

Answers

58. (7, -3) 59. (4, 9) 60. (-1, -7)
61. no solution 62. (-2, 7) 63. no solution
64. no solution 65. (7, -2)
66. infinitely many solutions
67. (1, 7)
68. infinitely many solutions
69. (-2, -9) 70. $9a^2 + 12a + 4$
71. $b^2 - 14b + 49$ 72. $25c^2 + 90c + 81$
73. $9d^2 - 48d + 64$ 74. $16m^2 - 32m + 16$
75. $4n^2 + 4n + 1$ 76. $25p^2 - 60p + 36$
77. $q^2 - 4q + 4$
78. x-intercept: 3, y-intercept: 2
79. x-intercept: -8, y-intercept: $\frac{8}{5}$
80. x-intercept: 7, y-intercept: $-\frac{7}{6}$
81. x-intercept: $\frac{5}{2}$, y-intercept: $\frac{5}{3}$
82. x-intercept: 4, y-intercept: $\frac{1}{2}$
83. x-intercept: 9, y-intercept: $-\frac{1}{2}$
84. $y = 2x + 3$ 85. $y = x - 4$
86. $y = -\frac{1}{4}x + 1$ 87. $y = -\frac{3}{4}x - 5$
88. $y = 4x$ 89. $y = \frac{4}{5}$
90. $y = -\frac{2}{7}x - \frac{1}{2}$ 91. $y = \frac{2}{3}x + 2$
92. $g(x) = |x + 2| - 3$ 93. $g(x) = |x + 5| - 5$
94. $g(x) = 3|x + 2| - 15$
95. $g(x) = |x + 2| - 6$
96. infinitely many solutions
97. (2, 4, 7)

98. infinitely many solutions
99. no solution 100. (-3, -4, 2)
101. (1, -4, 7) 102. 3 in. by 6 in.
103. a. You need 7.5 pounds of peanuts, 3.5 pounds of raisins, 4.5 pounds of pretzels, and 3 pounds of chocolate candy pieces.
b. Recipe B c. 3 lbs
104. your friend; \$6.50

Chapter 2

2.1 Start Thinking

Sample answer:

$$f(x) = x^2$$

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

$$f(x) = (x - 1)^2$$

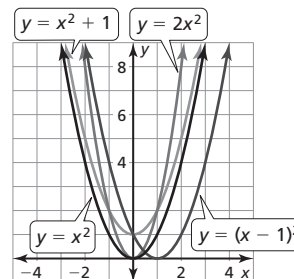
x	-2	-1	0	1	2
$f(x)$	9	4	1	0	1

$$f(x) = 2x^2$$

x	-2	-1	0	1	2
$f(x)$	8	2	0	2	8

$$f(x) = x^2 + 1$$

x	-2	-1	0	1	2
$f(x)$	5	2	1	2	5



The function $f(x) = (x - 1)^2$ is a horizontal translation 1 unit right ($h = 1$). The function $f(x) = 2x^2$ is a vertical stretch by a factor of 2 ($a = 2$). The function $f(x) = x^2 + 1$ is a vertical translation 1 unit up ($k = 1$).

Answers

2.1 Warm Up

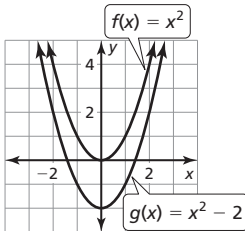
- $6x^2 - 16x + 8$
- $20x^2 + 13x + 2$
- $8x^2 - 10xy - 3y^2$
- $12a^2 + 3a$
- $20x^2 - 3x - 2$
- $15y^2 + 22y + 8$

2.1 Cumulative Review Warm Up

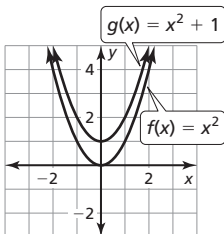
- $g(x) = x + 3$
- $g(x) = x - 2$
- $g(x) = |5x - 2| - 4$

2.1 Practice A

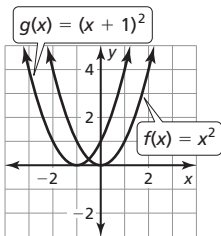
- The graph of g is a translation 2 units down of the graph of f .



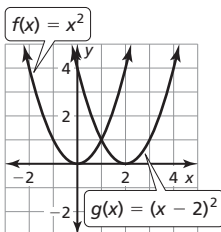
- The graph of g is a translation 1 unit up of the graph of f .



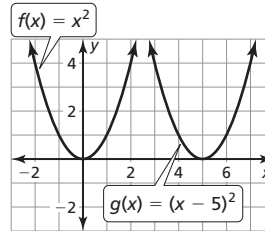
- The graph of g is a translation 1 unit left of the graph of f .



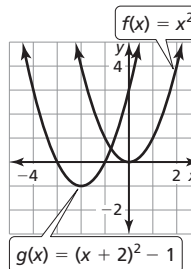
- The graph of g is a translation 2 units right of the graph of f .



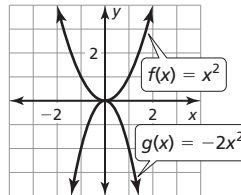
- The graph of g is a translation 5 units right of the graph of f .



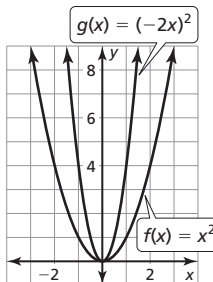
- The graph of g is a translation 2 units left and 1 unit down of the graph of f .



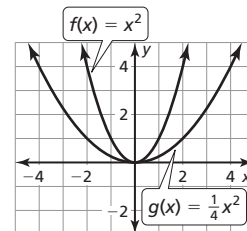
- The graph of g is a reflection in the x -axis followed by a vertical stretch by a factor of 2 of the graph of f .



- The graph of g is a reflection in the y -axis followed by a horizontal shrink of the graph of f by a factor of $\frac{1}{2}$.



- The graph of g is a vertical shrink by a factor of $\frac{1}{4}$ of the graph of f .

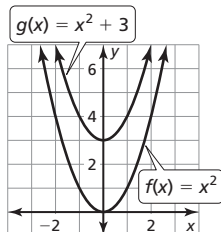


Answers

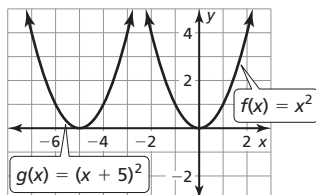
10. When $0 < a < 1$ in the function $g(x) = a \cdot f(x)$, the transformation is a vertical shrink, not stretch; The graph of g is a reflection in the x -axis followed by a vertical shrink by a factor of $\frac{1}{3}$ of the graph of the parent quadratic function.
11. The graph is a vertical stretch by a factor of 2, followed by a translation 3 units left and 2 units up of the parent quadratic function; $(-3, 2)$
12. The graph is a reflection in the x -axis, followed by a vertical stretch by a factor of 5 and a translation 1 unit down of the parent quadratic function; $(0, -1)$
13. $g(x) = -3x^2 - 3$; $(0, -3)$
14. $g(x) = -x^2 - 7$; $(0, -7)$
15. a. $a = 2, h = 3, k = -4$; $g(x) = (2x - 3)^2 - 4$
 b. $a = 4, h = 3, k = -4$; $g(x) = 4(x - 3)^2 - 4$

2.1 Practice B

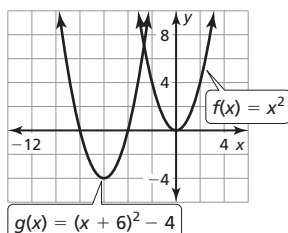
1. The graph of g is a translation 3 units up of the graph of f .



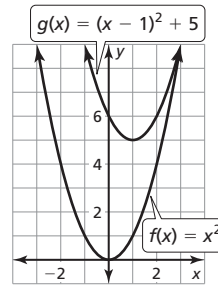
2. The graph of g is a translation 5 units left of the graph of f .



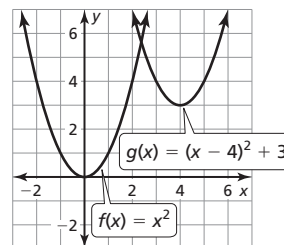
3. The graph of g is a translation 6 units left and 4 units down of the graph of f .



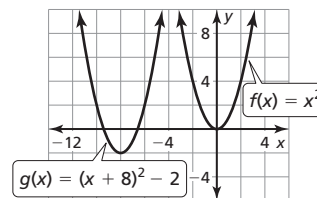
4. The graph of g is a translation 1 unit right and 5 units up of the graph of f .



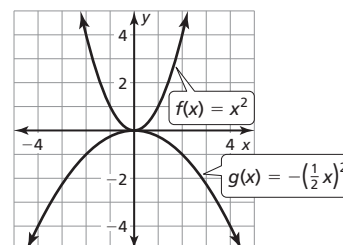
5. The graph of g is a translation 4 units right and 3 units up of the graph of f .



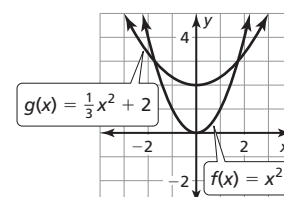
6. The graph of g is a translation 8 units left and 2 units down of the graph of f .



7. The graph of g is a reflection in the x -axis, followed by a horizontal stretch by a factor of 2 of the graph of f .

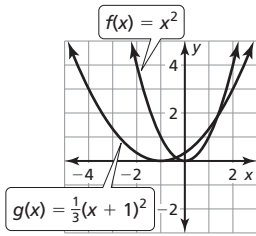


8. The graph of g is a vertical shrink by a factor of $\frac{1}{3}$, followed by a translation 2 units up of the graph of f .



Answers

9. The graph of g is a vertical shrink by a factor of $\frac{1}{3}$, followed by a translation 1 unit left of the graph of f .



10. The graph is a reflection in the x -axis, followed by a vertical stretch by a factor of 3 and a translation 6 units left and 4 units down of the parent quadratic function; $(-6, -4)$
11. The graph is a vertical shrink by a factor of $\frac{1}{3}$, followed by a translation 2 units right and 1 unit up of the parent quadratic function; $(2, 1)$

12. $g(x) = \frac{(x+2)^2}{2}; (-2, 0)$

13. $g(x) = -(3x+4)^2 - 4; (-\frac{4}{3}, -4)$

14.

$h(x) = f(x) + 3$	Add 3 to the output.
$= 4x^2 - 3x + 3$	Substitute $f(x)$ and simplify.
$g(x) = h(-x)$	Multiply the input by -1 .
$= 4x^2 + 3x + 3$	Substitute $-x$ into $h(x)$ and simplify.

2.1 Enrichment and Extension

$$y = -3x^2; y = 3(x+1)^2 + 1; y = 3(x-1)^2 + 1;$$

$$y = -3(x+1)^2 - 1; y = 3(x-4)^2 - 2;$$

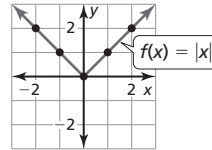
$$y = -3(x-2)^2 + 2; y = -3(x+2)^2 + 2$$

2.1 Puzzle Time

EL SALVADOR

2.2 Start Thinking

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



V shape; yes; yes; The line of symmetry is the y -axis.

2.2 Warm Up

- $P'(5, 3)$
- $P'(-5, -3)$
- $P'(-5, -15)$
- $P'(3, 3)$

2.2 Cumulative Review Warm Up

- linear; $y = 11x$; $y = 220$; After jogging for 20 minutes, 220 calories were burned.
- not linear

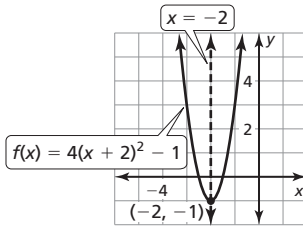
2.2 Practice A

- $f(x) = (x-2)^2$
- $x = -1$

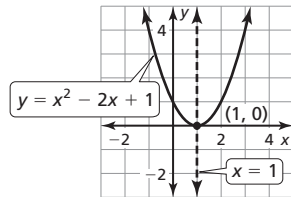
$f(x) = (x+1)^2$
- $g(x) = (x+2)^2 + 4$
- $h(x) = (x-3)^2 - 2$
- $y = -3(x-1)^2 + 3$

Answers

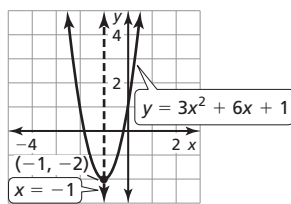
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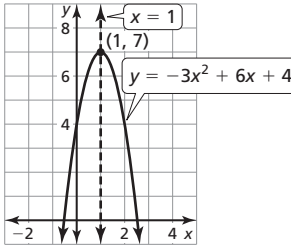
7.



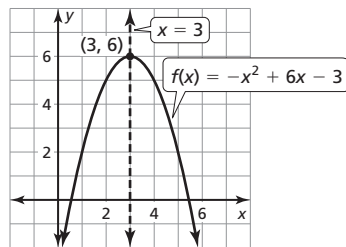
8.



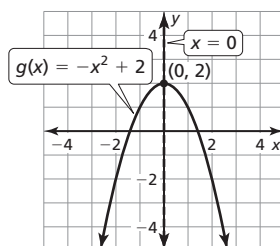
9.



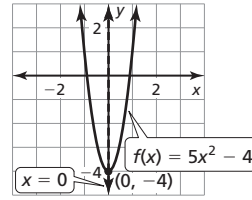
10.



11.



12.



13. Both graphs have the same axis of symmetry, $x = -2$.

14. C; It has the largest leading coefficient, $a = 3$.

15. minimum: 2; domain: all real numbers, range: $y \geq 2$; increasing to the right of $x = 0$; decreasing to the left of $x = 0$

16. minimum: -3 ; domain: all real numbers, range: $y \geq -3$; increasing to the right of $x = 0$; decreasing to the left of $x = 0$

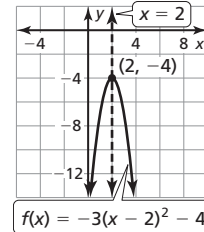
17. maximum: 3; domain: all real numbers, range: $y \leq 3$; increasing to the left of $x = 2$; decreasing to the right of $x = 2$

18. maximum: 11; domain: all real numbers, range: $y \leq 11$; increasing to the left of $x = 1$; decreasing to the right of $x = 1$

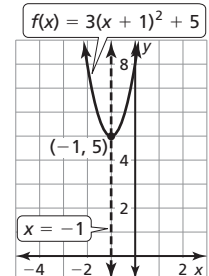
19. a. noon b. 75 customers

2.2 Practice B

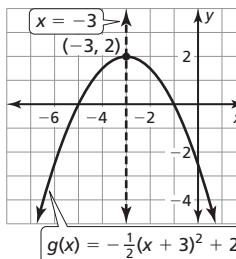
1.



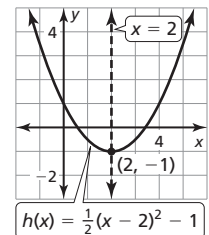
2.



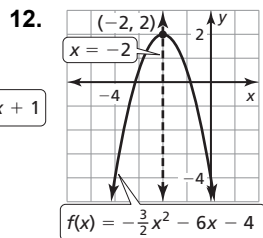
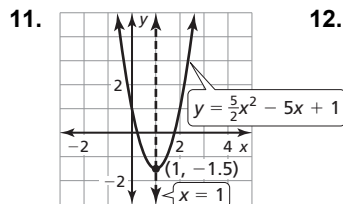
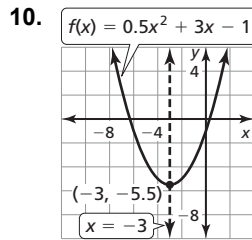
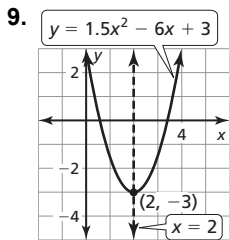
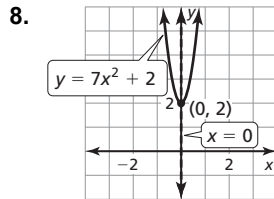
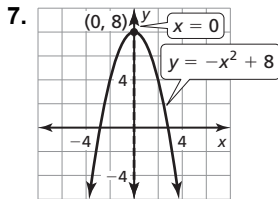
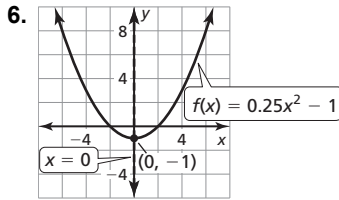
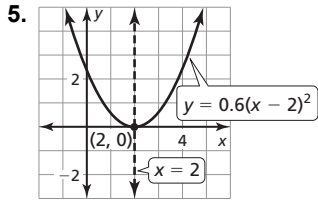
3.



4.



Answers



13. lowest; The y -values on either side of $x = 3$ are greater than 3.
14. A; Both have an axis of symmetry of $x = 2$.
15. minimum: 12; domain: all real numbers, range: $y \geq 12$; increasing to the right of $x = 0$; decreasing to the left of $x = 0$
16. maximum: 9; domain: all real numbers, range: $y \leq 9$; increasing to the left of $x = -3$; decreasing to the right of $x = -3$

17. maximum: 6; domain: all real numbers, range: $y \leq 6$; increasing to the left of $x = -3$; decreasing to the right of $x = -3$
18. minimum: 2.5; domain: all real numbers, range: $y \geq 2.5$; increasing to the right of $x = -3$; decreasing to the left of $x = -3$
19. a. The maximum height occurs $\frac{1}{6}$ mile from the base of the bridge.
b. The maximum height is $\frac{1}{12}$ mile.

2.2 Enrichment and Extension

1. $y = 3x^2 - 6x + 1$ 2. $y = x^2 + 2x - 1$
3. $y = -2x^2 - 8x + 1$ 4. $y = -3x^2 - 6x - 3$
5. $y = -x^2 + 2x + 5$ 6. $y = \frac{1}{2}x^2 + 2x + 2$

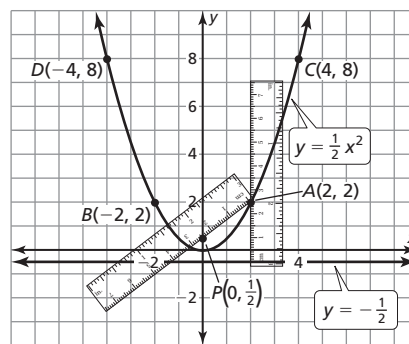
7. no; The definition of a quadratic function says $a \neq 0$, but for the axis of symmetry to be undefined, a would have to be 0.
8. *Sample answer:* $(-1, 10)$; The x -value 7 is 4 units away from the vertex x -value 3. Because the x -value -1 is also 4 units away from 3, it has the same output value 10.

2.2 Puzzle Time

THIS BRITISH ROWER WAS THE FIRST WOMAN TO ROW ACROSS THREE OCEANS.

2.3 Start Thinking

Sample answer:



yes; Point P is the same distance from the parabola as the line $y = -\frac{1}{2}$ is to the parabola. So, it will always yield the same distance as long as the measurement is taken from a point on the graph of the parabola.

Answers

2.3 Warm Up

1. 11.7 2. 3.2 3. 18
4. 7.3 5. 12.6 6. 14.3

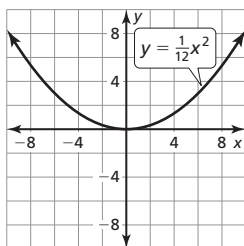
2.3 Cumulative Review Warm Up

1. $x = 0.75$ 2. $x = 8.125$
 $y = -2$ $y = 8.5$
 $z = 0.5$ $z = -2.625$

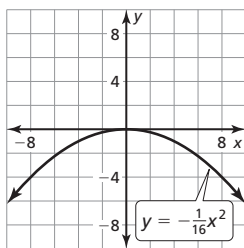
2.3 Practice A

1. $y = \frac{1}{8}x^2$ 2. $y = -\frac{1}{12}x^2$ 3. $y = -\frac{1}{24}x^2$
4. $y = -\frac{1}{16}x^2$ 5. $y = -\frac{1}{4}x^2$ 6. $y = -\frac{1}{8}x^2$
7. A; The directrix is below the focus.

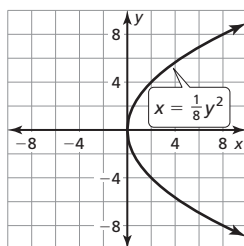
8. focus: (0, 3), directrix: $y = -3$,
axis of symmetry: $x = 0$



9. focus: (0, -4), directrix: $y = 4$,
axis of symmetry: $x = 0$



10. focus: (2, 0), directrix: $x = -2$,
axis of symmetry: $y = 0$



11. 12 in.; The receiver is at the focus.

12. $x = \frac{1}{8}y^2$ 13. $x = -\frac{1}{16}y^2$ 14. $y = \frac{1}{3}x^2$

15. $x = \frac{1}{24}y^2$ 16. $y = \frac{1}{8}x^2$ 17. $x = -\frac{1}{4}y^2$

18. vertex: (1, 3), focus: (1, 6), directrix: $y = 0$, axis of symmetry: $x = 1$; The graph is a vertical shrink by a factor of $\frac{1}{3}$, followed by a translation 1 unit right and 3 units up.

19. vertex: (-5, -2), focus: (-5, -4), directrix: $y = 0$, axis of symmetry: $x = -5$; The graph is a vertical shrink by a factor of $\frac{1}{2}$, followed by a reflection in the x -axis and a translation 5 units left and 2 units down.

20. vertex: (2, -4), focus: (3, -4), directrix: $x = 1$, axis of symmetry: $y = -4$; The graph is a translation 2 units right and 4 units down.

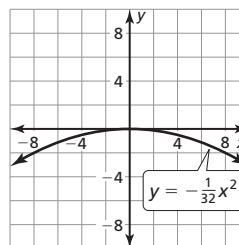
21. vertex: (-6, 10), focus: (-6, 3), directrix: $y = 17$, axis of symmetry: $x = -6$; The graph is a vertical shrink by a factor of $\frac{1}{7}$, followed by a reflection in the x -axis and a translation 6 units left and 10 units up.

2.3 Practice B

1. $y = \frac{1}{20}x^2$ 2. $y = -\frac{1}{24}x^2$ 3. $y = \frac{1}{16}x^2$

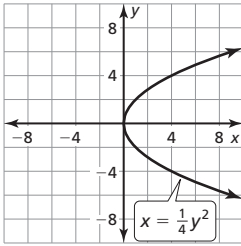
4. $y = -\frac{1}{32}x^2$ 5. $y = -\frac{1}{28}x^2$ 6. $y = \frac{1}{8}x^2$

7. focus: (0, -8), directrix: $y = 8$,
axis of symmetry: $x = 0$

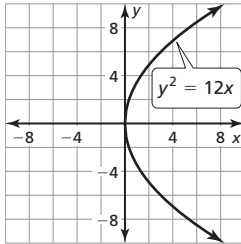


Answers

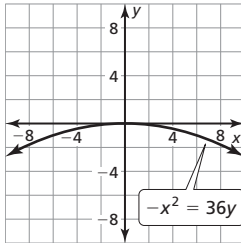
8. focus: (1, 0), directrix: $x = -1$,
axis of symmetry: $y = 0$



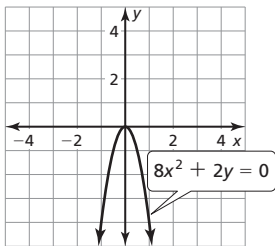
9. focus: (3, 0), directrix: $x = -3$,
axis of symmetry: $y = 0$



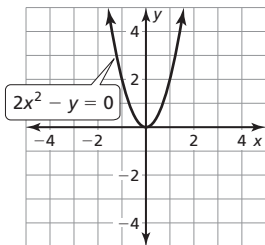
10. focus: (0, -9), directrix: $y = 9$,
axis of symmetry: $x = 0$



11. focus: $(0, -\frac{1}{16})$, directrix: $y = \frac{1}{16}$,
axis of symmetry: $x = 0$



12. focus: $(0, \frac{1}{8})$, directrix: $y = -\frac{1}{8}$,
axis of symmetry: $x = 0$



13. $y = \frac{1}{12}x^2$ 14. $y = -\frac{1}{8}x^2$ 15. $y = -x^2$

16. $x = -\frac{1}{48}y^2$ 17. $x = \frac{5}{12}y^2$ 18. $y = -\frac{3}{8}x^2$

19. $x = -\frac{1}{3}y^2$ 20. $x = \frac{3}{4}y^2$

21. vertex: (-3, 2), focus: (-7, 2), directrix: $x = 1$,
axis of symmetry: $y = 2$; The graph is a shrink
towards the y -axis by a factor of $\frac{1}{4}$, followed by a
reflection in the y -axis and a translation 3 units left
and 2 units up.

22. vertex: (-2, -1), focus: $(-2, -\frac{31}{32})$,
directrix: $y = -\frac{33}{32}$, axis of symmetry: $x = -2$;
The graph is a vertical stretch by a factor of
32, followed by a translation 2 units left and 1 unit
down.

23. vertex: (6, -3), focus: $(\frac{121}{20}, -3)$, directrix: $x = \frac{119}{120}$,
axis of symmetry: $y = -3$; The graph is a stretch
away from the y -axis by a factor of 20, followed by
a translation 6 units right and 3 units down.

24. vertex: (-1, 9), focus: (-1, 1), directrix: $y = 17$,
axis of symmetry: $x = -1$; The graph is a vertical
shrink by a factor of $\frac{1}{8}$, followed by a reflection
in the x -axis and a translation 1 unit left and 9 units
up.

2.3 Enrichment and Extension

1. $x = \frac{a^2}{4}y^2$

2. $y = \frac{n}{8}x^2$

3. $y = \frac{b}{12}x^2$

4. $x = \frac{3n}{2}y^2$

5. \overline{RS} has a slope of

$$\frac{s^2 - r^2}{s - r} = \frac{(s - r)(s + r)}{s - r} = s + r = r + s.$$

$$\overline{OT} \text{ has a slope of } \frac{t^2 - 0}{t - 0} = \frac{t^2}{t} = t.$$

Because \overline{RS} and \overline{OT} are parallel lines, their slopes
are equal.

So, $r + s = t$.

Answers

6. To find the midpoint of a line segment, find the average of the x -values and y -values of the endpoints.

The x -value of the midpoint of \overline{RS} would be $\frac{r + s}{2}$.

The x -value of the midpoint \overline{OT} would be $\frac{t}{2}$.

The x -value of the midpoint \overline{UV} would be $\frac{u + v}{2}$.

\overline{UV} has as slope of $\frac{v^2 - u^2}{v - u} = \frac{(v - u)(v + u)}{v - u} = v + u = u + v$.

Because \overline{UV} is parallel to both \overline{RS} and \overline{OT} , all slopes are equal and $u + v = r + s = t$.

So, the x -values of their midpoints are all the same and lie on the same line, $x = \frac{t}{2}$ or $x = \frac{r + s}{2}$ or

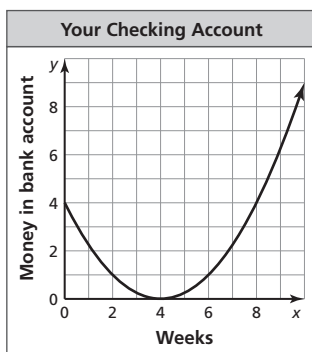
$$x = \frac{u + v}{2}.$$

2.3 Puzzle Time

YELLOWSTONE PARK

2.4 Start Thinking

Sample answer:



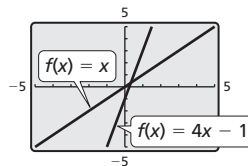
$y = 110.25$; After 25 weeks, you have \$110.25 in your bank account.

2.4 Warm Up

- $y = -\frac{1}{6}(x - 6)$
- $y - 3 = \frac{1}{2}(x - 1)$
- $y + 1 = -2(x - 4)$
- $y + 3 = 3(x - 3)$
- $y + 18 = -\frac{1}{4}(x - 4)$
- $y + 1 = -3(x - 6)$

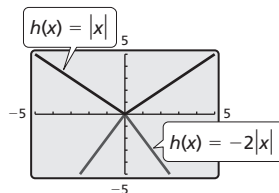
2.4 Cumulative Review Warm Up

1.



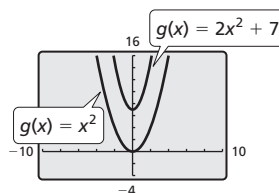
The graph is a vertical stretch by a factor of 4, followed by a translation 1 unit down of its parent function.

2.



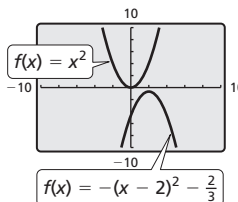
The graph is a vertical stretch by a factor of 2, followed by a reflection in the x -axis of its parent function.

3.



The graph is a vertical stretch by a factor of 2, followed by a translation 7 units up of its parent function.

4.



The graph is a reflection in the x -axis, followed by a translation 2 units right and $\frac{2}{3}$ unit down.

2.4 Practice A

- $y = \frac{7}{16}(x - 2)^2 - 3$
- $y = -\frac{1}{18}(x - 3)^2 - 8$
- $y = -9(x + 1)^2 + 4$
- $y = \frac{8}{5}(x - 10)(x - 6)$
- $y = \frac{3}{16}(x - 2)(x - 8)$
- $y = -\frac{2}{7}(x + 14)(x + 2)$

Answers

7. a. $y = -\frac{5}{9}(x - 1)^2 + 5$
b. $y = -\frac{5}{9}x^2 + \frac{10}{9}x + \frac{40}{9}$
c. $y = -\frac{5}{9}(x + 2)(x - 4)$
d. $y = -\frac{5}{9}x^2 + \frac{10}{9}x + \frac{40}{9}$
e. yes; intercept form; Two intercepts were given.

8. 9.21 ft

2.4 Practice B

1. $y = -\frac{1}{9}(x - 1)^2 - 6$ 2. $-\frac{9}{49}(x + 2)^2 + 5$
3. $y = \frac{1}{3}(x + 1)^2 - 1$
4. $y = -\frac{5}{3}(x - 12)(x - 8)$
5. $y = \frac{1}{16}(x + 7)(x + 1)$
6. $y = -\frac{4}{81}(x + 9)(x - 9)$

7. The two given sets of coordinates were not substituted into the correct places.

$$y = a(x - h)^2 + k$$

$$-7 = a(1 - 3)^2 - 5$$

$$-7 = 4a - 5$$

$$-2 = 4a$$

$$-\frac{1}{2} = a$$

The equation is $y = -\frac{1}{2}(x - 3) - 5$.

8. a. The maximum area of 2500 square feet occurs when the length is 50 feet.

b. $A(x) = -x^2 + 100x$; $A(2) = 196 \text{ ft}^2$

c. 0 to 50 ft: $50 \frac{\text{ft}^2}{\text{ft}}$; 50 to 100 ft: $-50 \frac{\text{ft}^2}{\text{ft}}$

2.4 Enrichment and Extension

1. linear; $y = -1.8x + 212.10$
2. quadratic
a. $y = -4.9x^2 + 19.6x + 58.8$
b. $y = -4.9(x - 2)^2 + 78.4$
c. The graph of the function is a reflection in the x -axis, followed by a vertical stretch by a factor of 4.9 and a translation 2 units right and 78.4 units up of its parent function.

3. quadratic

a. $y = -3x^2 + 30x + 12$

b. $y = -3(x - 5)^2 + 87$

- c. The graph of the function is a reflection in the x -axis, followed by a vertical stretch by a factor of 3 and a translation 5 units right and 87 units up of its parent function.

4. linear; $y = 0.433x + 14.7$

5. quadratic

a. $y = -5x^2 + 14x + 3$

b. $y = -5(x - 1.4)^2 + 12.8$

- c. The graph of the function is a reflection in the x -axis, followed by a vertical stretch by a factor of 5 and a translation 1.4 units right and 12.8 units up of its parent function.

2.4 Puzzle Time

PINK FLAMINGO

Cumulative Review

1. $x = -18$ 2. $x = -15$ 3. $x = -12$

4. $x = -26$ 5. $x = 75$ 6. $x = -2$

7. $x = 3$ 8. $x = 12$ 9. $x = 21$

10. $x = 9$ 11. $x = 8$ 12. $x = 6$

13. $x = 26$ 14. $x = -7$ 15. $x = 8$

16. $x = -45$

17. a. 89%

b. 95%

c. 55 correct answers

d. 60 correct answers

18. a. 89%

b. 75%

c. 24 correct answers

d. 26 correct answers

e. 22 correct answers

19. 3 cups

20. 4 tablespoons

21. 5.83

22. 7.07

23. 2.83

24. 10.44

25. 18.87

26. 7.07

27. 12.37

28. 7.21

29. 10.44

Answers

- 30.** 19.24 **31.** 10.00 **32.** 10.00 **33.** 12.08
34. 17.03 **35.** 12.04 **36.** $\frac{35}{3}$ **37.** $-\frac{9}{4}$
38. $5\frac{4}{7}$ or $\frac{39}{7}$ **39.** -2 **40.** -10
41. 8 **42.** 5 **43.** -3 **44.** 2
45. $x = \frac{1}{8}y - 3$ **46.** $x = 2y - 6$
47. $x = -\frac{1}{5}y + 7$ **48.** $x = 4y + 7$
49. $x = 2y + \frac{8}{3}$ **50.** $x = \frac{3}{2}y - \frac{5}{4}$
51. $x = 2y + 10$ **52.** $x = -\frac{1}{4}y - 5$
53. $x = 3y - 8$ **54.** $x = \frac{1}{4}$
55. no solution **56.** no solution
57. no solution **58.** $x = \frac{28}{9}$
59. $x = 6$ **60.** $x = \frac{81}{2}$
61. $x = \frac{100}{3}$ **62.** $x = 1$
63. $x = \frac{100}{9}$ **64.** $x = 8$
65. no solution **66.** 5 h
67. 2.25 h **68.** about 52.5 h
69. $y = -\frac{1}{8}x - \frac{5}{8}$ **70.** $y = 4x - 41$
71. $y = \frac{1}{2}x + 4$ **72.** $y = -\frac{7}{2}x - \frac{19}{2}$
73. $y = -\frac{13}{10}x + \frac{22}{5}$ **74.** $y = -\frac{3}{7}x + \frac{20}{7}$
75. $y = \frac{3}{5}x + \frac{37}{5}$ **76.** $y = \frac{19}{8}x - \frac{21}{4}$
77. $y = -4x + 17$ **78.** $y = -\frac{5}{4}x - 2$
79. $y = \frac{11}{8}x - \frac{23}{2}$ **80.** $y = -\frac{3}{4}x + \frac{21}{4}$
81. $y = -\frac{3}{14}x + \frac{41}{14}$ **82.** $y = \frac{1}{7}x - \frac{27}{7}$
83. $y = -\frac{5}{4}x + \frac{21}{4}$ **84.** $(x + 3)(x - 2)$
85. $(x + 6)(x - 7)$ **86.** $(x - 4)(x + 12)$
87. $(x - 11)(x + 7)$ **88.** $(x + 1)(x + 12)$
89. $(x + 8)(x - 2)$ **90.** $(x - 6)(x + 4)$
91. $(x + 5)(x - 1)$ **92.** $(x - 3)(x - 1)$
93. $(x + 6)(x + 5)$ **94.** $(x - 12)(x - 8)$
95. $(x + 5)(x + 8)$ **96.** $(2x + 7)(x - 5)$
97. $(3x + 10)(x - 4)$ **98.** $(2x - 1)(x + 10)$
99. $(3x - 2)(x - 10)$ **100.** $(4x - 12)(x + 12)$
101. $(5x - 3)(x + 2)$ **102.** $(2x - 4)(3x + 11)$
103. $(x + 9)(4x - 9)$
104. $(2x + 10)(x - 4)$ or $(2x - 8)(x + 5)$
105. $y = -x^2 - 4x + 32$
106. $y = 4x^2 + 4x - 48$
107. $y = -2x^2 - 2x + 4$
108. $y = -6x^2 + 6x + 72$
109. $y = -5x^2 + 55x - 120$
110. $y = 3x^2 - 9x - 84$
111. $y = 6x^2 - 36x + 54$
112. $y = -7x^2 - 14x - 7$
113. $y = 2x^2 - 16x + 32$
114. $y = x^2 - 8x + 17$
115. $y = x^2 + 10x + 18$
116. $y = x^2 - 16x + 73$
117. $y = 3x^2 + 6x + 7$
118. $y = -7x^2 - 70x - 178$
119. $y = -9x^2 + 54x - 74$
120. $y = -4x^2 - 64x - 261$
121. $y = 2x^2 - 20x + 51$
122. $y = 3x^2 + 6x + 2$

Answers

123. 6 in. 124. 42 ft² 125. 18 in.

126. 5184 in.² 127. $x = 2 \pm 3i\sqrt{6}$

128. $x = -1 \pm \sqrt{15}$

129. $x = \frac{-3 \pm \sqrt{73}}{2}$

130. $x = \frac{5 \pm i\sqrt{47}}{2}$

131. $x = -3 \pm \sqrt{30}$ 132. $x = 4 \pm \sqrt{34}$

133. $x = \frac{-7 \pm \sqrt{139}}{2}$ 134. $x = \frac{5 \pm i\sqrt{47}}{6}$

135. $x = \frac{7 \pm \sqrt{129}}{-8}$ 136. $x = \frac{2 \pm 2i\sqrt{39}}{5}$

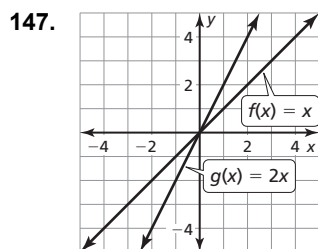
137. $x = \frac{7 \pm i\sqrt{47}}{12}$ 138. $x = \frac{-13 \pm i\sqrt{167}}{-8}$

139. $x = \frac{-3 \pm i\sqrt{55}}{4}$ 140. $x = \frac{-5 \pm i\sqrt{119}}{-4}$

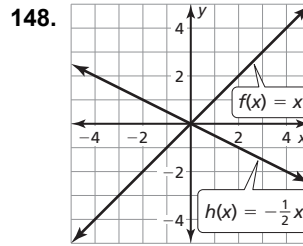
141. $x = \frac{-8 \pm i\sqrt{38}}{-3}$ 142. $x = \frac{15 \pm i\sqrt{223}}{-8}$

143. $x = 3 \pm \sqrt{6}$ 144. $x = \frac{-3 \pm i\sqrt{23}}{4}$

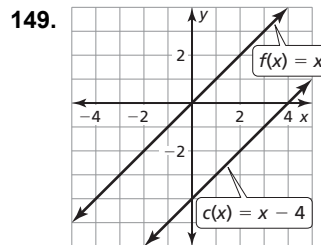
145. $x = \frac{9 \pm \sqrt{103}}{2}$ 146. $x = \frac{3 \pm i\sqrt{111}}{12}$



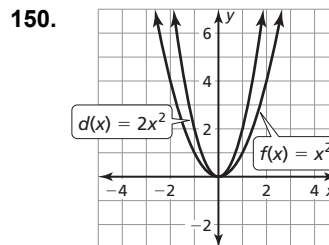
The graph of $g(x)$ is a vertical stretch by a factor of 2 of the graph of $f(x)$.



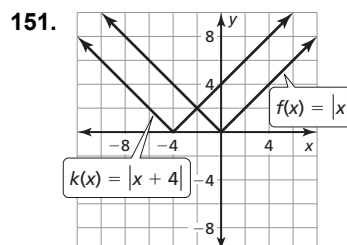
The graph of $h(x)$ is a vertical shrink by a factor of $\frac{1}{2}$ and a reflection in the y -axis of the graph of $f(x)$.



The graph of $c(x)$ is a vertical translation 4 units down of the graph of $f(x)$.

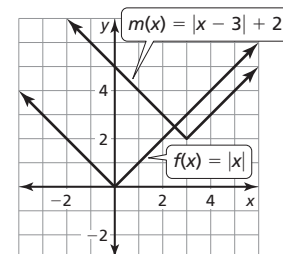


The graph of $d(x)$ is a vertical stretch by a factor of 2 of the graph of $f(x)$.



The graph of $k(x)$ is a horizontal translation 4 units left of the graph of $f(x)$.

152. The graph of $m(x)$ is a translation 3 units right and 2 units up of the graph of $f(x)$.



Answers

153. $g(x) = -2x - 3$ 154. $g(x) = \frac{4}{7}x + 1$

155. $g(x) = |x + 2| + 4$

156. $g(x) = \frac{1}{2}|x - 6| - 7$

157. $g(x) = -|x - 3| - 5$

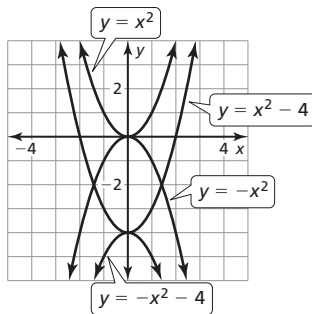
158. $g(x) = -|x + 1| + 2$

159. $g(x) = -3x - 1$

160. $g(x) = -\frac{3}{4}x + 5$

Chapter 3

3.1 Start Thinking



Equation	Number of x-intercepts	Point(s)
$y = x^2$	1	(0, 0)
$y = -x^2$	1	(0, 0)
$y = x^2 - 4$	2	(-2, 0), (2, 0)
$y = -x^2 - 4$	0	N/A

Yes, there are patterns; *Sample answer:* A quadratic equation has one x -intercept when the vertex is on the x -axis. If the quadratic equation opens down, the graph has two x -intercepts if the constant is positive and none if the constant is negative. If the quadratic equation opens up, the graph has two x -intercepts if the constant is negative and none if the constant is positive; The vertex is a minimum if the x^2 term is positive; The vertex is a maximum if the x^2 term is negative.

3.1 Warm Up

1. (4, -2) 2. (-3, 4)

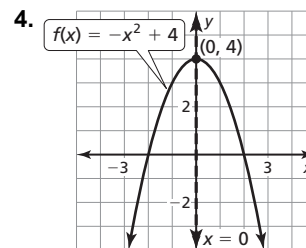
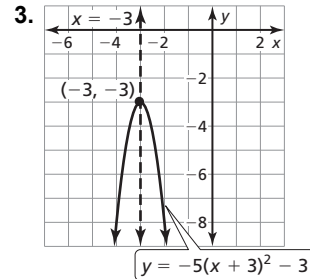
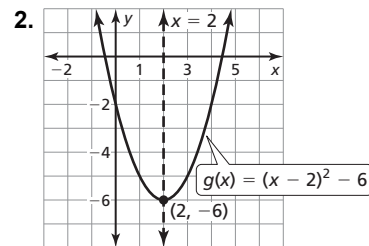
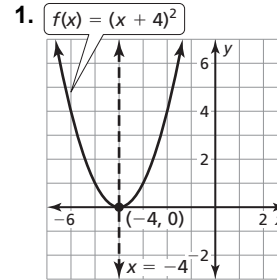
3. infinitely many solutions

4. no solution

5. $\left(\frac{3}{11}, -\frac{21}{11}\right)$ or about (0.27, -1.91)

6. (-1, -2)

3.1 Cumulative Review Warm Up



3.1 Practice A

1. $x = 5$ and $x = 1$ 2. $x = 3$
 3. $x = 5$ and $x = -5$ 4. $x = -2$ and $x = 6$
 5. $x = 4$ and $x = -4$ 6. $x = 3$ and $x = -\frac{1}{2}$