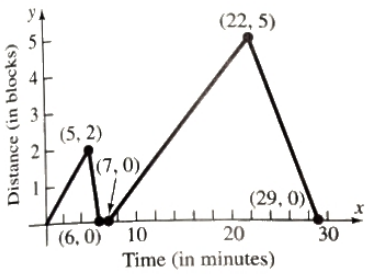
30. (a) About 119.84 pounds
(b)



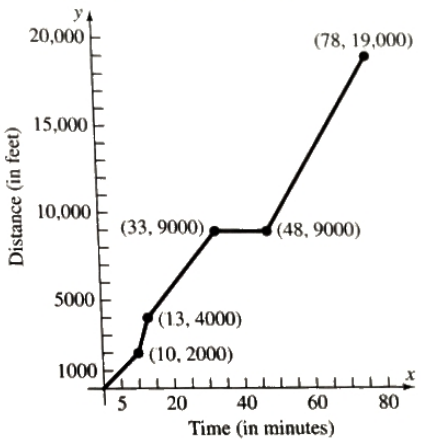
(c) The weight W varies from 120 pounds to about 119.7 pounds.
(d) About 0.83 miles

31. **(a)** III **(b)** IV **(c)** I **(d)** V **(e)** II **32. (a)** II **(b)** V **(c)** IV **(d)** III **(e)** I

33.



34.



35. **(a)** 2 hr elapsed during which Kevin was between 0 and 3 mi from home. **(b)** 0.5 hr elapsed during which Kevin was 3 mi from home **(c)** 0.3 hr elapsed during which Kevin was between 0 and 3 mi from home. **(d)** 0.2 hr elapsed during which Kevin was 0 mi from home **(e)** 0.9 hr elapsed during which Kevin was between 0 and 2.8 mi from home. **(f)** 0.3 hr elapsed during which Kevin was 2.8 mi from home. **(g)** 1.1 hr elapsed during which Kevin was between 0 and 2.8 mi from home. **(h)** 3 mi **(i)** 2 times

36. **(a)** $(7, 7.4)$ **(b)** $(4.2, 6)$ **(c)** Increasing from 0 to 30 mi/hr **(d)** 0 mi/hr **(e)** 50 mi/hr **(f)** $(2, 4), (4.2, 6), (7, 7.4), (7.6, 8)$

37. All points $(5, y)$ and $(x, 0)$ are excluded. **39.** The x-intercepts can number anywhere from 0 to infinitely many. There is at most one y-intercept. **40.** yes **41.** yes; $f(x) = 0$