Name ______________________ Date ____________ Class ____________

LESSON 5-1

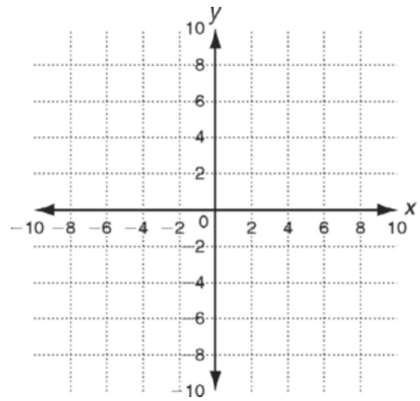
Practice B

Using Transformations to Graph Quadratic Functions

Graph the function by using a table.

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

x	$f(x) = x^2 + 2x - 1$	$(x, f(x))$
–2		
–1		
0		
1		
2		



Using the graph of $f(x) = x^2$ as a guide, describe the transformations, and then graph each function. Label each function on the graph.

2. $h(x) = (x - 2)^2 + 2$

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3. $h(x) = -(3x)^2$

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4. $h(x) = \left(\frac{1}{2}x\right)^2$

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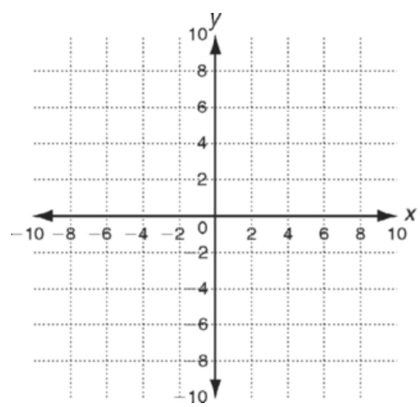

Use the description to write a quadratic function in vertex form.

5. The parent function $f(x) = x^2$ is reflected across the x-axis, horizontally stretched by a factor of 3 and translated 2 units down to create function g.

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6. A ball dropped from the top of tower A can be modeled by the function $h(t) = -9.8t^2 + 400$, where t is the time after it is dropped and $h(t)$is its height at that time. A ball dropped from the top of tower B can be modeled by the function $h(t) = -9.8t^2 + 200$. What transformation describes this change? What does this transformation mean?

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Problem Solving

1. $\begin{cases} b = p + 1 \\ m = 3p \\ 6m + 5.5b + 9.5p = 236.5 \end{cases}$

2. $\left[\begin{array}{ccc|c} 0 & 1 & -1 & 1 \\ 1 & 0 & -3 & 0 \\ 6 & 5.5 & 9.5 & 236.5 \end{array}\right]$

3. $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 21 \\ 0 & 1 & 0 & 8 \\ 0 & 0 & 1 & 7 \end{array}\right]$

4. 21 mugs, 8 bowls, 7 plates
5. C
6. A

Reading Strategies

1. Possible answer: An augmented matrix shows the coefficients and the constants of the linear equations in the order they appear in the equations.
2. $\begin{cases} -5x + 10y = 3 \\ 2x - 4y = 1 \end{cases}$
3. Possible answer: Multiplying the equation by 3 gives an equation equivalent to the original equation. In the same way, multiplying one row of the augmented matrix by 3 gives a matrix equivalent to the original matrix.

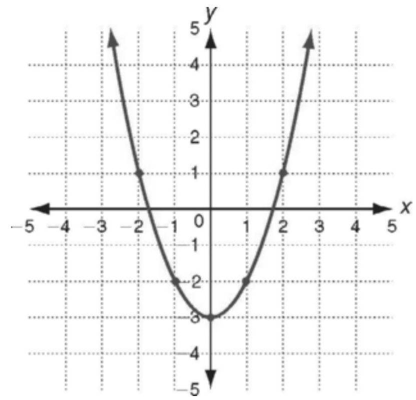
LESSON 5-1

Practice A

1. a.

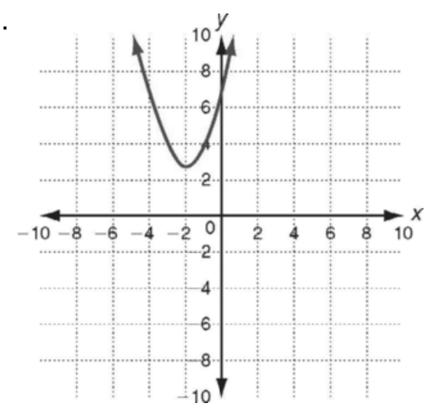
x	$f(x) = x^2 - 3$	$(x, f(x))$
–2	$f(-2) = (-2)^2 - 3$	(–2, 1)
–1	–2	(–1, –2)
0	–3	(0, –3)
1	–2	(1, –2)
2	1	(2, 1)

b.



2. Reflected across the x-axis
3. Translated 1 unit right
4. Translated 7 units up
5. Horizontal stretch by a factor of 3
6. Translated 3 units left
7. Vertical stretch by a factor of 5
8. a. $g(x) = (x + 2)^2 + 3$

b.



Practice B

1.

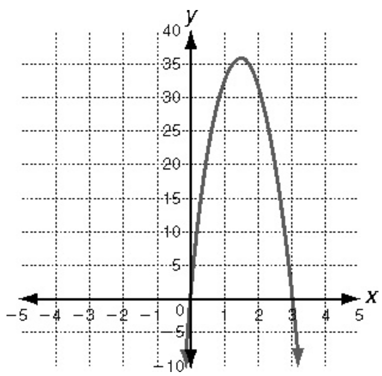
x	$f(x) = x^2 + 2x - 1$	$(x, f(x))$
–2	–1	(–2, –1)
–1	–2	(–1, –2)
0	–1	(0, –1)
1	2	(1, 2)
2	7	(2, 7)

2. Translated 2 units right, 2 units up
3. Reflected across the x-axis and horizontal compression by a factor of 3
4. Horizontal stretch by a factor of 2

5. $g(x) = -\left(\frac{1}{3}x\right)^2 - 2$

6. Vertical translation; possible answer: at a given time a ball dropped from tower A will be 200 feet higher than a ball dropped from tower B at the same time. Tower A is 200 feet taller than tower B.

Practice C

1. Parabola that opens downward
2. The ball rises.
3. Reflected across x-axis, translated 1.5 units right and 36 units up, vertically stretched by a factor of 16
4. 

5. $g(x) = -\frac{1}{5}x^2 + 2$
6. $m(x) = -3x^2$
7. Possible answer: Both parabolas open upward; one is translated 1 unit down and the other is translated 1 unit right.
8. Translation 2 units right

Reteach

1.

x	$f(x) = x^2 - 6x + 7$	$(x, f(x))$
1	$f(1) = 1^2 - 6(1) + 7 = 2$	(1, 2)
2	$f(2) = -1$	(2, –1)
3	$f(3) = -2$	(3, –2)
4	$f(4) = -1$	(4, –1)
5	$f(5) = 2$	(5, 2)

2. –3

   Graph is shifted 1 unit left and 3 units down.

3. (3, 2)

   Graph is shifted 3 units right and 2 units up.

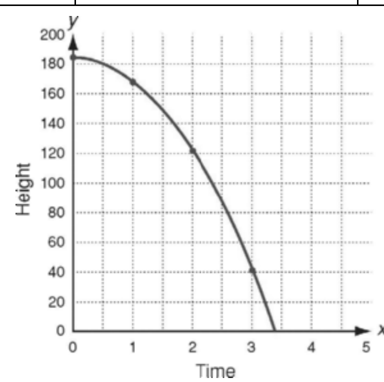
Challenge

1. $y = -5(x + 1)^2 + 4$
2. $y = \frac{1}{2}(x - 2)^2 - 3$
3. $y = 7(x + 3)^2 - 4$
4. $y = -\frac{1}{4}(x - 2)^2 + 3$

Problem Solving

1.

Time (t)	$f(t) = -16t^2 + 185$	$(t, f(t))$
0	$f(0) = -16(0)^2 + 185$	(0, 185)
1	$f(1) = -16(1)^2 + 185$	(1, 169)
2	$f(2) = -16(2)^2 + 185$	(2, 121)
3	$f(3) = -16(3)^2 + 185$	(3, 41)
4	$f(4) = -16(4)^2 + 185$	(4, –71)

2. 

3. $f(x) = x^2$
4. Parabola
5. The graph is translated up 185 units. Since a is negative, it is reflected across the x-axis. Since $|a| = 16$, it is stretched vertically by a factor of 16.
6. D
7. B

Reading Strategies

1. a. Line

   b. Parabola

   c. Parabola

   d. Line

2. Domain = set of all real numbers; range = $[3, \infty)$
3. Slope = $\frac{1}{2}$; possible answer: since the slope is positive, the line slopes