Answers

66. not a function **67.** function

68. function

69. **a.** $3x + 225$ **b.** \$243

70. **a.** $5.85m + 28.84t$ **b.** \$115.77

71. $g(x) = x + 2$ **72.** $g(x) = x + 2$

73. $g(x) = |2x + 7| + 3$

74. $g(x) = |3x - 14| - 1$

75. $g(x) = 3(x + 1) + 4$

76. $g(x) = 2x - 5$

77. $g(x) = -\frac{1}{4}(x + 3) + 3$

78. $(3, -1, 5)$ **79.** $(2, 4, -3)$

80. There are an infinite number of solutions.

81. $(-3, 3, 4)$ **82.** $(-2, 4, -3)$ **83.** $(2, 7, -6)$

84. There are an infinite number of solutions.

85. $(-3.8, -2.6, 2.6)$ **86.** $(1, -2, 3)$

87. \$142,500 **88.** 8% **89.** \$125

90. \$68 **91.** 6%

92. $x = -6$ and $x = 6$

93. $x = -8$ and $x = 8$

94. $x = -7$ and $x = 7$

95. $x = -4$ and $x = 4$

96. $x = -6$ and $x = 6$

97. $x = -8$ and $x = 8$

98. $x = -2$ and $x = 5$

99. $x = -1$ and $x = 3$

100. $x = 1$ and $x = 6$

101. $x = 4$ and $x = 7$

102. $x = 1$ and $x = 8$

103. $x = -7$ and $x = -3$

104. $x = -4$ and $x = \frac{1}{2}$

105. $x = -4$ and $x = \frac{2}{3}$

106. $x = -1$ and $x = -\frac{3}{5}$

107. $25 - 9i$ **108.** $-21 + 3i$

109. $2 - 5i$ **110.** $-17 + 2i$

111. $-4 + 3i$ **112.** $7 + 8i$

113. $-22 + 9i$ **114.** $5 + 22i$

115. $9 + 19i$ **116.** $-15 - 2i$

117. $-6 + 10i$ **118.** $-8 - 16i$

119. $23 + 7i$ **120.** $-22 + 29i$

121. $-13 + 87i$ **122.** $32 - 80i$

123. $19 + 59i$ **124.** $44 - 18i$

125. $32 + 24i$ **126.** $-7 - 24i$

127. **a.** 1.25 h **b.** 1 h

128. **a.** 0.5 h **b.** 1.6 h

Chapter 6

6.1 Start Thinking

1. exponential growth; 10% increase

2. linear growth; slope: 1.28

3. exponential growth; 25% increase

6.1 Warm Up

1.

x	y
-1	-3
0	0
1	3
2	6

2.

x	y
-1	0.5
0	1
1	2
2	4

3.

x	y
-1	$\frac{2}{3}$
0	2
1	6
2	18

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Answers

6.1 Cumulative Review Warm Up

1. 2^7 **2.** x^4 **3.** $8b^{15}$

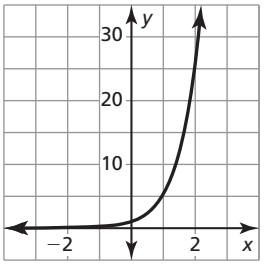
4. 3^{x+5} **5.** y^{3x} **6.** $9a^{2x}$

6.1 Practice A

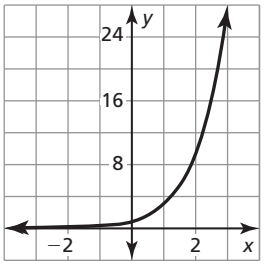
1. a. $\frac{1}{9}$ **b.** 27 **2. a.** $\frac{5}{4}$ **b.** 40

3. a. $\frac{13}{4}$ **b.** 11

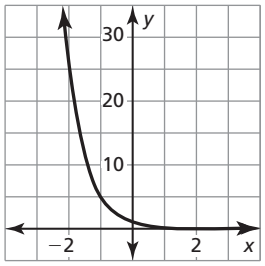
4. exponential growth



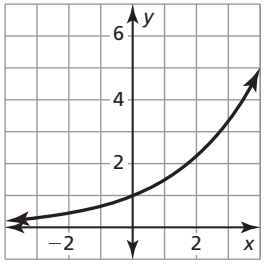
5. exponential growth



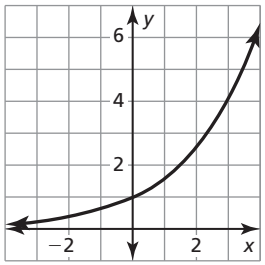
6. exponential decay



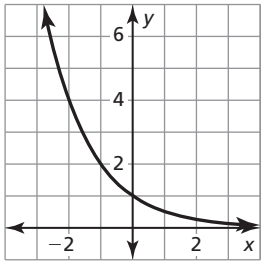
7. exponential growth



8. exponential growth



9. exponential decay



10. $b = 2$ **11.** $b = 8$

12. a. exponential growth

b. 6% increase

c. \$0.25

d. 15 years

13. $y = a(1 + 0.732)^t$; growth rate = 73.2%

14. $y = a(1 + 0.223)^t$; growth rate = 22.3%

15. $y = a(1 - 0.936)^t$; decay rate = 93.6%

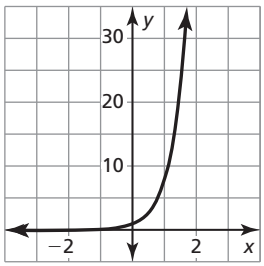
16. \$153.32

6.1 Practice B

1. a. $\frac{1}{25}$ **b.** 125 **2. a.** $\frac{5}{2}$ **b.** 80

3. a. $-\frac{26}{9}$ **b.** 24

4. exponential growth



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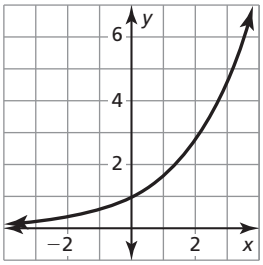
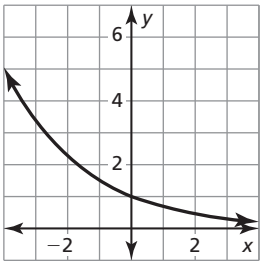
Answers

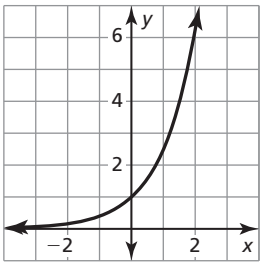
5. exponential growth



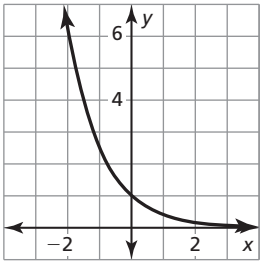
6. exponential decay



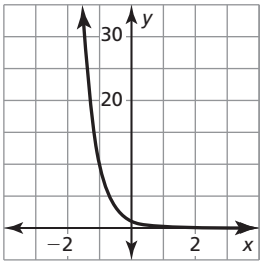
7. exponential growth



8. exponential decay



9. exponential decay



10. $b = 10$

11. $b = \frac{1}{3}$

12. a. exponential decay

b. 20% decrease

c. \$54,000

d. 2.6 yr

13. $y = a(1 - 0.0468)^t$; decay rate = 4.68%

14. $y = a(1 + 0.016)^6$; growth rate = 1.6%

15. $y = a(1 - 0.996)^t$; decay rate = 99.6%

16. \$153.73

6.1 Enrichment and Extension

1. c **2.** d **3.** a **4.** b

5. if $a = 0$ or $b = 1$

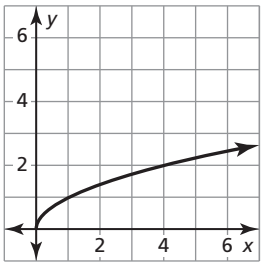
6. $y = 5^x$

7. $y = \left(\frac{1}{3}\right)^x$

8. All five functions have a y-intercept of $(0, 1)$.

9. All five functions have the same domain and range; domain: all real numbers, range: $y > 0$.

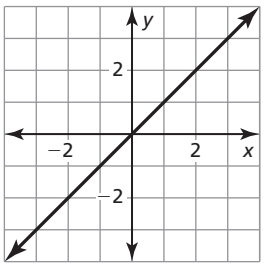
10. a.



b. $y = \sqrt{x}$, radical function

c. domain: $x \geq 0$
range: $y \geq 0$

11. a.



b. $y = x$, linear function

c. domain: all real numbers
range: all real numbers

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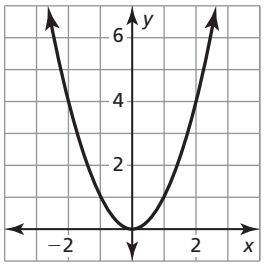
Answers

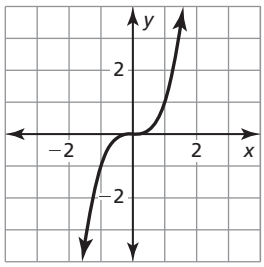
12. a.



b. $y = x^2$, quadratic function

c. domain: all real numbers
range: $y \geq 0$

13. a.



b. $y = x^3$, cubic function

c. domain: all real numbers
range: all real numbers

6.1 Puzzle Time

YOU TICK IT OFF

6.2 Start Thinking

semi-annual balance = \$7828.59, quarterly balance = \$7831.04, monthly balance = \$7832.68, daily balance = \$7833.48

Sample answer: The balance after 5 years will increase by a small amount as the number of compoundings increases. However, it seems there is a limit as to how high the balance will increase. The balance only increased by \$0.80 when the number of compoundings jumped from 12 to 365.

6.2 Warm Up

1. growth; initial value 1; percent increase 20%

2. decay; initial value 1; percent decrease 22%

3. decay; initial value 1; percent decrease 37.5%

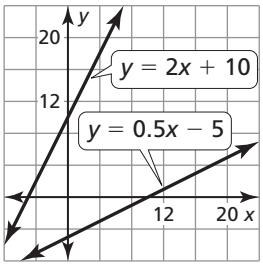
4. growth; initial value 28; percent increase 3%

5. decay; initial value 25,000; percent decrease 5%

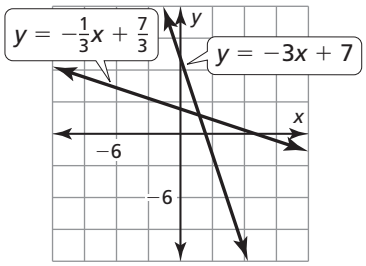
6. growth; initial value 1; percent increase 100%

6.2 Cumulative Review Warm Up

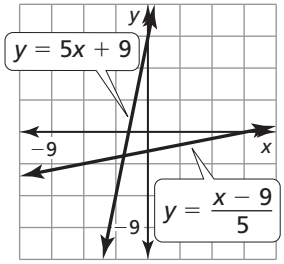
1. $y = 2x + 10$



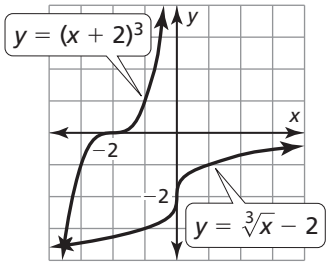
2. $y = -\frac{1}{3}x + \frac{7}{3}$



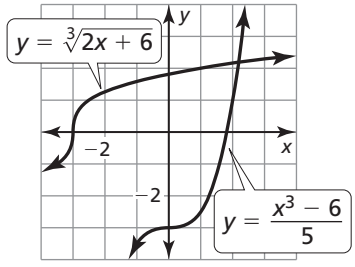
3. $y = 5x + 9$



4. $y = \sqrt[3]{x} - 2$



5. $y = \sqrt[3]{2x + 6}$



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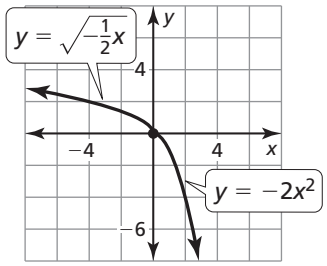
Answers

6. $y = \sqrt{-\frac{1}{2}x}, \ x \leq 0$



6.2 Practice A

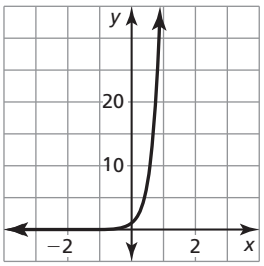
1. e^7 **2.** e^5 **3.** $\frac{e^3}{3}$

4. $\frac{5}{e^5}$ **5.** $9e^{6x}$ **6.** $4e^{5x}$

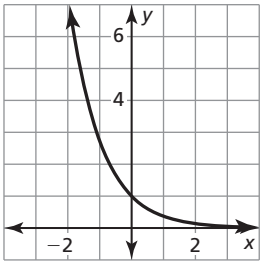
7. incorrectly squared the exponent $3x$, instead of multiplying by 2

$$\left(2x^{3x}\right)^2 = (2)^2\left(e^{3x}\right)^2$$
$$= 4e^{6x}$$

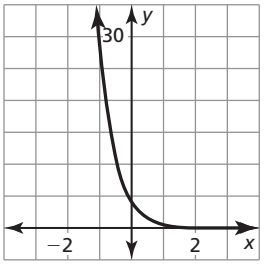
8. exponential growth



9. exponential decay



10. exponential decay

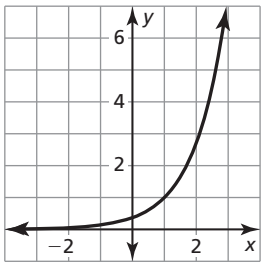


11. $y = (1 - 0.393)^x$; 39.3%

12. $y = 2(1 - 0.181)^x$; 18.1%

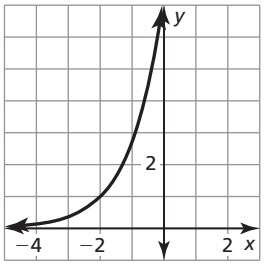
13. $y = 5(1 + 0.822)^x$; 82.2%

14.



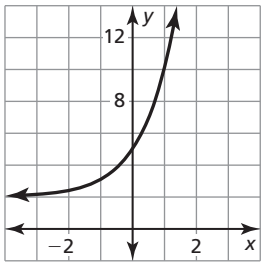
domain: $-\infty < x < \infty$; range: $y > 0$

15.



domain: $-\infty < x < \infty$; range: $y > 0$

16.



domain: $-\infty < x < \infty$; range: $y > 2$

17. a. \$4415.25 **b.** \$4376.70 **c.** 4.6 years

6.2 Practice B

1. $\frac{1}{e^2}$ **2.** $\frac{3}{2e^3}$ **3.** $\frac{125}{e^{12x}}$

4. $2\sqrt{5}e^{4x}$ **5.** $4e^{3x}$ **6.** e^{3x+3}

7. incorrectly placed 2^4 in the denominator, although the exponent is not negative

$$\left(2e^{-3x}\right)^4 = \frac{16}{e^{12x}}$$

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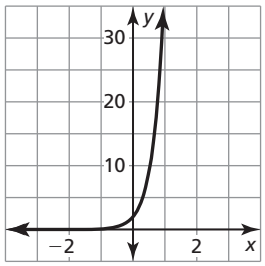
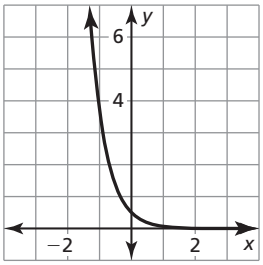
Answers

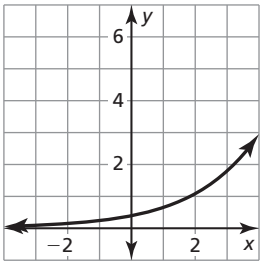
8. exponential growth



9. exponential decay



10. exponential growth

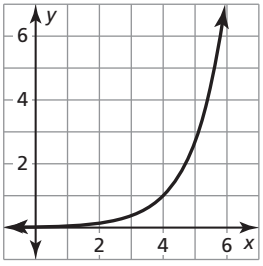


11. $y = (1 + 0.284)^x$; 28.4%

12. $y = 3(1 - 0.478)^x$; 47.8%

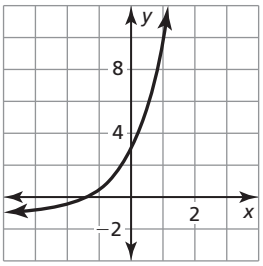
13. $y = 0.25(1 + 1.4596)^x$; 145.96%

14.



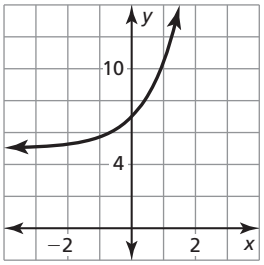
domain: $-\infty < x < \infty$; range: $y > 0$

15.



domain: $-\infty < x < \infty$; range: $y > -1$

16.



domain: $-\infty < x < \infty$; range: $y > 5$

17. a. \$5415.71 **b.** \$5416.44

c. \$4.96 **d.** \$49.60; 10 times more

6.2 Enrichment and Extension

Sum	Approximation
$\sqrt{12}\left(1 - \frac{1}{3 \bullet 3} + \frac{1}{5 \bullet 3^2} - \frac{1}{7 \bullet 3^3} + \ldots\right)$	≈ 3.137852892
$\sqrt{12}\left(1 - \frac{1}{3 \bullet 3} + \frac{1}{5 \bullet 3^2} - \frac{1}{7 \bullet 3^3} + \frac{1}{9 \bullet 3^4} - \ldots\right)$	≈ 3.142604746
$\sqrt{12}\left(1 - \frac{1}{3 \bullet 3} + \frac{1}{5 \bullet 3^2} - \frac{1}{7 \bullet 3^3} + \frac{1}{9 \bullet 3^4} - \frac{1}{11 \bullet 3^5} + \ldots\right)$	≈ 3.141308785
$\sqrt{12}\left(1 - \frac{1}{3 \bullet 3} + \frac{1}{5 \bullet 3^2} - \frac{1}{7 \bullet 3^3} + \frac{1}{9 \bullet 3^4} - \frac{1}{11 \bullet 3^5} + \frac{1}{13 \bullet 3^6} \ldots\right)$	≈ 3.141674313

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Answers

1. The number π is a mathematical constant that is the ratio of a circle's circumference to its diameter.

2. 3.14159265359

3. The fraction $\frac{22}{7} \approx 3.142857$ is only an approximation, just like 3.14.

4. In mathematics, a transcendental number is a number that is *not* the root of any nonzero polynomial. π and *e* are both transcendental numbers. Note that all transcendental numbers are irrational, but not all irrational numbers are transcendental. For example, the irrational number $\sqrt{2}$ is a root of the polynomial $x^2 - 2$, so it is not transcendental.

5. Euler's Identity

6.2 Puzzle Time

VACUUM CLEANER

6.3 Start Thinking

The graph of $f^{-1}(x)$ is a reflection of $f(x)$ in the line $y = x$. The domain of $f(x)$ is the range of $f^{-1}(x)$ and the range of $f(x)$ is the domain of $f^{-1}(x)$.

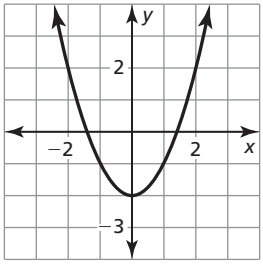
6.3 Warm Up

1. 2 **2.** 0 **3.** 3

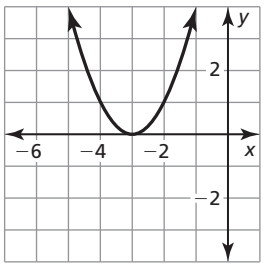
4. -1 **5.** $\frac{1}{2}$ **6.** $-\frac{1}{2}$

6.3 Cumulative Review Warm Up

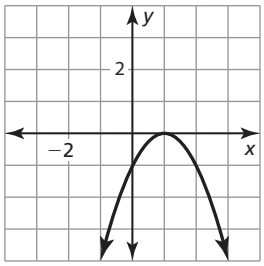
1. a.



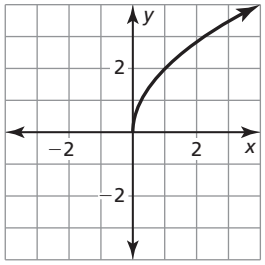
b.



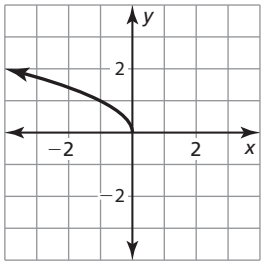
c.



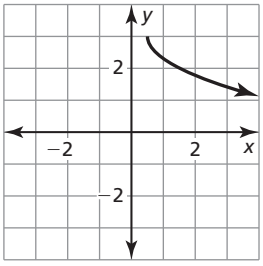
2. a.



b.



c.



6.3 Practice A

1. $2^3 = 8$ **2.** $7^1 = 7$ **3.** $5^2 = 25$

4. $\log_4 16 = 2$ **5.** $\log_5 1 = 0$ **6.** $\log_6 \frac{1}{6} = -1$

7. 4 **8.** 3 **9.** 1

10. -1 **11.** 0 **12.** -3

13. 0.699 **14.** 2.639 **15.** -0.602

16. 30 decibels **17.** x **18.** $2x$

19. $3x$ **20.** $y = \log_{1.1} x$ **21.** $y = \log_3 x$

22. $y = 3^x$ **23.** $y = 3(10^x)$

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Answers

24. $y = \frac{1}{3}e^x$ **25.** $y = \frac{1}{5}\ln x$

26. a. 208.6 mi/h **b.** 8.2 mi

6.3 Practice B

1. $9^0 = 1$ **2.** $6^3 = 216$

3. $2^{-2} = \frac{1}{4}$ **4.** $\log_{13} \frac{1}{169} = -2$

5. $\log_4 8 = \frac{3}{2}$ **6.** $\log_{81} 9 = \frac{1}{2}$

7. 2 **8.** 5 **9.** 0

10. -4 **11.** -3 **12.** -2

13. -0.699 **14.** 0.673 **15.** -2.916

16. yes; The sound is 130 decibels.

17. $7x$ **18.** 18 **19.** $3x$

20. $y = \log_{0.75} x$ **21.** $y = \left(\frac{3}{4}\right)^x$

22. $y = 2(10^x)$ **23.** $y = e^x - 2$

24. $y = \ln x + 3$ **25.** $y = \log_6(x - 2)$

26. a. 116.83 in.; 9.74 ft
b. 1651.8 lb

6.3 Enrichment and Extension

1. 5 **2.** 3 **3.** 4

4. 1 **5.** 2 **6.** $\frac{1}{3}$

7. 0 **8.** -2 **9.** -2

10. 343 **11.** 11 **12.** $\frac{1}{216}$

13. 729 **14.** 1 **15.** 2

16. $\frac{1}{256}$ **17.** $\frac{1}{64}$ **18.** $\frac{1}{3}$

19. 3 **20.** 4 **21.** 3

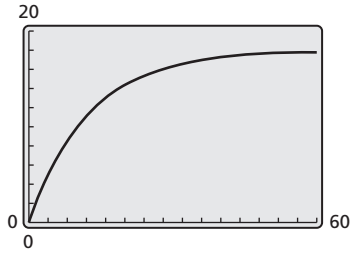
22. 512 **23.** 2 **24.** 2401

6.3 Puzzle Time

AT A SNOOPER MARKET

6.4 Start Thinking

1.



Sample answer: $x\text{min} = 0$, $x\text{max} = 60$, $x\text{scl} = 4$, $y\text{min} = 0$, $y\text{max} = 20$, $y\text{scl} = 2$

2. approximately 6 windows after 5 days; approximately 10 windows after 10 days

3. approximately 17 windows in approximately 36 days; Note that the graph asymptotically approaches 18 from below, but never reaches it.

6.4 Warm Up

1. reflection in x-axis, followed by a translation 3 units up

2. vertical shrink by a factor of $\frac{1}{2}$, followed by a translation 2 units left and 5 units down

3. reflection in y-axis, and a horizontal shrink by a factor of $\frac{1}{3}$

4. translation 2 units right, and a vertical stretch by a factor of 4

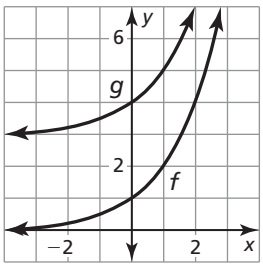
6.4 Cumulative Review Warm Up

1. $y = 3x + 5$ **2.** $y = -5x - 2$

3. $y = -2x + 9$ **4.** $y = \frac{11}{5}x + \frac{62}{5}$

6.4 Practice A

1. translation 3 units up



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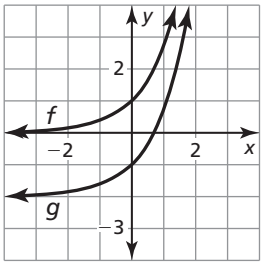
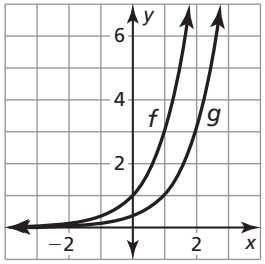
Answers

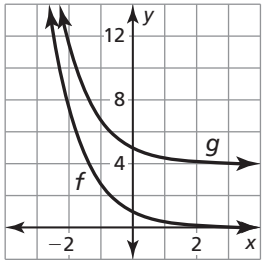
2. translation 2 units down



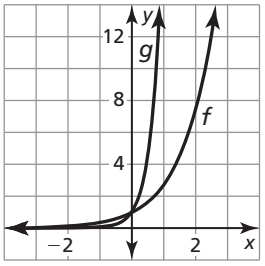
3. translation 1 unit right



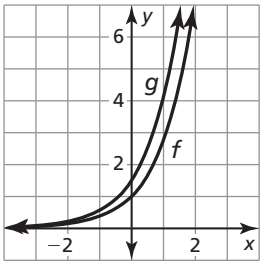
4. translation 4 units up



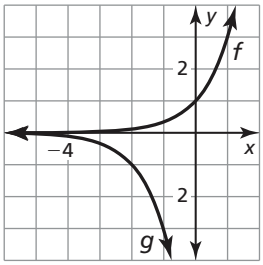
5. horizontal shrink by a factor of $\frac{1}{3}$



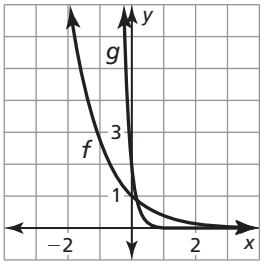
6. vertical stretch by a factor of $\frac{3}{2}$



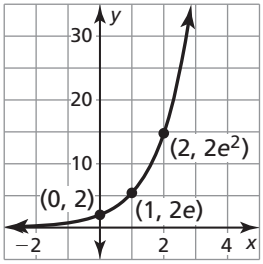
7. reflection in the x-axis, followed by a horizontal translation 2 units left



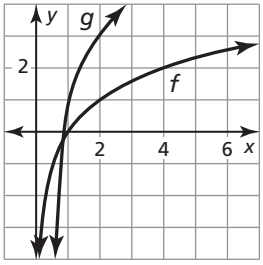
8. horizontal shrink by a factor of $\frac{1}{5}$ and a vertical stretch by a factor of 2



9. incorrectly evaluates as $(2e)^x$, but in $f(x) = 2e^x$, the 2 is the leading coefficient and not part of the base



10. vertical stretch by a factor of 4, followed by a translation 1 unit down



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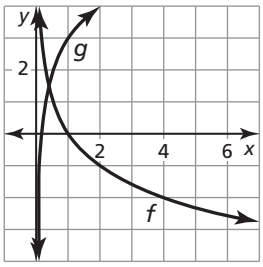
Answers

11. reflection in the x-axis, followed by a translation 3 units up



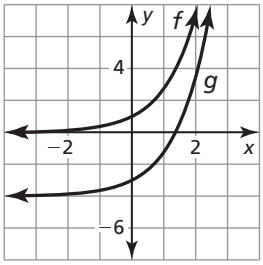
12. $g(x) = -3^{x+3} - 1$ **13.** $g(x) = \frac{1}{4}e^{x} + 5$

14. $g(x) = \log_8(-(x + 4))$

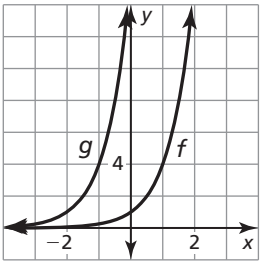
15. $g(x) = 9\log_{1/6}(x - 2) - 3$

6.4 Practice B

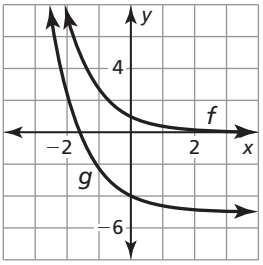
1. translation 4 units down



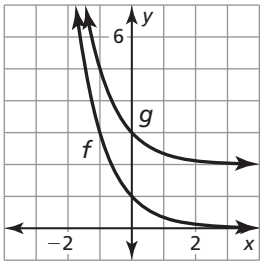
2. translation 2 units left



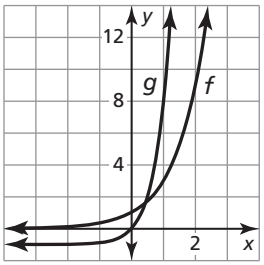
3. translation 5 units down



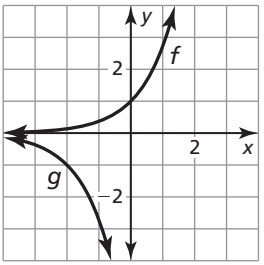
4. translation 2 units up



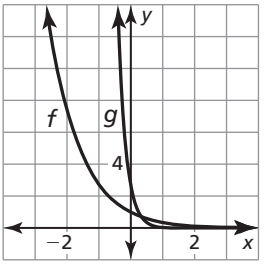
5. horizontal shrink by a factor of $\frac{1}{2}$, followed by a translation 1 unit down



6. reflection in the x-axis, followed by a translation 2 units left



7. translation 1 unit right, followed by a horizontal shrink by a factor of $\frac{1}{4}$



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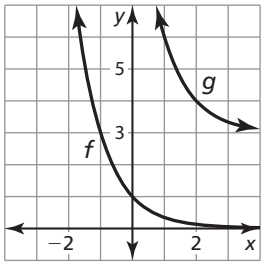
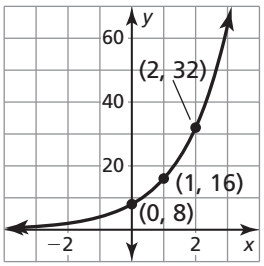
Answers

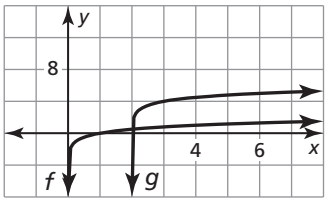
8. translation 2 units right and 3 units up



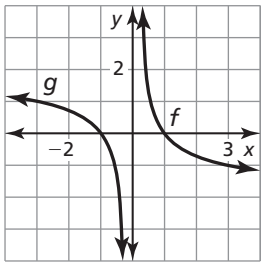
9. incorrectly evaluated as $2^x + 3$, but in $f(x) = 2^{x+3}$, the 3 is in the exponent and is added to x first



10. translation 2 units right and 4 units up



11. reflection in the y-axis, followed by a reflection in the x-axis



12. $g(x) = \left(\frac{2}{5}\right)^{-x/2} - 4$

13. $g(x) = 2\left(e^{-(x+2)} + 3\right) = 2e^{-x-2} + 6$

14. $g(x) = -\log_{12}(x - 5) + 2$

6.4 Enrichment and Extension

1. K **2.** D **3.** E **4.** M

5. L **6.** G **7.** I **8.** J

9. F **10.** A **11.** N **12.** C

13. B **14.** H

6.4 Puzzle Time

LUNCH

6.5 Start Thinking

Sample answer: In each group, the right side of the third equation is the sum of the previous two, whereas the left side of the third equation involves a product inside the log.

$\log_2(3 \bullet 4) = \log_2(3) + \log_2(4)$

$\log_3\left(15 \bullet \frac{1}{3}\right) = \log_3(15) + \log_3\left(\frac{1}{3}\right)$

$\log_4(9 \bullet 2) = \log_4(9) + \log_4(2)$

Following this pattern:

$$\begin{aligned}\log_5(25 \bullet x) &= \log_5 25 + \log_5 x \\ &= 2 + \log_5 x \\ &\approx 2 + 1.4 \\ &= 3.4\end{aligned}$$

6.5 Warm Up

1. $n = 7$ **2.** $n = 6$ **3.** $n = \frac{1}{2}$

4. $n = \frac{1}{4}$ **5.** $n = 2$ **6.** $n = -3$

6.5 Cumulative Review Warm Up

1. $5, 1$ **2.** $-\frac{4}{3}, \frac{5}{2}$ **3.** $2 \pm 2\sqrt{3}$

4. $1 \pm 2i$ **5.** 3 **6.** $\frac{-1 \pm \sqrt{10}}{3}$

6.5 Practice A

1. 0.43 **2.** 1.796 **3.** 1.366

4. $\log_2 5 + \log_2 x$ **5.** $\log 7 + 4 \log x$

6. $\log_6 2 + \log_6 x - \log_6 y$

7. confuses logarithm rules for products and powers; The log of a product is the sum of the logs, not another product.

$\log_4 3x = \log_4 3 + \log_4 x$

8. $\log_7 \frac{3}{5}$ **9.** $\log 2$ **10.** $\ln\left(x^3 y^9\right)$

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Answers

11. $\log_2\left(9y^{1/2}\right)$ **12.** 0.683 **13.** 3.459

14. 1.285 **15.** yes; $\ln x = \dfrac{\log x}{\log e}$

16. about 7 decibel levels

6.5 Practice B

1. 2.732 **2.** -1.113 **3.** -0.43

4. $\log_3 12 + 7\log_3 x$

5. $\log_6 5 + 2\log_6 x - 3\log_6 y$

6. $\log_8 6 + \dfrac{1}{2}\log_8 x + \dfrac{1}{2}\log_8 y$

7. does not distribute the $\dfrac{1}{3}$ power to y as well as x

$\ln \sqrt[3]{xy} = \dfrac{1}{3}\ln x + \dfrac{1}{3}\ln y$

8. $\log_9\left(\dfrac{x^5}{4}\right)$ **9.** $\log_8\left(5\sqrt[4]{x}\right)$

10. $\ln\left(16x^5y^3\right)$ **11.** $\log_6\left(\dfrac{1}{x^3}\right)$

12. 1.302 **13.** 3.096 **14.** -0.544

15. yes; $\dfrac{\ln y}{\ln 3} = \log_3 y$

16. about 4.77 decibel levels

6.5 Enrichment and Extension

1. 9 **2.** 6 **3.** 3

4. -1.9041 **5.** -9.4717 **6.** 1

7. 1.4307 **8.** 400 **9.** 50

10. -4 **11.** 2.0402 **12.** 2.9307

13. 68.6309 **14.** 0.5 **15.** 161

16. 9983.6667

6.5 Puzzle Time

A SILLYMANDER

6.6 Start Thinking

$10{,}000 = 5000e^{0.0525t}$; $t \approx 13.2$ years

6.6 Warm Up

1. $\log_2 5 = x - 1$; $x = 1 + \log_2 5$

2. $\ln 11 = -2x$; $x = -\dfrac{1}{2}\ln 11$

3. $\log_3 4 = 3 - 2x$; $x = \dfrac{3}{2} - \dfrac{1}{2}\log_3 4$

4. $2^{-1} = x + 5$; $x = -\dfrac{9}{2}$

5. $10^2 = 3 - x$; $x = -97$

6. $e^{1/3} = 2x$; $x = \dfrac{1}{2}\sqrt[3]{e}$

6.6 Cumulative Review Warm Up

1. $f(x) \to -\infty$ as $x \to -\infty$ and $f(x) \to -\infty$ as $x \to +\infty$

2. $g(x) \to +\infty$ as $x \to -\infty$ and $g(x) \to -\infty$ as $x \to +\infty$

3. $h(x) \to -\infty$ as $x \to -\infty$ and $h(x) \to +\infty$ as $x \to +\infty$

4. $p(x) \to +\infty$ as $x \to -\infty$ and $p(x) \to +\infty$ as $x \to +\infty$

6.6 Practice A

1. $x = -10$ **2.** $x = 2$

3. $x = 7$ **4.** $x = \log_2 5 \approx 2.322$

5. $x = \log_8 35 \approx 1.71$ **6.** $x = -\dfrac{1}{5}$

7. **a.** 24 years **b.** 246.1 cm

8. $x = 7$ **9.** $x = 1$

10. $x = 6$ **11.** $x = \dfrac{32}{5}$

12. $x = 100.7$ **13.** $x = 1$

14. $x = 4$; extraneous solution: $x = -1$

15. $x = 1$; extraneous solution: $x = -\dfrac{3}{2}$

16. $x = 2.91$; extraneous solution: $x = -6.91$

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Answers

17. $x = \pm\sqrt{6}$

18. a. 14.2 years
b. 13.95 years
c. 13.864 years
d. 13.863 years

19. $x < 1.92$ **20.** $x \geq 2.89$ **21.** $x > 9$

22. $x \approx 4.32$ **23.** $x \approx 1.03$

6.6 Practice B

1. $x = -3$

2. $x = \log_7 32 \approx 1.781$

3. $x = -4$

4. $x = \frac{1}{4}\log_6 13 \approx 0.358$

5. $x = \frac{1}{3}\ln 2 \approx 0.231$

6. $x = \frac{1}{2}\ln 2 \approx 0.347$

7. a. 2130.9 years
b. more years; 942.95 more years

8. $x = 2$ **9.** $x = \frac{1}{3}$ **10.** $x = \frac{4}{3}$

11. $x = 1$ **12.** $x = 5, -3$ **13.** $x = -5, 4$

14. $x = 13.22$; extraneous solution: $x = -11.22$

15. $x = \pm\frac{5}{4}$ **16.** $x = -1.35, -6.65$

17. $x = 0.772$; extraneous solution: $x = -7.772$

18. $x < 2 + 3\ln 3 \approx 4.08$

19. $x > e^5 \approx 148.4$

20. $x \geq \frac{1}{81} \approx 0.012$ **21.** 8.5 years

6.6 Enrichment and Extension

1. after about 30 min

2. about 2 h and 11 min

6.6 Puzzle Time

SO THEY HAVE SOMEWHERE TO PUT THE GROCERIES WHEN THEY GO SHOPPING

6.7 Start Thinking

1. exponential; *Sample answer*: An account balance increases over time.

2. linear; *Sample answer*: A scientist introduces a specific amount of chemical to a solution each hour.

3. quadratic; *Sample answer*: A model rocket is shot from a platform.

6.7 Warm Up

1. $y = 1.8x - 3.333$

2. $y = -1.626x + 3390.974$

6.7 Cumulative Review Warm Up

1. $x = \frac{17}{2}$ **2.** $x = 8$

3. $x = \frac{4}{7}$ **4.** $x = \frac{13}{4}$

6.7 Practice A

1. exponential; common ratio $= \frac{1}{3}$

2. quadratic; common second difference

3. $y = 3(2)^x$ **4.** $y = 5(4)^x$ **5.** $y = 2(3)^x$

6. $y = 2(5)^x$ **7.** $y = 7(2)^x$ **8.** $y = 5(3)^x$

9. The x-values must have a common difference before a common ratio in the y-values can be used.

x	0	1	3	5	7
y	2	4	8	16	32

$\times 2$ $\times 2$ $\times 2$ $\times 2$

The outputs have a common ratio of 2, but the inputs do not have a common difference, so the data do not represent a recognizable function.

10. exponential relationship; $y = 96(2)^x$

11. linear relationship; For every increase of x by 1, y increases by 5.

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Answers

12. $y = 5(1.2)^x$

6.7 Practice B

1. exponential; common ratio $= 4$

2. exponential; common ratio $= \frac{3}{2}$

3. $y = 5(2)^x$ **4.** $y = 6(3)^x$ **5.** $y = 9(2)^x$

6. $y = 3(5)^x$ **7.** $y = \frac{1}{10}(6)^x$ **8.** $y = \frac{1}{2}(4)^x$

9. assumed that the output of any exponential function is always positive, because b^x is always positive, but forgot that the coefficient a can be negative

x	0	2	4	6	8
y	-2	-4	-8	-16	-32

$\times 2$ $\times 2$ $\times 2$ $\times 2$

The outputs have a common ratio of 2, so the data represent an exponential function.

10. exponential relationship; $y = 64\left(\frac{\sqrt{2}}{2}\right)^{x-1}$

11. linear relationship; For every increase of x by 10, y increases by 15.

12. $y = 3.4(1.5)^x$

6.7 Enrichment and Extension

1. 10^8, or 100,000,000 times louder

2. 10^{11}, or 100,000,000,000 times louder

3. 30 decibels **4.** 60 decibels

6.7 Puzzle Time

SHEEP SHAPE

Cumulative Review

1. 245 **2.** 48 **3.** 162

4. -32 **5.** -224 **6.** -320

7. -8 **8.** 9 **9.** 16

10. $\frac{8}{27}$ **11.** $\frac{16}{25}$ **12.** $\frac{1}{81}$

13. $-\frac{8}{125}$ **14.** $\frac{1}{256}$ **15.** $-\frac{27}{64}$

16. $-\frac{1}{32}$ **17.** $-\frac{16}{81}$ **18.** $-\frac{27}{125}$

19. 5×10^{-4} **20.** 3.82×10^{11}

21. -1.32×10^{-2} **22.** 5.7×10^{-6}

23. 2.3×10^{6} **24.** -9.2×10^{-10}

25. -3.59×10^{-4} **26.** 5.13×10^{4}

27. 4.1×10^{-5} **28.** 4.5×10^{3}

29. 1.2×10^{7} **30.** 7.31×10^{5}

31. -8.17×10^{-7} **32.** 4.17×10^{11}

33. -6.2×10^{4} **34.** 8.3×10^{12}

35. 8.9×10^{-8} **36.** 2×10^{-3}

37. a. Bowling Alley A: \$19, Bowling Alley B: \$25
b. Bowling Alley A: \$22.50, Bowling Alley B: \$25
c. 6 games or more

38. a. \$22.50 **b.** \$25 **c.** \$100

39. 0.00185 **40.** $-89{,}000$

41. 0.0000000384 **42.** 0.000000257

43. 460,000 **44.** -0.00334

45. 0.0000000305 **46.** 44,900

47. 590,000 **48.** $-2{,}250{,}000{,}000$

49. 0.308 **50.** -0.0000000106

51. 55,100,000 **52.** 618,000,000

53. 0.000000184 **54.** 890,000

55. 0.000000092 **56.** -0.0000732

57. $y = -\frac{2}{5}x - 12$ **58.** $y = \frac{5}{11}x - 4$

59. $y = \frac{3}{5}x - 9$ **60.** $y = \frac{1}{4}x - 4$

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Answers

61. $y = -\frac{7}{8}x + 3$

62. $y = \frac{3}{5}x - 12$

63. $y = -2x + 7$

64. $y = 3x - 20$

65. $y = -\frac{1}{2}x - 10$

66. $y = \frac{5}{6}x + 5\frac{1}{2}$

67. $y = -3x + 13$

68. $y = 4x + 24$

69. $x = 0$ and $x = 7$

70. $x = -3$ and $x = 0$

71. $x = -4$ and $x = 0$

72. $x = 0$ and $x = 8$

73. $x = 1$ and $x = 2$

74. $x = -9$ and $x = 3$

75. $x = -6$ and $x = -5$

76. $x = -2$ and $x = 8$

77. $x = -\frac{7}{2}$ and $x = 5$

78. $x = -5$ and $x = \frac{1}{3}$

79. $x = -4$ and $x = \frac{7}{2}$

80. $x = -\frac{1}{3}$ and $x = 7$

81. $x = -\frac{1}{5}$ and $x = 3$

82. $x = \frac{7}{3}$ and $x = 9$

83. $4 + 4i$

84. $4 - 3i$

85. $11 - 12i$

86. $-12 - i$

87. $10 + 6i$

88. $8 - 20i$

89. $1 - 3i$

90. $-2 + 14i$

91. $-14 - 3i$

92. $21 - 5i$

93. $5 + 8i$

94. $-10 + 6i$

95. $18 + 21i$

96. $-17 - 5i$

97. $-6 + 12i$

98. $-10 - 5i$

99. $-28 - 21i$

100. $-6 - 7i$

101. $-81 + 69i$

102. $-42 + 66i$

103. $-36 + 32i$

104. $-50 - 30i$

105. $-41 + 126i$

106. $-31 + 53i$

107. $-79 + 14i$

108. $27 + 3i$

109. $x = \frac{-3 \pm i}{2}$

110. $x = \frac{1 \pm i\sqrt{35}}{6}$

111. $x = \frac{-3 \pm i\sqrt{87}}{8}$

112. $x = \frac{5 \pm i\sqrt{167}}{12}$

113. $x = 2 \pm i\sqrt{3}$

114. $x = \frac{3 \pm i\sqrt{6}}{5}$

115. $x = \frac{9 \pm i\sqrt{15}}{8}$

116. $x = \frac{5 \pm i\sqrt{7}}{4}$

117. **a.** $P = 10x$

b. $A = 4x^2 + 30x - 100$

c. $x = 12$

d. 836 ft^2

118. $x = \frac{-5 \pm \sqrt{41}}{2}$

119. $x = \frac{-2 \pm \sqrt{2}}{2}$

120. $x = 4 \pm \sqrt{21}$

121. $x = 1$ and $x = 2$

122. $x = 1$ and $x = \frac{3}{2}$

123. $x = \frac{5 \pm \sqrt{17}}{2}$

124. $x = \frac{3 \pm 2\sqrt{3}}{3}$

125. $x = \frac{-3 \pm \sqrt{89}}{10}$

126. $x = \frac{1}{3}$ and $x = \frac{1}{2}$

127. $x = \frac{7 \pm \sqrt{73}}{4}$

128. $x = \frac{-7 \pm \sqrt{37}}{2}$

129. $x = \frac{1 \pm \sqrt{129}}{8}$

130. $x = \frac{5 \pm \sqrt{13}}{6}$

131. $x = \frac{9 \pm \sqrt{129}}{4}$

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Answers

132. a. $P = 6x + 8$

b. $A = 2x^2 + 8x$

c. $x = 8$

d. 192 ft^2

133. a. $A = 40.5x$

b. $x = 6$

c. 243 ft^2

d. \$605.07

134. a. $A = 32x$

b. $x = 11$

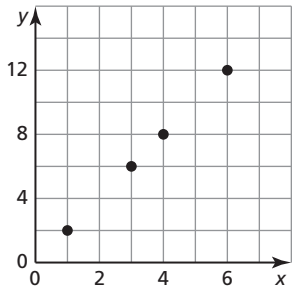
c. 352 ft^2

d. \$1615.68

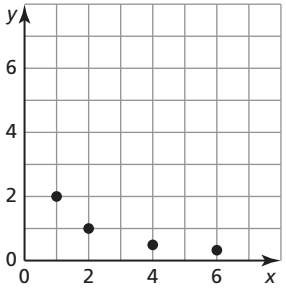
Chapter 7

7.1 Start Thinking

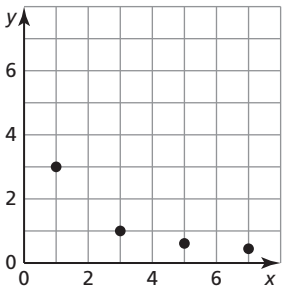
1. The quotient of x and y is the same for each point, $\frac{x}{y} = \frac{1}{2}$. The graph is the line $y = 2x$.



2. The product of x and y is the same for each point, $xy = 2$. The graph is not a line but curved.



3. The product of x and y is the same for each point, $xy = 3$. The graph is not a line but curved.



7.1 Warm Up

1. $-\frac{3}{4}$ **2.** 10 **3.** 0.8

4. -26 **5.** -26 **6.** $-\frac{3}{2}$

7.1 Cumulative Review Warm Up

1. $\left(-\frac{1}{2}, 3\right)$ **2.** $\left(\frac{21}{2}, -3\right)$

3. $\left(\sqrt{3}, 3\right), \left(-\sqrt{3}, 3\right)$

7.1 Practice A

1. inverse variation **2.** inverse variation

3. direct variation **4.** direct variation

5. neither **6.** direct variation

7. inverse variation **8.** neither

9. direct variation **10.** inverse variation

11. $y = -\frac{30}{x}; y = -10$ **12.** $y = \frac{7}{x}; y = \frac{7}{3}$

13. $y = \frac{2}{x}; y = \frac{2}{3}$

14. incorrectly used the equation $\frac{y}{x} = a$, which implied a direct variation between x and y, not inverse variation;

$xy = a$

$(5)(6) = a$

$a = 30$

So, $y = \frac{30}{x}$.

15. 3750 songs

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