

## Answers for Lesson 11-1, pp. 619–621 Exercises

- |   |                              |                             |
|---|------------------------------|-----------------------------|
| 1. $10\sqrt{2}$   | 2. $7\sqrt{2}$               | 3. $5\sqrt{3}$              |
| 4. $-4\sqrt{5}$   | 5. $-6\sqrt{30}$             | 6. $40\sqrt{5}$             |
| 7. $2n\sqrt{7}$   | 8. $6b^2\sqrt{3}$            | 9. $6x\sqrt{3}$             |
| 10. $2n\sqrt{n}$  | 11. $2a^2\sqrt{5a}$          | 12. $-4b^2\sqrt{3}$         |
| 13. 20  | 14. 18                       | 15. $11\sqrt{2}$            |
| 16. $84\sqrt{3}$  | 17. $7\sqrt{3}$              | 18. $-30\sqrt{3}$           |
| 19. $6n\sqrt{2}$  | 20. $14t\sqrt{2}$            | 21. $3x^2\sqrt{17}$         |
| 22. $80t^3$   | 23. $3a^3\sqrt{2}$           | 24. $-6a^2\sqrt{2}$         |
| 25. 3 mi  | 26. 12 mi                    | 27. 17 mi                   |
| 28. $\frac{\sqrt{21}}{7}$   | 29. $\frac{3\sqrt{3}}{2}$    | 30. $\frac{5}{2}$           |
| 31. $\frac{2\sqrt{30}}{11}$   | 32. $\frac{\sqrt{5}}{3a}$    | 33. $\frac{\sqrt{7}}{4c}$   |
| 34. $\frac{5\sqrt{3a}}{7}$  | 35. $\frac{2n\sqrt{2n}}{9}$  | 36. $\sqrt{3}$              |
| 37. $\frac{3}{2}$   | 38. $2\sqrt{3}$              | 39. $-2\sqrt{5}$            |
| 40. $2x\sqrt{7}$  | 41. $\frac{s}{3}$            | 42. $\frac{a^2\sqrt{3}}{2}$ |
| 43. $\frac{3}{y}$   | 44. $\frac{3\sqrt{2}}{2}$    | 45. $\sqrt{5}$              |
| 46. $\frac{\sqrt{21x}}{7x}$   | 47. $\frac{2\sqrt{10n}}{5n}$ | 48. $\frac{9\sqrt{2}}{4}$   |
| 49. $2\sqrt{3}$   | 50. $\frac{\sqrt{2b}}{b}$    | 51. $\frac{\sqrt{55y}}{2y}$ |
| 52. not simplest form; radical in the denominator of a fraction         |                              |                             |
| 53. not simplest form; radical in the denominator of a fraction         |                              |                             |
| 54. Simplest form; radicand has no perfect-square factors other than 1. |                              |                             |
| 55. Simplest form; radicand has no perfect-square factors other than 1. |                              |                             |

**Answers for Lesson 11-1, pp. 619–621 Exercises (cont.)**

**56. a.**  $\sqrt{18 \cdot 10} = \sqrt{180} = \sqrt{36} \cdot \sqrt{5} = 6\sqrt{5}$

**b.** Answers may vary. Sample:  $a = 36, b = 5; a = 9, b = 20$ 

**57.** 30

**58.**  $2\sqrt{13}$

**59.**  $\frac{3\sqrt{2}}{4}$

**60.**  $\frac{-2\sqrt{a}}{a^2}$

**61.**  $2\sqrt{15}$

**62.**  $\frac{x\sqrt{y}}{y^2}$

**63.**  $-\sqrt{3}$

**64.**  $4\sqrt{5}$

**65.**  $2ab\sqrt{5b}$

**66.**  $ab^2c\sqrt{abc}$

**67.**  $\frac{\sqrt{3m}}{4m}$

**68.**  $\frac{8\sqrt{6a}}{3a}$

**69.**  $-3 \pm 3\sqrt{2}$

**70.**  $1 \pm \sqrt{5}$

**71.**  $\frac{2 \pm \sqrt{10}}{3}$

**72. a.**  $\sqrt{50} = \sqrt{25 \cdot 2} = \sqrt{25} \cdot \sqrt{2} = 5\sqrt{2}$

**b.** The radicand has no perfect-square factors other than 1.**73.** Answers may vary. Sample: 12, 27, 48.

**74. a.**  $2\sqrt{6}$  in.

**b.** 4.90 in.

**75.**  $12x$

**76.**  $10b^2$

**77.**  $30a^4$

**78.**  $\pi$  seconds

**Answers for Lesson 11-2, pp. 625–627 Exercises**

1.  $5\sqrt{6}$
2.  $18\sqrt{10}$
3.  $-2\sqrt{5}$
4.  $2\sqrt{7}$
5.  $14\sqrt{2}$
6.  $-8\sqrt{3}$
7. yes
8. yes
9. no
10.  $4\sqrt{2}$
11.  $-3\sqrt{3}$
12.  $4\sqrt{2}$
13.  $-2\sqrt{5}$
14.  $\sqrt{7}$
15.  $8\sqrt{10}$
16.  $4 - 4\sqrt{2}$
17.  $9 + \sqrt{3}$
18.  $6 - 2\sqrt{3}$
19.  $3\sqrt{5} + 2\sqrt{3}$
20.  $3\sqrt{2} + 6$
21.  $6 - 5\sqrt{6}$
22.  $-9 - 14\sqrt{6}$
23.  $58 - 10\sqrt{30}$
24.  $11 - 4\sqrt{7}$
25.  $43 + 4\sqrt{30}$
26.  $32 + 9\sqrt{11}$
27.  $23 - 5\sqrt{13}$
28.  $2\sqrt{7} + 2\sqrt{3}$
29.  $-6\sqrt{2}$
30.  $-4\sqrt{6} - 12\sqrt{2}$
31.  $\frac{3\sqrt{10} + 3\sqrt{5}}{5}$
32.  $-5\sqrt{11} - 5\sqrt{3}$
33.  $18\sqrt{3} + 9\sqrt{11}$
34.  $10\sqrt{2} + 10$ ; 24.1
35.  $-\frac{4}{3}$ ;  $-1.3$
36.  $6 - 4\sqrt{2}$ ; 0.3
37. 7.4 ft
38.  $5\sqrt{10}$
39.  $6\sqrt{2} + 6\sqrt{3}$
40.  $22\sqrt{3} - 6$
41.  $8 + 2\sqrt{15}$
42.  $\frac{13 + \sqrt{65} + \sqrt{130} + 5\sqrt{2}}{8}$
43.  $15 + 4\sqrt{14}$
44.  $-24$
45.  $-\sqrt{2}$
46.  $4\sqrt{3} + 4\sqrt{2} + 3\sqrt{6} + 6$
47.  $\frac{\sqrt{10}}{5}$
48.  $8\sqrt{2}$  units
49.  $(10 + 10\sqrt{2})$  units
50.  $6\sqrt{10}$  units
51.  $(4x + x\sqrt{10})$  units

**Answers for Lesson 11-2, pp. 625–627 Exercises (cont.)**

52. Answers may vary. Sample:

$$8\sqrt{2} + 4\sqrt{3}, 2\sqrt{7} + 9\sqrt{3}, 6\sqrt{5} + 3\sqrt{7}$$

53. a. The student simplified  $\sqrt{48}$  as  $2\sqrt{24}$  instead of  $2\sqrt{12}$  or  $4\sqrt{3}$ .

b.  $2\sqrt{6} + 4\sqrt{3}$

54. a.  $2\sqrt{2}$  or 2.8 ft

b.  $s\sqrt{2}$

55. 9.1%

56. 12.8%

57. 15.5%

58. a.  $x^{\frac{n}{2}}$

b.  $x^{\frac{n-1}{2}}\sqrt{x}$

59.  $\frac{\sqrt{ab}}{b}$

60. about 251 years

61. They are unlike radicals.

62. a. 1, 0, 1, 1;

4, 1, 5,  $\sqrt{17}$ ;

5, 3, 8,  $\sqrt{34}$ ;

8, 6, 14, 10;

10, 9, 19,  $\sqrt{181}$

b. No; the only values it worked for were 0 and 1.

63.  $\sqrt{a+b} \neq \sqrt{a} + \sqrt{b}$

64.  $\frac{9\sqrt{2}}{2}$

65.  $\frac{23\sqrt{7}}{21}$

66.  $\frac{8\sqrt{15}}{15}$

67. 2

68.  $10\sqrt{2}$

69. 70

70.  $2\sqrt{2} - \sqrt{6} - \sqrt{3} + 3$

71. a.  $2\sqrt{6}$

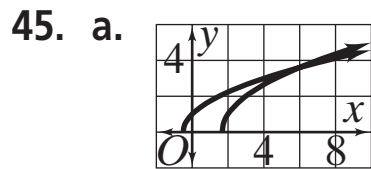
b.  $2\sqrt{13}$

c.  $\sqrt{2(p+q)}$

## Answers for Lesson 11-3, pp. 632–633 Exercises

- |                      |                       |                           |
|----------------------|-----------------------|---------------------------|
| 1. 4                 | 2. 49                 | 3. 36                     |
| 4. 137               | 5. 15                 | 6. 16                     |
| 7. 576 ft            | 8. 602 watts          | 9. 4.5                    |
| 10. 3                | 11. 7                 | 12. $-2$                  |
| 13. 4                | 14. 2.5               | 15. 2                     |
| 16. $-4$             | 17. none              | 18. $-\frac{1}{2}$        |
| 19. $-7$             | 20. none              | 21. 3                     |
| 22. 5                | 23. no solution       | 24. 2                     |
| 25. no solution      | 26. 4                 | 27. 1.25 or $\frac{5}{4}$ |
| 28. $\frac{1}{4}, 1$ | 29. a. 25<br>b. 11.25 | 30. about 2.5 in.         |
31. An extraneous solution is a solution of a new equation that does not satisfy the original equation.
32. Answers may vary. Sample:  $x - 2 = \sqrt{7 - 2x}$ ,  $\sqrt{3x} = 3$
- |                 |                 |                 |
|-----------------|-----------------|-----------------|
| 33. 1600 ft     | 34. 3           | 35. no solution |
| 36. no solution | 37. 1, 6        | 38. 1.5         |
| 39. 11          | 40. 0, 12       | 41. 3, 6        |
| 42. 44          | 43. no solution |                 |
44. a. 68 ft  
b. 20.5 mi/h  
c. As radius increases, velocity decreases.  
As height decreases, velocity decreases.  
d. Velocity depends upon the difference of the height and the radius.

**Answers for Lesson 11-3, pp. 632–633 Exercises (cont.)**



- b. approximately (6, 3.6)  
c. 6; it is the  $x$ -coordinate of the point of intersection.

46. a.  $V = 10x^2$   
b.  $x = \sqrt{\frac{V}{10}}$   
c. 2, 3, 4, 5, 6, 7

47. a.  $-\sqrt{7}, \sqrt{7}$   
b. 49  
c. In both cases 3 is added to each side. To solve the first equation you find the square roots of each side, and in the second equation you find the square of each side.

48.  $-2, 8$

49. 0

50. no solution

51.  $-1$

52. Subtract  $\sqrt{2x}$  from each side. Square both sides. Solve for  $x$ . Check the solution if there is one.

53. The square of  $\sqrt{x-1}$  will have only 2 terms while  $\sqrt{x-1}$  squared will have 3 terms.

54. a. about 2.0 m  
b. about 32.4 m

## Answers for Lesson 11-4, pp. 640–643 Exercises

1.  $x \geq 2$

2.  $x \geq \frac{3}{4}$

3.  $x \geq 0$

4.  $x \geq -7$

5.  $x \geq -3$

6.  $x \geq 5$

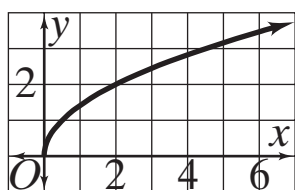
7.  $x \geq -\frac{5}{3}$

8.  $x \geq -2$

9.  $x \geq \frac{4}{3}$

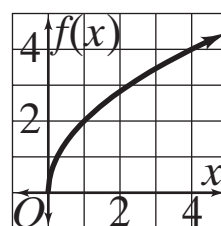
10.

$x$	$y$
0	0
2	2
4.5	3



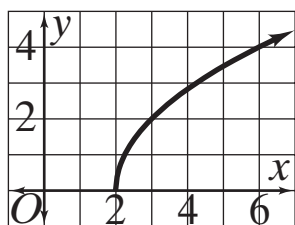
11.

$x$	$f(x)$
0	0
1	2
4	4



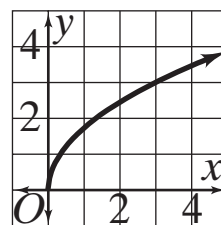
12.

$x$	$y$
2	0
3	2
6	4



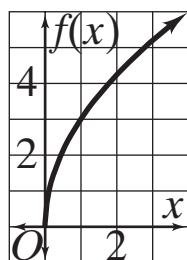
13.

$x$	$y$
0	0
3	3
$5\frac{1}{3}$	4



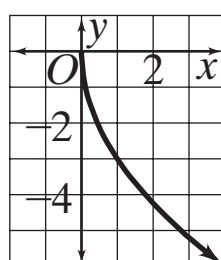
14.

$x$	$f(x)$
0	0
1	3
4	6



15.

$x$	$y$
0	0
1	-3
4	-6



**Answers for Lesson 11-4, pp. 640–643 Exercises (cont.)**

16.

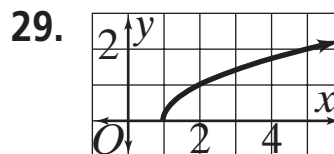
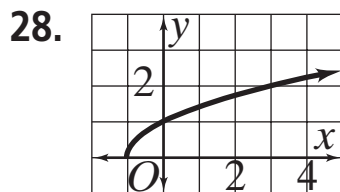
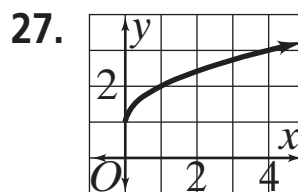
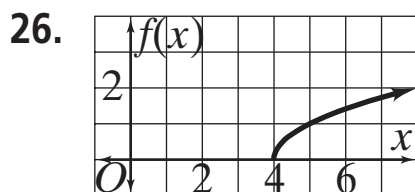
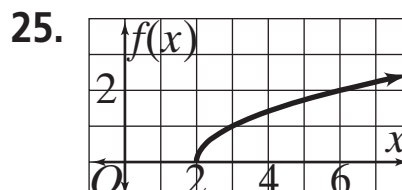
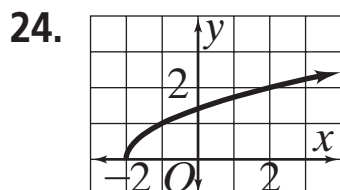
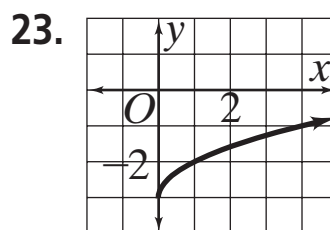
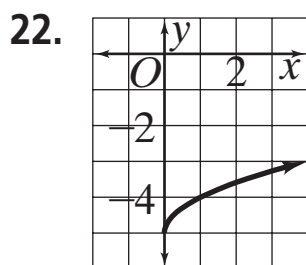
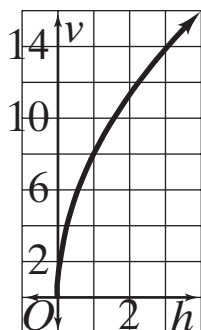
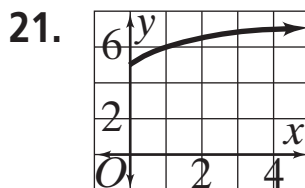
$h$	$v$
0	0
1	8
4	16

17. D

18. A

19. C

20. B



30.  $x \geq 4; y \geq 0$

31.  $x \leq 4; y \geq 0$



**Answers for Lesson 11-4, pp. 640–643 Exercises (cont.)**

- 32.** Form an inequality setting the radicand  $\geq 0$ . Solve for  $x$ .  
Answers may vary. Sample:

$$y = \sqrt{x - 2}$$

$$\begin{aligned} \text{Domain: } x - 2 &\geq 0 \\ x &\geq 2 \end{aligned}$$

- 33. a–d.** Answers may vary. Samples:

**a.**  $y = \sqrt{x + 2}$

**b.**  $y = \sqrt{x + 2}$

**c.**  $y = 2\sqrt{x}$

**d.** Check students' work.

- 34.** Translate the graph of  $y = \sqrt{x}$  8 units to the left.

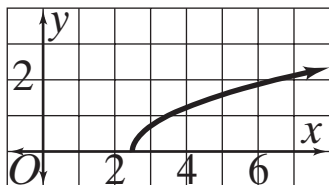
- 35.** Translate the graph of  $y = \sqrt{x}$  10 units down.

- 36.** Translate the graph of  $y = \sqrt{x}$  12 units up.

- 37.** Translate the graph of  $y = \sqrt{x}$  9 units right.

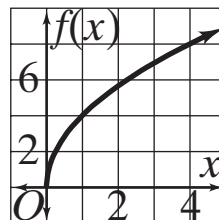
**38.**

$x$	$y$
2.5	0
3.5	1
6.5	2



**39.**

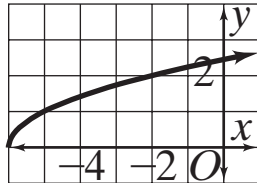
$x$	$f(x)$
0	0
1	4
2	5.7
4	8



**Answers for Lesson 11-4, pp. 640–643 Exercises (cont.)**

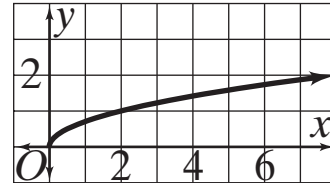
40.

$x$	$y$
-6	0
-5	1
-2	2
0	2.4



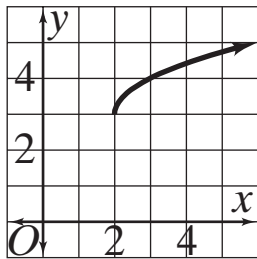
41.

$x$	$y$
0	0
2	1
4	1.4
8	2



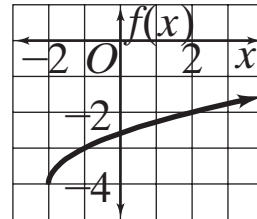
42.

$x$	$y$
2	3
3	4
6	5



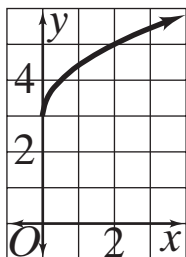
43.

$x$	$f(x)$
-2	-4
-1	-3
2	-2



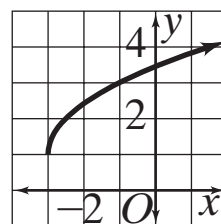
44.

$x$	$y$
0	3
1	4.4
2	5
3	5.4



45.

$x$	$y$
-3	1
-2	2.4
-1	3
0	3.4



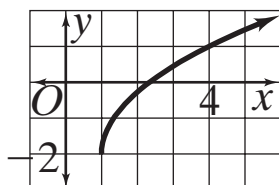
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**Answers for Lesson 11-4, pp. 640–643 Exercises (cont.)**

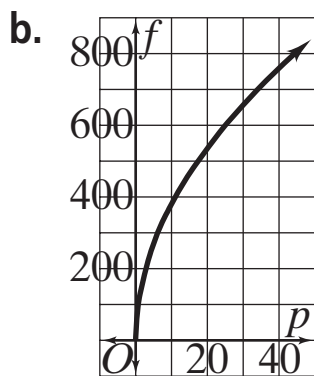
**46.**

$x$	$y$
1	-2
2	-0.3
3	0.4
4	1

**47.** D



**48. a.**  $p \geq 0$



**c.** about 45 lb/in.<sup>2</sup>

**49. a.** no

**b.** Answers may vary. Sample: The graph of  $y = \sqrt{x}$  is the first quadrant portion of the graph of  $x = y^2$ .

**c.**  $y = -\sqrt{x}$

**50.**  $y = 3\sqrt{x}$  rises more steeply because  $3\sqrt{x} > \sqrt{3x}$  for all positive values of  $x$ .

**51.** False;  $x$  must equal 81.

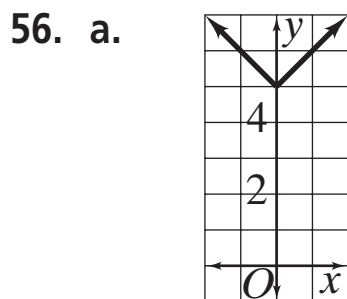
**52.** False; only combine like terms.

**53.** true

**54.** False;  $x = -1$ .

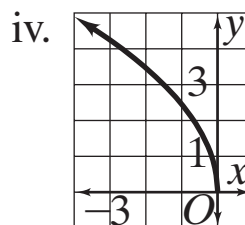
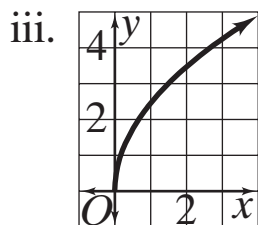
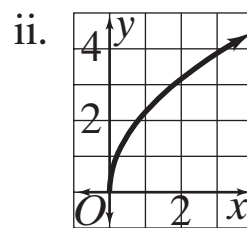
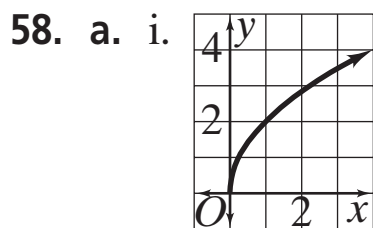
**Answers for Lesson 11-4, pp. 640–643 Exercises (cont.)**

55. a. about 213 cameras  
 b. month 4



b.  $y = |x| + 5$

57. Translate the graph of  $y = \sqrt{x}$  right 2 units and up 3 units.



- b. The greater the absolute value of  $n$ , the steeper the graph. If  $n < 0$ , then the graph lies in Quadrant II. If  $n > 0$ , the graph lies in Quadrant I.

59. Check students' work.

## Answers for Lesson 11-5, pp. 648–649 Exercises

1.  $\frac{3}{5}$
2.  $\frac{4}{5}$
3.  $\frac{3}{4}$
4.  $\frac{4}{5}$
5.  $\frac{3}{5}$
6.  $\frac{4}{3}$
7. 0.5299
8. 0.5736
9. 1.2799
10. 0.9962
11. 0.9659
12. 19.0811
13. 0.8660
14. 0.0872
15. 5.5
16. 10.4
17. 19.2
18. 38.1
19. 66.0
20. 21.1
21.  $AC \approx 6; AB \approx 8$
22.  $AC \approx 36; BC \approx 22$
23.  $BC \approx 6; AB \approx 18$
24.  $AC \approx 4; AB \approx 50$
25. a. i.  $\approx 0.9848, \approx 0.9848$   
ii.  $\approx 0.9063, \approx 0.9063$   
b. The values are equal, and the angles are complementary.  
c. Answers may vary. Sample:  
The acute angles of a right triangle are complementary.
26.  $c = 29; \sin A = \frac{21}{29}; \cos A = \frac{20}{29}; \tan A = \frac{21}{20}$
27.  $b = 15; \sin A = \frac{8}{17}; \cos A = \frac{15}{17}; \tan A = \frac{8}{15}$
28.  $a = 24; \sin A = \frac{12}{13}; \cos A = \frac{5}{13}; \tan A = \frac{12}{5}$
29.  $c = 25; \sin A = \frac{7}{25}; \cos A = \frac{24}{25}; \tan A = \frac{7}{24}$
30. 514.3
31. 4.5
32. 78.4
33.  $q \approx 6.1; r \approx 7.9$
34. Check students' work.
35. 0.25

## Answers for Lesson 11-6, p. 652 Exercises

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1. about 2.0 mi
2. about 172 ft
3. about 816 ft
4. about 0.4 mi
5. A
6. about 4.4 mi
7. a. about 177 ft  
b. about 86 ft
8. about 55 mi
9. about 57 ft
10. a. about 1,720,000 ft  
b. about 326 mi
11. 550 ft
12. about 1.74 mi