5.3 Notetaking with Vocabulary (continued)

| Transformation	$f(x)$ Notation	Examples	
Horizontal Translation Graph shifts left or right.	$f(x - h)$	$g(x) = \sqrt{x - 2}$	2 units right
		$g(x) = \sqrt{x + 3}$	3 units left
Vertical Translation Graph shifts up or down.	$f(x) + k$	$g(x) = \sqrt{x} + 7$	7 units up
		$g(x) = \sqrt{x} - 1$	1 unit down
Reflection Graph flips over x- or y-axis.	$f(-x)$ $-f(x)$	$g(x) = \sqrt{-x}$	in the y-axis
		$g(x) = -\sqrt{x}$	in the x-axis
Horizontal Stretch or Shrink Graph stretches away from or shrinks toward y-axis.	$f(ax)$	$g(x) = \sqrt{3x}$	shrink by a factor of $\frac{1}{3}$
		$g(x) = \sqrt{\frac{1}{2}x}$	stretch by a factor of 2
Vertical Stretch or Shrink Graph stretches away from or shrinks toward x-axis.	$a \bullet f(x)$	$g(x) = 4\sqrt{x}$	stretch by a factor of 4
		$g(x) = \frac{1}{5}\sqrt{x}$	shrink by a factor of $\frac{1}{5}$

Notes:
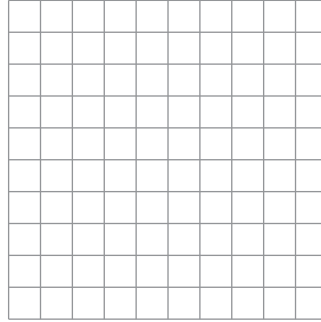
5.3 **Notetaking with Vocabulary** (continued)

Extra Practice

In Exercises 1 and 2, graph the function. Identify the domain and range of each function.

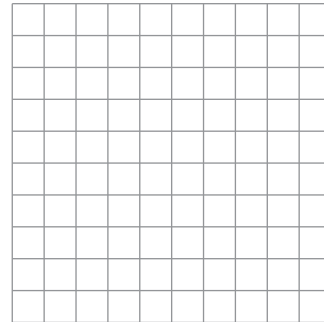**1.** $f(x) = \sqrt[3]{-3x} + 1$
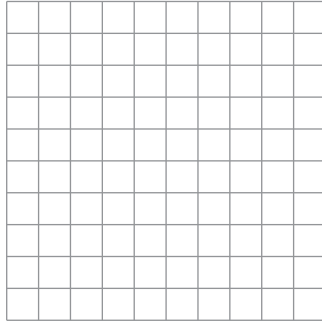
2. $g(x) = 2(x - 5)^{1/2} - 4$

3. Describe the transformation of $f(x) = \sqrt[4]{2x} + 5$ represented by $g(x) = -\sqrt[4]{2x} - 5$.

4. Write a rule for g if g is a horizontal shrink by a factor of $\frac{5}{6}$, followed by a translation 10 units to the left of the graph of $f(x) = \sqrt[3]{15x + 1}$.

5. Use a graphing calculator to graph $8x = y^2 + 5$. Identify the vertex and the direction that the parabola opens.

6. Use a graphing calculator to graph $x^2 = 49 - y^2$. Identify the radius and the intercepts of the circle.