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**1-5 Study Guide and Intervention**

(continued)

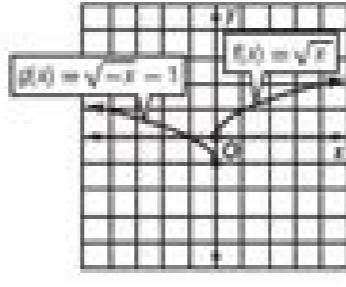
**Parent Functions and Transformations**

**Transformations of Parent Functions** Parent functions can be transformed to create other members in family of graphs.

<b>Translations</b>	$g(x) = f(x) + k$ is the graph of $f(x)$ translated...	... $k$ units up when $k > 0$ .
		... $k$ units down when $k < 0$ .
<b>Reflections</b>	$g(x) = -f(x)$ is the graph of $f(x)$ ...	...reflected in the $x$ -axis.
	$g(x) = f(-x)$ is the graph of $f(x)$ ...	...reflected in the $y$ -axis.
<b>Dilations</b>	$g(x) = a \cdot f(x)$ is the graph of $f(x)$ ...	...expanded vertically if $a > 1$ .
		...compressed vertically if $0 < a < 1$ .
	$g(x) = f(ax)$ is the graph of $f(x)$ ...	...compressed horizontally if $a > 1$ .
		...expanded horizontally if $0 < a < 1$ .

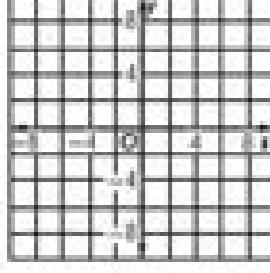
**Example** Identify the parent function  $f(x)$  of  $g(x) = \sqrt{-x} - 1$ , and describe how the graphs of  $g(x)$  and  $f(x)$  are related. Then graph  $f(x)$  and  $g(x)$  on the same axes.

The graph of  $g(x)$  is the graph of the square root function  $f(x) = \sqrt{x}$  reflected in the  $y$ -axis and then translated one unit down.

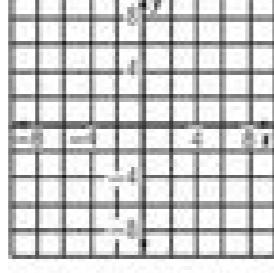
**Exercises**

Identify the parent function  $f(x)$  of  $g(x)$ , and describe how the graphs of  $g(x)$  and  $f(x)$  are related. Then graph  $f(x)$  and  $g(x)$  on the same axes.

1.  $g(x) = 0.5|x + 4|$



2.  $g(x) = 2x^2 - 4$

**Chapter 3 Answers****Practice 3-1**

1. 1 2. 2 3. 2 4. 1 5. 3 6. -10  
 7.  $3.50 + 2.50r = 16$ ; 5 roses  
 8.  $210m + 580 = 10,000$ ; 45 min  
 9.  $6.5 + 1.5h = 11$ ; 3h 10.  $0.34 + 0.21n = 1.18$ ; 5 oz  
 11.  $24.95 + 5.95a = 50$ ; 4 pair 12. 4.5 13. -17 14. 4  
 15. -36 16. -8.4 17. -6 18. 14 19. 14 20. 16 21. 6  
 22. -9.5 23. 168 24. -3 25. 9 26. -5 27. -21  
 28. -69 29. 3.1 30. -55 31. 13 32. -22  
 33. a. Subtr. Prop. of Eq.  
     b. Simplify.  
     c. Mult. Prop. of Eq.  
     d. Simplify.  
 34. a. Subtr. Prop. of Eq.  
     b. Simplify.  
     c. Mult. Prop. of Eq.  
     d. Simplify.  
 35. a. Add. Prop. of Eq.  
     b. Simplify.  
     c. Div. Prop. of Eq.  
     d. Simplify.

**Practice 3-2**

1. -9.6 2. 6.9 3. 2.98 4. -3 5. -11 6. -9 7. 5  
 8. -11 9. 4 10. 3 11. -5 12. 2 13. -5 14. 3 15. 7  
 16. 23 17. -6 18. 21 19. -8 20. 5 21. 10 22. -1  
 23. -2 24. -5 25. 44 26. 3 27. 4 28. 9 29. 5  
 30. -15 31. 31 32. -27 33.  $\frac{3}{2}$  34. 12 35. 3 36. -11  
 37. 24 38. 49 39. -10 40.  $\frac{3}{2}$  41. -12 42. 2 43.  $-\frac{7}{3}$   
 44. 2 45. 24 46.  $2n + 3(400 - n) = 1050$ ; 150 student tickets, 250 adult tickets 47.  $w + 2w + w + 2w = 30$ ; 10 ft  
 48.  $\frac{1}{3}t + \frac{2}{3}t = 1100$ ; \$1500 49.  $\frac{5}{7}m = 125$ ; 175 lb  
 50.  $29.95 + 0.10m = 99.95$ ; 700 min

**Practice 3-3**

1. 7 2. 9 3. -15 4. 3 5. identity 6. 5 7. no solution  
 8. 13 9. 7 10. no solution 11. 4 12. 8 13. identity  
 14. no solution 15. 2 16. -9 17. identity 18. 18 19. 7  
 20. identity 21. identity 22. identity 23. no solution  
 24. 3 25. 2 26. 1 27. -2 28. no solution 29. 10  
 30. identity 31.  $-\frac{15}{2}$  32. -3 33. 4  
 34.  $40d = 60 + 20d$ ; 3 days 35.  $4v = 21 + 2.50v$   
 36.  $100 + c = 5c$ ; 25 candles 37. 1 38. 20  
 39. 0.5

**Practice 3-4**

1. 57.50/b 2. \$0.75/lb 3. 287 bags/d 4. 680 cal/h  
 5. \$0.50/oz 6. \$9.40/oz 7. mo: 168 = 180 8. yes; 90 = 90  
 9. yes; 72 = 72 10. yes; 16 = 16 11. no; -24 ≠ -25.6  
 12. 3 13. 35 14. 26.4 15. 2 16. 2.5 17. 15 18. 16  
 19. 2.1 20. 22.5 21. 9 22. 15 23. 96 24. 3 25. 45  
 26. 40 27. 18 28. 2 29. 7.2 30. 4.8 31. 3 32. 45  
 33. 11.25 34. 30.25 35. 3 36.  $-\frac{5}{3}$  37. 7 38. 2.75  
 39. -6 40. -5 41. 3.75 42. 52.5 min 43. 182 mi  
 44.  $54\frac{1}{2}$  beats 45. \$0.10/mi

**Practice 3-5**

1. 7.2 2. 11.6 3. 1.5 4. 4.4 5. 3 6. 6.6 7. 9.3 8. 6  
 9. 20 10. 216 in. 11. 4 in. 12. 27.5 ft. 13. 7.5 14. 7 in.

**Practice 3-6**

1.  $60(t - 1.5) = 40t$ ; freight train: 4.5 h, passenger train: 3 h  
 2.  $10(t + 1.5) = 25t$ ; 2.5 h  
 3.  $r + 10 = 3r$ ; Leah: 5 km/h, May: 15 km/h  
 4.  $24 = 2(w + 4) + 2w$ ; width: 4 in., length: 8 in.  
 5.  $48 = 2(3w) + 2w$ ; width: 8 in., length: 16 in.  
 6.  $60r + 50t = 330$ ; 1:00 P.M.  
 7.  $3t = \frac{1}{2}(4t) - \frac{2}{3}$  h or 40 min  
 8.  $3t + 2t = 4; \frac{4}{5}$  h or 48 min  
 9. 800 = 1000t - 3t; 9:00 A.M.  
 10.  $200(t + 1) = 250t$ ; 1000 mi  
 11.  $x + x + 1 + x + 2 = 126$ ; 41, 42, 43  
 12.  $x + x + 2 + x + 4 + x + 6 = 216$ ; 51, 53, 55, 57  
 13.  $84 = 2(w + 8) + 2w$ ; 17 in.  
 14.  $x + 2x - 8 + 2x - 8 = 74$ ; 18 in.

**Practice 3-7**

1. 25% decrease 2. 150% increase 3. 50% decrease  
 4. 200% increase 5. 6% decrease 6. 40% increase  
 7. 63% decrease 8. 75% increase 9. 14% increase  
 10. 31% increase 11. 150% increase 12. 20% decrease  
 13. 50% increase 14. 10% decrease 15. 13% decrease  
 16. 50% increase 17. 20% decrease 18. 11% decrease  
 19. 22% increase 20. 18% increase 21. 30% increase  
 22. 11% increase 23. 300% increase 24. 66% increase  
 25. 310% increase 26. 13% decrease 27. 45% increase  
 28. 0.5 cm; 16.7% 29. 0.05 cm; 10% 30. 0.5 cm; 8.3%  
 31. 0.5 in.; 3.1% 32. 0.005 g; 0.01% 33. 0.05 cm; 5.6%  
 34.  $71.25 \text{ cm}^2$ ;  $89.25 \text{ cm}^2$  35.  $11.25 \text{ in.}^2$ ;  $19.25 \text{ in.}^2$   
 36.  $86.25 \text{ m}^2$ ;  $106.25 \text{ m}^2$  37.  $5831.88 \text{ in.}^3$ ;  $6868.13 \text{ in.}^3$   
 38.  $3171.88 \text{ cm}^3$ ;  $3871.13 \text{ cm}^3$  39.  $39.38 \text{ m}^3$ ;  $86.63 \text{ m}^3$

## Do you know HOW?

Identify a pattern and find the next three numbers in the pattern.

1.  $-5, -3, 1, 3, \dots$
2.  $6, 12, 18, \dots$
3.  $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \dots$  Find the next two terms.  $\frac{1}{16}, \frac{1}{32}$
4.  $x + 2, x + 3, \dots$  Find the next term.  $x + 4$

5. What properties of real numbers are illustrated by each equation below?

6.  $x + (-x) = 0$  Inverse Property of Addition
7.  $3(x + 4) = 3x + 12$  Distributive Property
8.  $\frac{1}{2} \cdot \frac{2}{3} = 1$  Inverse Property of Multiplication

Evaluate the expression for the given value of the variable.

$$4. x^2 - 2x + 11; x = 3$$

$$5. 3(2x - 1) - 3x + 2x - 4$$

6. The expression  $(x - 4)$  models the daily cost in dollars of renting a car gear from the car rental company. In the expression,  $x$  represents the number of hours the car is gear. What is the cost of renting a car gear for a day when the car is gear for 2 hours?  $\$10$

Solve each equation.

$$7. x + 2 = 3x - 5$$

8.  $8(y + 1) = 64$

Solve each equation for  $x$ . State any restrictions on the variables.

$$9. \frac{x+1}{x-2} = x$$

$$x = \frac{x+1}{x-2}$$

## Chapter 6 Answers

### Practice 6-1

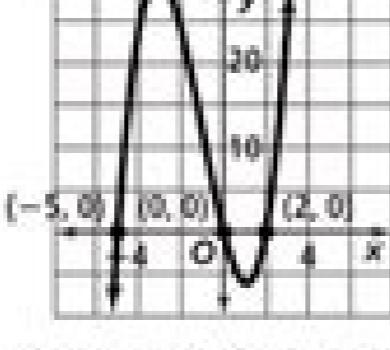
1.  $y = -0.0439834815x^3 + 0.6507936508x^2 - 2.935185185x + 24.84126984; 21.098$
2.  $y = 0.0130787037x^3 + 0.1743053556x^2 + 0.7951058201x + 3.125396825; 4.6362$
3.  $5x + 2$ ; linear binomial
4.  $-3$ ; constant monomial
5.  $6x^4 - 1$ ; quartic binomial
6.  $3x^2 - 2x + 1$ ; quartic trinomial
7.  $2m^2$ ; quadratic monomial
8.  $-4x^3 + x^2 + 3x$ ; cubic trinomial
9.  $2x^2 - 1$ ; quadratic binomial
10.  $-3m^3 + 5m^2$ ; cubic binomial
11.  $-7x^2 + 5x$ ; quadratic binomial
12.  $3x^3$ ; cubic monomial
13.  $-x^3 + 2$ ; cubic binomial
14.  $-x$ ; linear monomial
15.  $a^5 + a^4 + a^3$ ; quintic trinomial
16.  $x^2 - 25$ ; quadratic binomial
17.  $p^2 - 5p + 6$ ; quadratic trinomial
18.  $9c^4$ ; quartic monomial
19.  $b - 3$ ; linear binomial
20.  $12x - 6$ ; linear binomial

21.  $x^2 + \frac{2}{3}$ ; quadratic binomial
22.  $\frac{1}{2}x^4 + x - \frac{5}{4}$ ; quartic trinomial
23.  $-\frac{1}{3}z^5 + 1$ ; quintic binomial
24.  $3x + 5$  units

25.  $0.0008797x^3 + 0.2229900x^2 - 3.1465532x + 29.0544437$ ; about 31203.18

26.  $0.000006x^3 - 0.0005101x^2 + 0.1270416x + 2.0612682$ ; about 12 yr

### 22. $-5, 0, 2$



23. rel. max.: 4.06; rel. min.: -8.21; zeros: 0, 2, 5
24. rel. max.: 16.9; rel. min.: -5.05; zeros: -3, 1, 3
25.  $x(x + 2)(x - 8)$
26.  $x(x + 3)(x + 4)$
27.  $x(x - 3)(x - 5)$
- 28a.  $V = x^2(20 - x)$
- 28b. about 1185 in.<sup>3</sup>

### Practice 6-3

1. yes
2. yes
3. no
4. yes
5.  $x^2 - 3x + 2$
6.  $x^2 + 3x - 7$ , R 5
7.  $-2x^2 + 9x + 5$
8.  $x^2 + 6x + 9$
9.  $x^2 - x + 8$ , R -12
10.  $x^2 - 7$ , R -10
11.  $x^2 + x$ , R 1
12.  $x^2 + 2x^2 + 6$
13.  $x^3 - x^2 + x + 11$ , R 32
14.  $2x^3 + 15x^2 - 12x$
15.  $-1$
16.  $-16$
17.  $-13$
18.  $0$
19.  $x - 16$
20.  $2x + 11$ , R 48
21.  $x^2 + 6x + 3$ , R 2
22.  $3x^2 - 7x + 7$ , R -8
23.  $(x + 1)(x - 3)(x + 5)$
24.  $(x - 2)(x + 3)(x - 4)$
25.  $2x^2 - 2x - 1$ , R 16
26.  $x^3 + 3x^2 + 3x + 4$ , R 1
27.  $x^3 + 2x^2 - x$ , R 1
28.  $x^4 + x^3 + x^2 + x + 1$
29.  $x^3 + 2x^2 + x + 2$ , R -6
30.  $3x^2 - 3x + 3$
31. width:  $x - 3$ ; height:  $x - 5$

### Practice 6-2

1. 5, multiplicity 3
2. 0, 8, multiplicity 2
3. 2, -7, multiplicity 1
4. 0, multiplicity 2; 4, multiplicity 2
5.  $-3, 0, 3$

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### Practice 6-2

6.  $-\frac{5}{2}, 3$ , multiplicity 2
7.  $y = 2x^3 - x^2 - 50x + 25$
8.  $y = -2x^3 + 15x^2 - 22x - 15$
9.  $V = x^3 + 54x^2 + 936x + 5184$
10.  $y = x^3 - 6x^2 + 5x + 12$
11.  $y = x^3 + 4x^2 + 5x - 2$
12.  $y = x^4 - 2x^3 - 15x^2$
13.  $y = x^3 + 6x^2 + 12x + 8$
14.  $x^3 - 2x^2 + x + 1$
15.  $x^3 + 7x^2 + 15x + 9$
16.  $2x^4 + 23x^3 + 60x^2 - 125x - 500$
17.  $y = 2x(x + 2)(x + 3)$
18.  $y = x^2(x + 2)(x - 3)$
19.  $y = -3x(x - 3)^2$
20.  $-1, 1, 3$

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### Practice 6-4

1.  $(2x - 3)(4x^2 + 6x + 9); \frac{3}{2}, \frac{-3 \pm 3\sqrt{3}}{4}$
2.  $(x + 4)(x^2 - 4x + 16); -4, 2 \pm 2\sqrt{3}$
3.  $2(x + 3)(x^2 - 3x + 9); -3, \frac{3 \pm 3\sqrt{3}}{2}$
4.  $2(x - 5)(x^2 + 5x + 25); 5, \frac{-5 \pm 5\sqrt{3}}{2}$
5.  $4(x - 2)(x^2 + 2x + 4); 2, -1 \pm i\sqrt{3}$
6.  $(3x + 1)(9x^2 - 3x + 1); -\frac{1}{3}, \frac{1 \pm i\sqrt{3}}{6}$
7.  $(4x - 1)(16x^2 + 4x + 1); \frac{1}{4}, \frac{-1 \pm i\sqrt{3}}{8}$
8.  $(x - 3)(x^2 + 3x + 9); 3, \frac{-3 \pm 3\sqrt{3}}{2}$
9.  $(x + 1)(x - 1)(x + 2)(x - 2); -2, -1, 1, 2$
10.  $(x + 1)(x - 1)(x^2 - 1); -1, 1, -\sqrt{11}, \sqrt{11}$
11.  $(x^2 - 2)(x^2 - 8); -\sqrt{2}, \sqrt{2}, -\sqrt{8}, \sqrt{8}$
12.  $(x + 2)^2(x - 2)^2; -2, 2$
13.  $(x^2 - 7)(x^2 - 2); -\sqrt{7}, \sqrt{7}, -\sqrt{2}, \sqrt{2}$
14.  $(x^2 + 4)(x^2 + 9); -2i, 2i, -3i, 3i$
15.  $(x + 1)(x - 1)(x + 3)(x - 3); -1, 1, -3, 3$
16.  $(x + 1)(x - 1)(x^2 + 4); -1, 1, -2i, 2i$
17. 5.52%
18.  $-2, 2, -0.71, 0.71$
19. 0.06, 15.94
20. 0





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