

Answers for 9.8

For use with pages 610–614

9.8 Skill Practice

- The polynomial is written as a monomial or as a product of a monomial and one or more prime polynomials.
- A polynomial with integer coefficients is not factorable if it cannot be written as the product of polynomials of lesser degree using only integer coefficients and constants, and if the only common factors of its terms are 1 and -1 .
- $(x - 8)(x + 1)$
- $(y + 3)(5y - 2)$
- $(z - 4)(6z - 7)$
- $(a - 6)(10 - 3a)$
- $(b + 5)(b^2 - 3)$
- $(c + 9)(7c^2 + 2)$
- $(x + 13)(x - 1)$
- $(y - 4)(y^2 - 5)$
- $(z - 1)(12 + 5z^2)$
- C
- $(x + 1)(x^2 + 2)$
- $(y - 9)(y^2 + 1)$
- $(z - 4)(z^2 + 3)$
- $(c + 7)(c^2 + 5)$
- $(a + 13)(a^2 - 5)$
- $(2s - 3)(s^2 + 9)$
- $(5n - 4)(n^2 + 5)$
- $(x + 8)(x - y)$
- $(y + 1)(y + 5x)$
- -6 , not $+6$, was the common monomial factored out of the third and fourth terms of the polynomial, so the sign between the two groups of factors should be $-$ not $+$; $(a + 8)(a^2 - 6)$.
- $x^2(x - 1)(x + 1)$
- $4a^2(3a - 1)(3a + 1)$
- $3n^3(n - 4)(n + 4)$
- $4y^4(y - 2)(y + 2)$
- $3c^7(5c - 1)(5c + 1)$
- $2p(6 - p)(6 + p)$
- $8s^2(2s - 1)(2s + 1)$
- $5z^6(4z - 3)(4z + 3)$
- cannot be factored
- $6g(g - 2)$
- $3w^2(w + 4)^2$
- $3r^3(r + 6)(r - 5)$
- $(b - 5)(b - 2)(b + 2)$
- $(h + 4)(h - 5)(h + 5)$
- $(9t - 1)(t^2 + 2)$

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- 38.** $2x^3y(x - 9)(x + 9)$
- 39.** $7ab^3(a - 3)(a + 3)$
- 40.** $-4st(st - 3)^2$
- 41.** D
- 42.** The factorization is correct, but the polynomial has not been factored completely. The binomial factor $(x^2 - 9)$ can be factored using the difference of two squares patterns;
 $(x - 6)(x - 3)(x + 3)$.
- 43.** $-1, \pm 2$ **44.** $11, \pm 3$
- 45.** $\frac{7}{4}, \pm 2$ **46.** $0, 2, 4$
- 47.** $0, -5, -3$ **48.** $0, -9, 8$
- 49.** $0, \pm 9$ **50.** $0, \pm 10$
- 51.** $0, \pm 2$ **52.** $5, \pm 2$
- 53.** $-\frac{1}{3}, \pm 1$ **54.** $3, \pm 2$
- 55.** No; when the polynomial is factored completely, the equation becomes $(x + 2)(x^2 + 3) = 0$. When the factor $x^2 + 3$ is set equal to zero, the resulting equation, $x^2 + 3 = 0$, or $x^2 = -3$, has no real number solutions because x^2 cannot be negative.
- 56.** 6 in., 1 in., 2 in.
- 57.** 12 ft, 4 ft, 2 ft
- 58.** $(x + 2y)(x - 1)(x + 1)$
- 59.** $(2b - a)(2b - 3)(2b + 3)$
- 60.** $(4s - 1)(s + 3t)$
- 61.** $(3x + 4)(2x - 1)$
- 62.** $(2s + 3)(5s + 2)$
- 63.** $(4n - 3)(3n - 1)$
- 64.** $(8a + 3)(2a + 1)$
- 65.** $(3w + 2)(7w - 2)$
- 66.** $(3y - 5)(5y - 2)$
- 67.** First, rewrite the middle term as $ab + ab$ and group the terms:
 $a^2 + 2ab + b^2 = (a^2 + ab) + (ab + b^2)$. Factor each group and then use the distributive property to factor out the common binomial: $(a^2 + ab) + (ab + b^2)$
 $= a(a + b) + b(a + b)$
 $= (a + b)(a + b) = (a + b)^2$.
- 9.8 Problem Solving**
- 68.** 2 in.
- 69.** a. $4w^2 + 16w$
b. 4 in. long by 4 in. wide by 8 in. high
- 70.** 16 in. long by 6 in. wide by 12 in. high

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71. a. 1, about -0.2

b. The zero $t \approx -0.2$ has no meaning because t , which represents time in seconds, cannot be negative in this situation. The zero $t = 1$ means the ball hits the ground 1 second after you throw it.

72. a. 1.5 ft

b. 3 ft; to find how far the robot has traveled horizontally when it lands back on the ground, find the non-zero x -value that makes the height y equal to zero. Solve $0 = -10x^2 + 30x$; the roots are $x = 0$ feet (which is the starting point of the jump) and $x = 3$ feet (which is the ending point of the jump).

73. a. $-h^3 + 5h^2 + 36h$

b. 4 in. long by 9 in. wide by 5 in. high, 3 in. long by 10 in. wide by 6 in. high

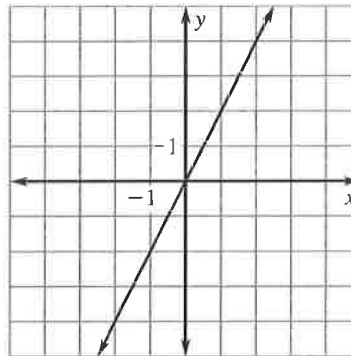
c. 4 in. long by 9 in. wide by 5 in. high; the 4-inch long box has a surface area of 202 square inches and the 3-inch long box has a surface area of 216 square inches.

74. a. 3 in.

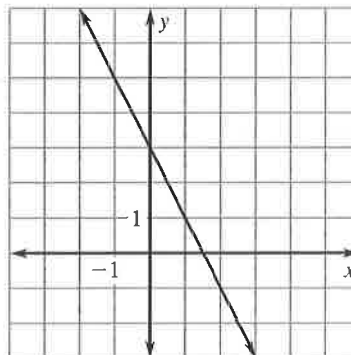
b. 27 in.^3 ; the thickness of the plastic used to make the sides of the box will make the edge length of the interior of the cube be less than 3 inches, so the volume of the interior will be less than 27 cubic inches.

9.8 Mixed Review

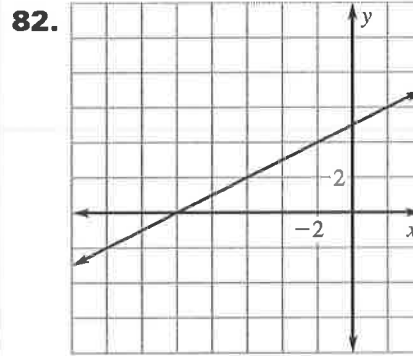
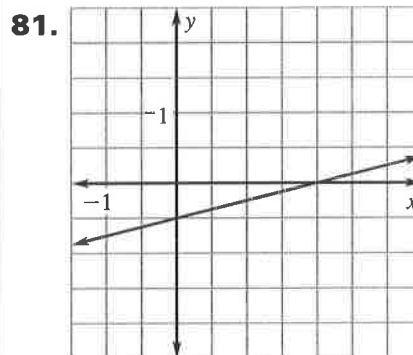
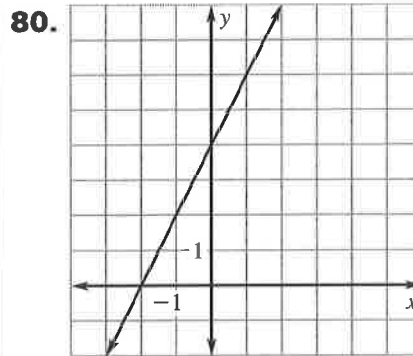
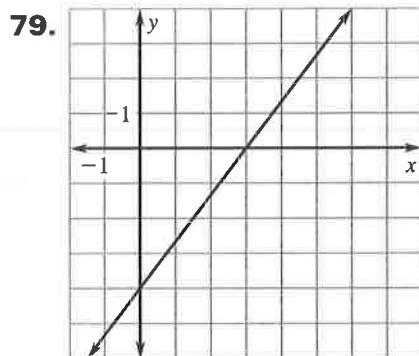
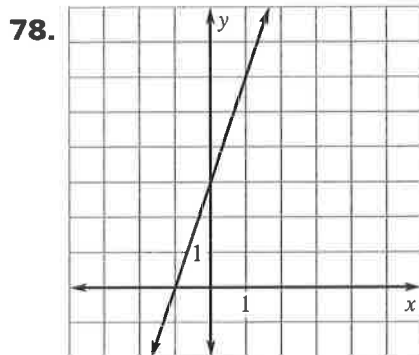
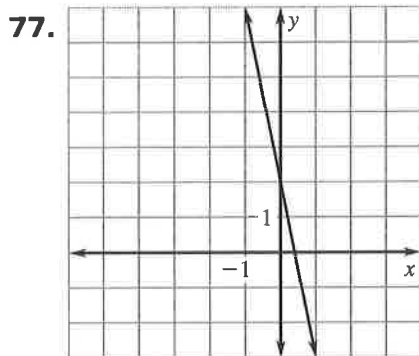
75.



76.

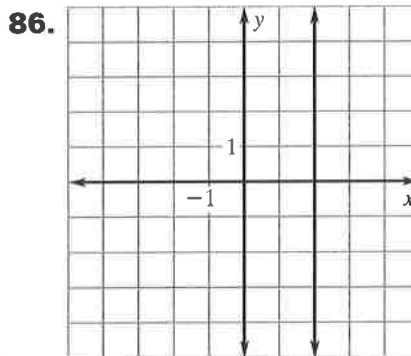
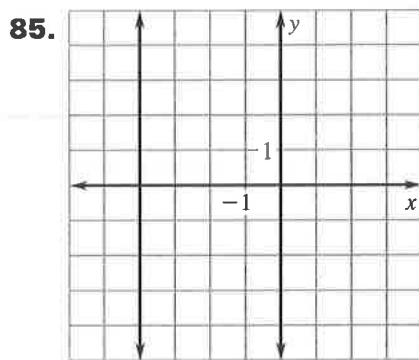
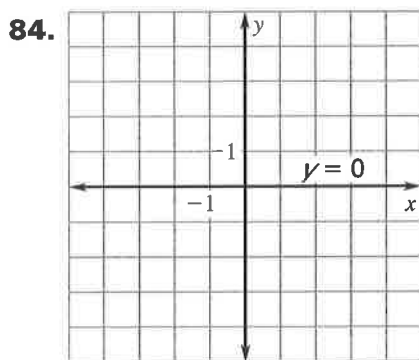
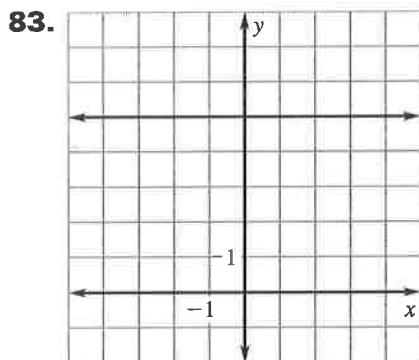


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87. $y = 2x$

88. $y = \frac{5}{3}x$

89. $y = x + 1$

9.5–9.8 Mixed Review of Problem Solving

1. a. $w^2 + 5w$

b. 15 ft, 10 ft

2. a. $x^3 + 5x^2 - 36x$

b. 15 in., 6 in., 2 in.

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3. a. $x^2 - 8x + 16$

- b. 196 in.^2 ; set the area polynomial from part (a) equal to 100 and solve for x . There are two solutions, $x = 14$ and $x = -6$. Because the x represents a length in this situation, x cannot be negative, so disregard the solution $x = -6$. The length of a side of the original piece of wood is 14 inches, so its area is $14^2 = 196$ square inches.

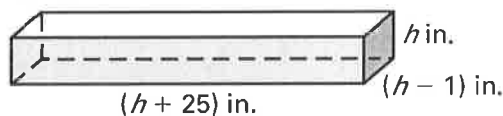
4. *Sample answer:* A ball is kicked from the ground with an initial vertical velocity of 48 feet per second; 0, 3; the starting time is 0, the ball lands back on the ground after 3 seconds.

5. a. $h = -16t^2 + 80t + 3$

b. 2 sec

- c. Yes; to find the values of t for which the height is 99 feet, solve the equation $99 = -16t^2 + 80t + 3$. The equation has two solutions $t = 2$ and $t = 3$, so the ball reaches the height of 99 feet twice, after 2 seconds and after 3 seconds.

6. a.



b. $h^3 - 24h^2 - 25h$

- c. 120 in.^2 ; to find the height h of the box, set the volume polynomial from part (b) equal to 600 and solve for h ; the only positive solution is $h = 5$ inches, so the length and width of the top of the box are $h + 25 = 5 + 25 = 30$ inches and $h - 1 = 5 - 1 = 4$ inches. So the area of the top of the box is $30(4) = 120$ square inches.

7. No; we are not given the initial height from which the ball is hit. We do not know the value of s in the vertical motion model $h = -16t^2 + vt + s$.

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8. 3 sec;

			3
	/	/	
*	*	*	*
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	●
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

9. 100 ft. *Sample answer:*

Replacing y in the equation $y = -0.005x^2 + 0.6x$ with 10 and solving for x gives $x = 20$ and $x = 100$. The lesser value is the distance from the kicker while the ball is on its way up and the greater value is the distance while the ball is on its way down. So the kicker is 100 feet from the goal post.

Answer Key

Lesson 9.8

Practice Level B

1. $(4x - 3)(x + 5)$ 2. $(12 - 2a)(a - 3)$
3. $(w^2 - 5)(w + 8)$ 4. $(2b^2 + 3)(b + 6)$
5. $(y - 1)(x + 15)$ 6. $(3x - 6)(y + 4)$
7. $(x^2 + 5)(x + 1)$ 8. $(y^2 + 1)(y - 14)$
9. $(m^2 + 2)(m - 6)$ 10. $(p^2 + 4)(p + 9)$
11. $(t^2 - 2)(t + 12)$ 12. $(3n^2 + 1)(n - 1)$
13. $7x^2(x + 4)$ 14. $4m(m - 2)(m + 2)$
15. $-2p(8p^2 + 1)$ 16. $6r^2(8r - 5)$
17. $15y(1 - 4y)$ 18. $6x(3y - 4x)$
19. $5(m^2 + 4m + 8)$ 20. $6(x + 5)(x - 4)$
21. $4z(z - 2)(z + 1)$ 22. $9(x^3 + 4x^2 + 4)$
23. $(x^2 + 5)(x + 1)$ 24. $(d^2 + 5)(d + 4)$
25. $-4, -2$ 26. $-5, 5$ 27. $\frac{7}{2}$ 28. $-\frac{1}{2}, -1$
29. $\frac{4}{3}$ 30. $-\frac{5}{3}$ 31. $2(2x + 3)(x + 1)$
32. a. $8\pi r^2 - 32\pi = 0$ b. 2 cm
33. a. $-16t^2 + 8t + 2$ b. 2.64 ft c. 3 ft d. about 0.7 sec