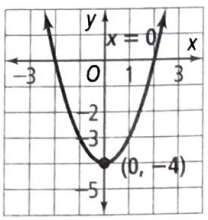
7.



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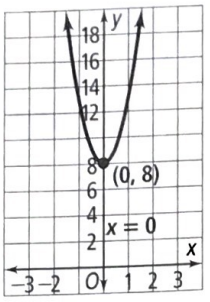

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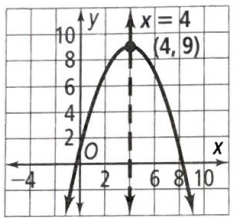

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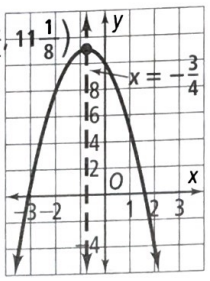

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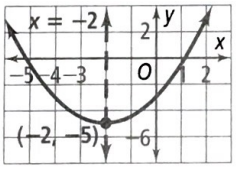

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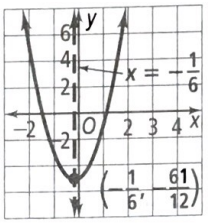
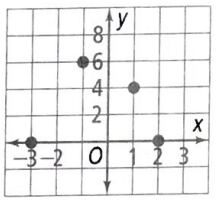


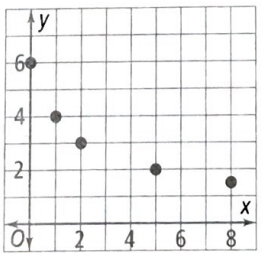
13. Answers will vary. Sample: $y = -x^2$ **14.** Answers will vary. Sample: $y = x^2$ **15.** Answers will vary. Sample: $y = x^2$ **16.** Answers will vary. Sample: $y = 0.5x^2$ **17.** ± 2 **18.** ± 5 **19.** 0 **20.** no solution **21.** $\pm\frac{2}{3}$ **22.** ± 4 **23.** -3, -4 **24.** 0, 2 **25.** 4, 5 **26.** $-3, \frac{1}{2}$ **27.** $-\frac{2}{3}, \frac{3}{2}$ **28.** 1, 4 **29.** 2.3 in. **30.** −6.74, 0.74 **31.** 0.38, 2.62 **32.** −2, −1.5 **33.** −9.12, −0.88 **34.** −1.65, 3.65 **35.** 1.26, 12.74 **36.** 7.6 ft by 15.8 ft **37.** 6.4 in. by 13.8 in. **38.** two **39.** two **40.** −1.84, 1.09 **41.** −2.5, 4 **42.** 7.87, 0.13 **43.** −0.25, 0.06 **44.** ± 5; square roots because there is no x-term **45.** 3; factoring because it is easy to factor **46.** 1.5 s

47.



quadratic

48.



exponential

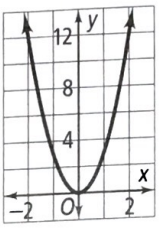
49. $y = 3x - 2$ **50.** $y = 5(2)^x$ **51.** (−1, 8), (2, −1) **52.** (0, −1), (1, −2) **53.** (−1, −1), (1, 1) **54.** (−2, −4), (3, 6) **55.** (−8, 3), (12, 123) **56.** (7, −2), (9, 6) **57.** (−7, −45), (−4, −21) **58.** (−13, 64), (3, −16) **59.** (6, 69) (10, 145) **60.** (−9, 33), (−12, 63) **61.** If you look at the graph and see how many times the graphs intersect, that is how many solutions the system will have.

Chapter 10

Get Ready! p. 611

1. 6 **2.** 18 **3.** 4.5 **4.** 8 **5.** 10 **6.** 4 **7.** 12 **8.** 14 **9.** $-2h^2 + 5h + 12$ **10.** $9b^4 - 49$ **11.** $-15x^2 - 11x - 2$

12.



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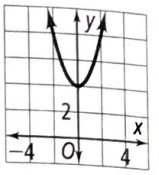

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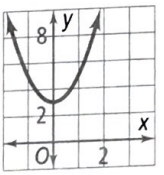


15. 2 **16.** 2 **17.** 0 **18.** 1 **19.** 2 **20.** 2 **21.** They both contain the same radical expression, $\sqrt{3}$. **22.** I would be rich.

Lesson 10-1 pp. 614–618

Got It? 1. 15 cm **2.** 9 **3a.** no; $20^2 + 47^2 \neq 52^2$ **b.** yes; $(2a)^2 + (2b)^2 = 4a^2 + 4b^2 = 4(a^2 + b^2) = 4c^2 = (2c)^2$

Lesson Check 1. 39 **2.** 7 **3.** yes; $12^2 + 35^2 = 37^2$ **4.** If you are a student, then you study math. **5.** The value of 13 should have been substituted for c since it is the hypotenuse. The correct equation is $12^2 + x^2 = 13^2$; $x = 5$.

Exercises 7. 8 **9.** 12 **11.** 17 **13.** 4.5 **15.** 6.1 **17.** 41 **19.** 8.5 **21.** 1.2 mi **23.** yes **25.** no **27.** yes **29.** 10 ft **31.** yes **33.** yes **35.** yes **37.** 719 ft **39.** Yes; $50^2 + 120^2 = 130^2$, so the triangle formed by the forces is a right triangle. **41a.** $a^2 + 2ab + b^2$ **b.** c^2 **c.** $\frac{1}{2}ab$ **d.** $a^2 + 2ab + b^2 = 4\left(\frac{1}{2}ab\right) + c^2$; $a^2 + b^2 = c^2$; it is the Pythagorean Theorem.

Lesson 10-2 pp. 619–625

Got It? 1. $6\sqrt{2}$ **2.** $-4m^5\sqrt{5m}$ **3a.** $18\sqrt{3}$ **b.** $3a^2\sqrt{2}$ **c.** $210x^3$ **d.** yes; $\sqrt{14t^2} = t\sqrt{14}$ **4.** $w\sqrt{17}$ **5a.** 4 **b.** $\frac{3}{a}$ **c.** $\frac{5y\sqrt{y}}{z}$ **6a.** $\frac{\sqrt{6}}{3}$ **b.** $\frac{\sqrt{10m}}{6m}$ **c.** $\frac{\sqrt{21s}}{3}$

Lesson Check 1. $7\sqrt{2}$ **2.** $4b^2\sqrt{b}$ **3.** $12m^2$ **4.** $\frac{\sqrt{15}}{x}$ **5.** $\frac{\sqrt{15}}{3}$ **6.** $\frac{\sqrt{3n}}{n}$ **7a.** Yes; there are no perfect-square factors in 31, there are no fractions in the radicand, and there are no radicals in the denominator. **b.** No; there is a fraction in the radicand. **c.** No; 25 is a perfect-square factor of 175. **8.** Answers may vary. Sample: $\frac{3}{\sqrt{12}} = \frac{3}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{3\sqrt{3}}{6} = \frac{\sqrt{3}}{2}$;

$\frac{3}{\sqrt{12}} = \frac{3}{\sqrt{12}} \cdot \frac{\sqrt{12}}{\sqrt{12}} = \frac{3\sqrt{12}}{12} = \frac{\sqrt{12}}{4} = \frac{2\sqrt{3}}{4} = \frac{\sqrt{3}}{2}$

9. A radical expression is in simplified form if the radicand has no perfect-square factors other than 1, the radicand contains no fractions, and no radicals appear in the denominator of a fraction.

Exercises **11.** $3\sqrt{11}$ **13.** $-2\sqrt{15}$ **15.** $50\sqrt{7}$ **17.** $5t^2\sqrt{2t}$ **19.** $-63x^4\sqrt{3x}$ **21.** $-18y\sqrt{3y}$ **23.** 4 **25.** 30 **27.** $42n^2$ **29.** $16y^3$ **31.** $-126a\sqrt{a}$ **33.** $24c^7$ **35.** $w\sqrt{26}$ **37.** $\frac{7\sqrt{3}}{4}$ **39.** $\frac{\sqrt{3x}}{8}$ **41.** $\frac{77a}{2}$ **43.** $\frac{\sqrt{10x}}{4x}$ **45.** $2\sqrt{11}$ **47.** $\frac{4}{5}$ **49.** $2\sqrt{6}$ in. **51.** not simplest form; radical in the denominator of a fraction **53.** Simplest form; radicand has no perfect-square factors other than 1. **55a.** $f\sqrt{3f}$ **b.** $\frac{1}{x^2}$ **c.** $\frac{\sqrt{2a}}{2a}$ **d.** $\frac{\sqrt{2m}}{4m}$ **57a.** $\sqrt{18 \cdot 10} = \sqrt{180} = \sqrt{36} \cdot \sqrt{5} = 6\sqrt{5}$ **b.** Answers may vary. Sample: 4 and 45 **59.** $2\sqrt{13}$ **61.** $\frac{-2\sqrt{a}}{a^2}$ **63.** $\frac{x\sqrt{y}}{y^2}$ **65.** $4\sqrt{5}$ **67.** $ab^2c\sqrt{abc}$ **69.** $\frac{8\sqrt{6a}}{3a}$ **71.** $1 \pm \sqrt{5}$ **73.** Answers may vary. Sample: 12, 27, 48 **75.** $10b^2$ **77a.** $5\left(\frac{\sqrt{2\pi}}{\pi}\right)$ ft, 3.99 ft **b.** $4\left(\frac{\sqrt{2\pi}}{\pi}\right)$, 3.19 in. **c.** $\left(\frac{\sqrt{10\pi}}{\pi}\right)$ m, 1.78 m

Lesson 10-3 pp. 626–631

Got It? **1a.** $-\sqrt{2}$ **b.** $7\sqrt{5}$ **2a.** $8\sqrt{7}$ **b.** $8\sqrt{2}$ **c.** No; if they are unlike and have no common factors other than 1, even if they can be simplified, they still will not be like. **3a.** $2\sqrt{3} + 5\sqrt{2}$ **b.** $15 - 4\sqrt{11}$ **c.** $-6\sqrt{2} - 6$ **4.** $\frac{-3\sqrt{10} + 3\sqrt{5}}{5}$ **5.** $(6\sqrt{5} - 6)$ in., or about 7.4 in.

Lesson Check **1.** $5\sqrt{3}$ **2.** $\sqrt{6}$ **3.** $\sqrt{21} - 2\sqrt{7}$ **4.** $41 - 12\sqrt{5}$ **5.** $3\sqrt{5} - \sqrt{10}$ **6.** $2\sqrt{7} - 4$ **7a.** $\sqrt{13} + 2$ **b.** $\sqrt{6} - \sqrt{3}$ **c.** $\sqrt{5} + \sqrt{10}$ **8.** $\sqrt{3} \cdot \sqrt{3} \neq 9$; $\frac{\sqrt{3}+1}{3-1} = \frac{\sqrt{3}+1}{2}$

Exercises **9.** $7\sqrt{5}$ **11.** $8\sqrt{3}$ **13.** 0 **15.** $-7\sqrt{5}$ **17.** $9\sqrt{10}$ **19.** $\frac{19\sqrt{5}}{2}$ **21.** $2\sqrt{3} + 3\sqrt{2}$ **23.** $3\sqrt{7} - 21$ **25.** $5\sqrt{33} - 15\sqrt{22}$ **27.** -6 **29.** $62 - 20\sqrt{6}$ **31.** $\frac{3\sqrt{7} + 3\sqrt{3}}{4}$ **33.** $-2\sqrt{5} - 5$ **35.** $\frac{7\sqrt{13} - 7\sqrt{5}}{8}$ **37.** $\frac{23\sqrt{5} - 23}{2}$ ft, or about 14.2 ft **39.** $-\frac{4}{3}$; -1.3 **41.** $\frac{-1 + \sqrt{7}}{4}$; -0.4 **43.** $9 + 6\sqrt{2} + 4\sqrt{5} + 3\sqrt{10}$; 35.9 **45.** No; yes; you can simplify $\sqrt{12}$ to $2\sqrt{3}$ and then combine the like radicals. **47.** $5\sqrt{10}$ **49.** $22\sqrt{3} - 6$ **51.** $\frac{13 + \sqrt{65} + \sqrt{130} + 5\sqrt{2}}{8}$ **53.** -24 **55.** $4\sqrt{3} + 4\sqrt{2} + 3\sqrt{6} + 6$ **57.** $s\sqrt{3}$ **59a.** $x^{\frac{n}{2}}$ **b.** $x^{\frac{n-1}{2}}\sqrt{x}$ **61.** $\frac{n\sqrt{5} - n}{2}$ **63a.** $3\sqrt{2}$ **b.** $2\sqrt{7}$ **c.** $\sqrt{2(p+q)}$ **65.** H **67.** The graph of the function $y = |x|$ is V-shaped with the vertex at the origin. The domain is all real numbers and the range is $\{y \mid y \geq 0\}$, because no matter what value of x you input, the output will always be nonnegative. **68.** $6\sqrt{3}$ **69.** $15\sqrt{6}$ **70.** $\frac{2\sqrt{2}}{3c}$ **71.** 15 **72.** 8^{16} **73.** 2^{11} **74.** 5^{27} **75.** 3^3 **76.** -1 **77.** $-4, 3$ **78.** $-5, 3$ **79.** $-3, \frac{2}{3}$ **80.** $-2, \frac{1}{2}$ **81.** -7

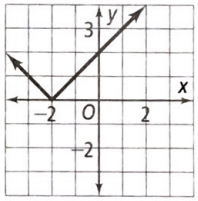
Lesson 10-4 pp. 633–638

Got It? **1.** 9 **2.** 0.825 ft **3.** 7 **4.** -2 **5a.** no solution **b.** The principal root of a number is never negative.

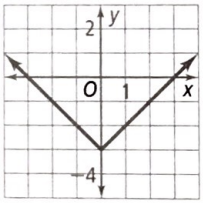
Lesson Check **1.** 12 **2.** 3 **3.** 1 **4.** no solution **5.** C **6.** If $x^2 = y^2$, then $x = y$; no, if $x = -1$ and $y = 1$, then $x^2 = y^2$, but $x \neq y$.

Exercises **7.** 4 **9.** 36 **11.** 8 **13.** 16 **15.** -2 **17.** about 5.2 ft **19.** 4.5 **21.** 7 **23.** 4 **25.** 2 **27.** none **29.** -7 **31.** 3 **33.** no solution **35.** no solution **37.** The student did not check the solutions in the original equations. Both of those solutions are extraneous, so the equation has no solution. **39a.** 25 **b.** 11.25 **41.** Add $\sqrt{y+2}$ to each side of the equation. Square each side of the equation. Solve for y. Check each apparent solution in the original equation. **43.** 3 **45.** no solution **47.** 1.5 **49.** 1600 ft **51.** The square of $\sqrt{x-1}$ will have only two terms, while the square of $\sqrt{x} - 1$ will have three terms. **53.** D **55.** B **57.** $5\sqrt{2}$ **58.** -24 **59.** $-\frac{2\sqrt{3} - 4\sqrt{2}}{5}$ **60.** no solution **61.** $-2, 2$ **62.** $-\frac{3}{2}, -\frac{2}{3}$

63.



64.



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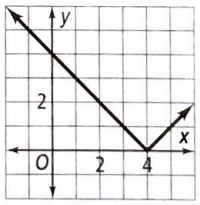
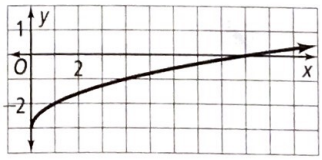


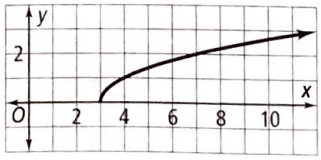
Lesson 10-5 pp. 639–644

Got It? **1.** $x \leq 2.5$ **2a.** when the power is more than 56.25 watts **b.** 4

3.

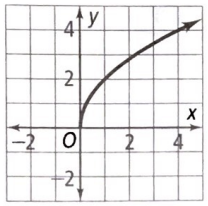


4.

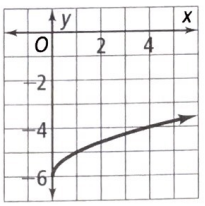


Lesson Check 1. $x \geq -3$

2.



3.



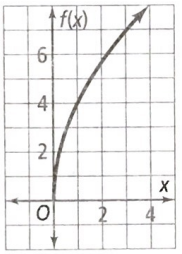
4. No; there is no variable in the radicand. **5.** The graph of $y = \sqrt{x-1}$ is the graph of $y = \sqrt{x}$ shifted to the right 1 unit. **6.** Yes; the domain includes all the values of x such that the radicand has a value greater than or equal to zero, so for $b > 0$, the domain of $y = \sqrt{x+b}$ is $x \geq -b$, which includes negative values.

Exercises 7. $x \geq 0$ **9.** $x \geq 7$ **11.** $x \geq -2$

13. $x \leq 18$ **15.** $x \geq 4$

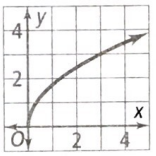
17.

x	f(x)
0	0
1	4
4	8



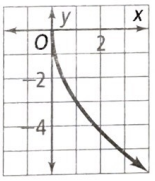
19.

x	y
0	0
3	3
5.3	4



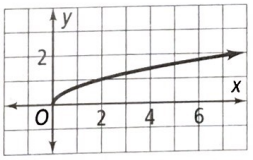
21.

x	y
0	0
1	−3
4	−6



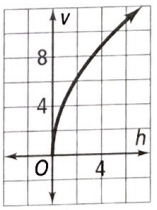
23.

x	y
0	0
2	1
8	2



25.

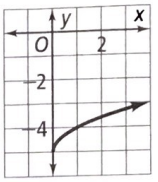
h	v
0	0
1	4.4
6	10.8



$h > 5.1$ m

27. A **29.** B

31.



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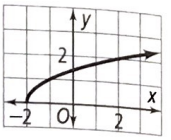
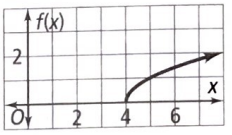
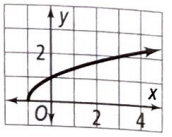


35.

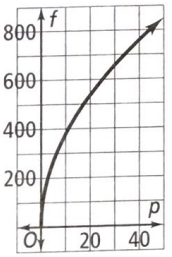


37.



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

41a.

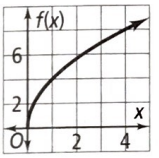


b. about 45 lb/in.^{2}

43. about 2800 m/s

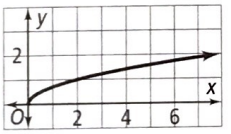
45.

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



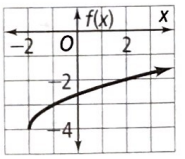
47.

x	y
0	0
2	1
4	1.4
8	2



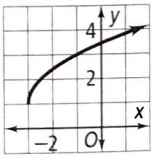
49.

x	f(x)
−2	−4
−1	−3
2	−2

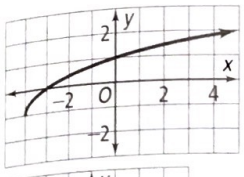


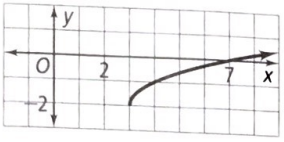
51.

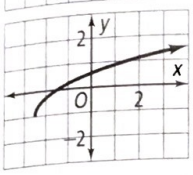
x	y
−3	1
−2	2.4
−1	3
0	3.4



53a. No; the graph does not pass the vertical-line test. **b.** The graph of $y = \sqrt{x}$ is the first-quadrant portion of the graph of $x = y^2$. **c.** $y = -\sqrt{x}$

55. 

57. 

59. 

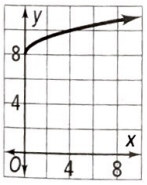
61a. The graph is V–Shaped with vertex at (0, 5) and passing through (1, 6) and (–1, 6). **b.** $y = |x| + 5$

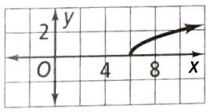
Lesson 10-6 pp. 645–651

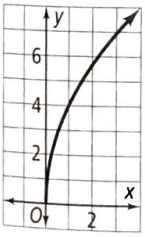
Got It? 1. $\frac{3}{5}$; $\frac{4}{5}$; $\frac{3}{4}$ **2a.** 0.9848 **b.** 1 **c.** 0.9659 **d.** 0.1564 **e.** sin 45° = cos 45°; a 45°-45°-90° triangle is an isosceles right triangle, so the legs have the same length, and the sine and cosine are the same ratio. **3.** 1.9 **4.** 41.8° **5.** about 130 ft

Lesson Check 1. $\frac{4}{5}$ **2.** $\frac{3}{5}$ **3.** $\frac{4}{3}$ **4.** about 6.4 cm **5.** 73.7° **6.** To find the sine of an angle, you find the ratio of the length of the opposite leg to the length of the hypotenuse. To find the cosine of an angle, you find the ratio of the length of the adjacent leg to the length of the hypotenuse. **7.** The student should use the $\sin^{-1}$ key; $\sin^{-1}(0.9) = 64.15806724$.

Exercises 9. $\frac{5}{13}$ **11.** $\frac{8}{17}$ **13.** $\frac{8}{17}$ **15.** $\frac{5}{13}$ **17.** 0.1736 **19.** 0.0872 **21.** 0.9397 **23.** 0.9455 **25.** 5.5 **27.** 19.2 **29.** 66.0 **31.** 60° **33.** 37° **35.** about 47.7 ft **37.** Divide the length of the adjacent side by the cosine of the acute angle. **39.** 514.3 **41.** 78.4 **43a.** about 1,720,000 ft **b.** about 326 mi **45.** 550 ft **47a.** sin A **b.** cos A **c.** tan A **49.** F **51.** The number line has a filled circle on 0.5 and points to the left.

52. 

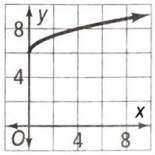
53. 

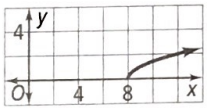
54. 

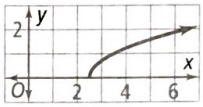
55. yes **56.** yes **57.** no
58. $(x - 3)(x + 4)$
59. $(x + 2)(x + 4)$
60. $(x + 3)(x - 5)$
61. $(x + 3)(x + 6)$

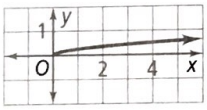
Chapter Review pp. 653–656

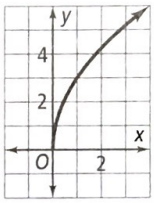
1. trigonometric ratios **2.** extraneous solution **3.** unlike radicals **4.** rationalize the denominator **5.** conjugates **6.** 6.5 **7.** 12.5 **8.** 6.1 **9.** 84 **10.** 17.5 **11.** 0.7 **12.** 6.6 **13.** 2.4 **14.** yes **15.** yes **16.** no **17.** yes **18.** no **19.** yes **20.** no **21.** no **22.** yes **23.** $-42\sqrt{6}$ **24.** $\sqrt{3}$ **25.** $\frac{5}{2}a$ **26.** $\frac{2}{3s}$ **27.** $-\frac{28}{3}x^2\sqrt{x}$ **28.** $30t^4\sqrt{3}$ **29.** Answers may vary. Sample: $\sqrt{32s}$, $\frac{8s}{\sqrt{2s}}$, $8\sqrt{\frac{s}{2}}$; they all have the s and the factor 2 under the radical. **30.** $s\sqrt{10}$ **31.** $2\sqrt{6}$ **32.** $4 + 2\sqrt{3}$ **33.** $4 - 2\sqrt{10}$ **34.** $\frac{-3\sqrt{2} + 9}{7}$ **35.** $-2 + \sqrt{3}$ **36.** $\frac{-3 + 3\sqrt{5}}{2}$ in. **37.** 169 **38.** 9 **39.** 18 **40.** 21 **41.** 2 **42.** 1 **43.** 1.5 **44.** $\frac{1}{2}$ **45.** 56.5 cm^3 **46.** $x \geq 0$ **47.** $x \geq -4$

48. 

49. 

50. 

51. 

52. 

53. $\sin A = \frac{8}{17}$, $\cos A = \frac{15}{17}$, $\tan A = \frac{8}{15}$
54. $\sin A = \frac{\sqrt{5}}{5}$, $\cos A = \frac{2\sqrt{5}}{5}$, $\tan A = \frac{1}{2}$
55. $\sin A = \frac{\sqrt{7}}{4}$, $\cos A = \frac{3}{4}$, $\tan A = \frac{\sqrt{7}}{3}$
56. length of $\overline{AC} \approx 9.9$, length of $\overline{BC} \approx 6.7$
57. length of $\overline{AB} \approx 10.2$, length of $\overline{BC} \approx 6.3$
58. length of $\overline{AB} \approx 26.9$, length of $\overline{AC} \approx 20.0$
59. length of $\overline{AC} \approx 24.5$, length of $\overline{BC} \approx 5.2$

Chapter 11

Get Ready! p. 661

1. $2\frac{1}{30}$ **2.** $3\frac{1}{4}$ **3.** $-\frac{73}{120}$ **4.** $\frac{11}{35}$ **5.** $\frac{q^6}{p^5}$ **6.** $6\frac{30}{49}$ **7.** $\frac{64}{729}$ **8.** $\frac{8yz^6}{5x^6}$ **9.** −7, 9 **10.** $-\frac{5}{3}$, $\frac{7}{4}$ **11.** −13 **12.** 0, 3 **13.** $-\frac{4}{3}$, 5 **14.** −5, $-\frac{2}{3}$ **15.** −10, −1 **16.** −3, 7 **17.** $-\frac{1}{2}$, $\frac{5}{3}$ **18.** no solution **19.** 1 **20.** 4 **21.** The excluded