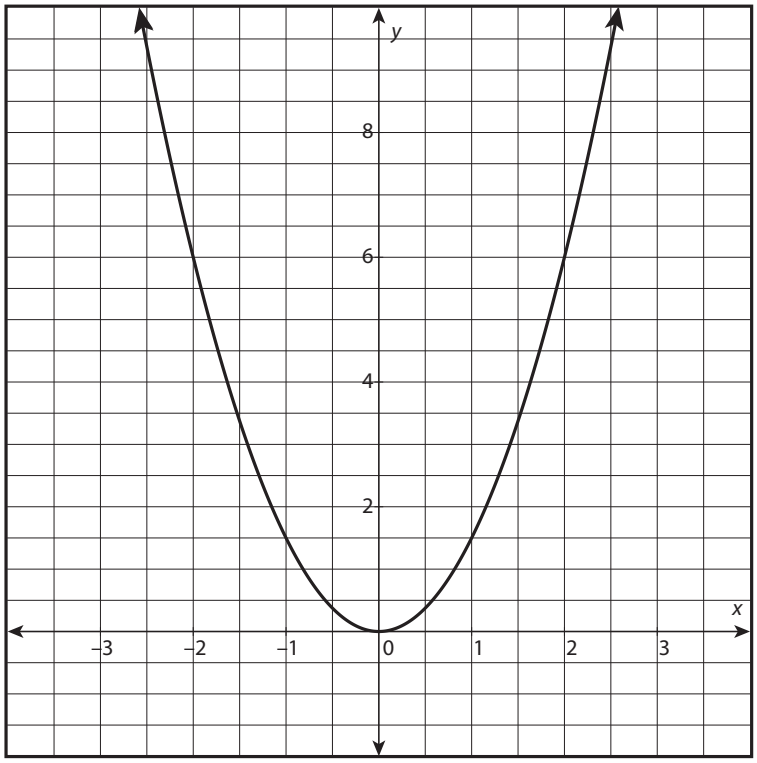
Guided Practice 3.3.2

Example 1

Describe the domain and range of the quadratic function $g(x) = 1.5x^2$.

1. Sketch a graph of the function.



2. Describe what will happen if the function continues.

   Looking at the function, you can see that the function will continue to increase upward and the function will continue to grow wider.

   Growing wider without end means that the domain of this function is all real numbers, or $-\infty < x < \infty$.

   Notice that the graph's lowest y-value is 0. Since the function continues to increase upward, the range of the function will be all real numbers greater than or equal to 0, or $0 \leq g(x) < \infty$.

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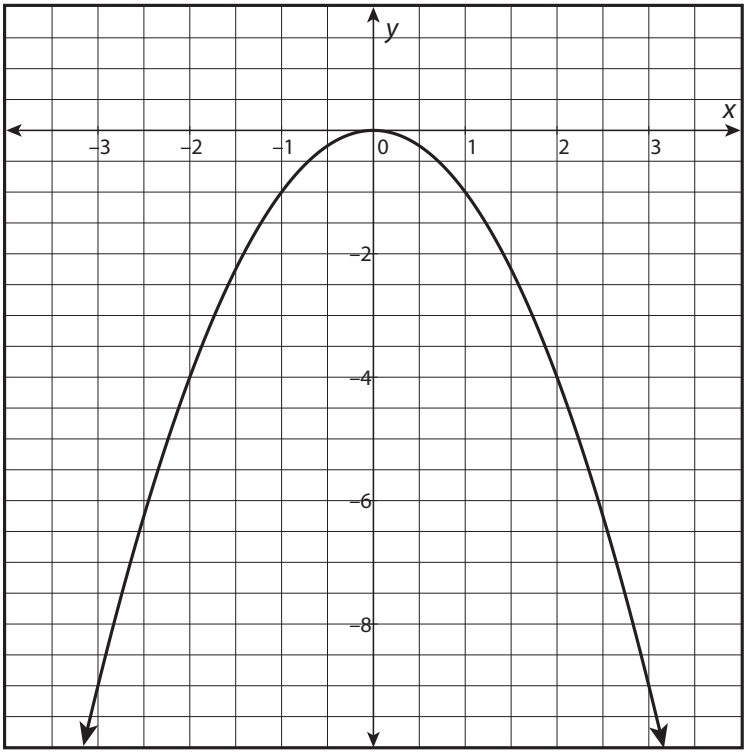
Example 2

Describe the domain and range of the following function, $f(x)$.



1. Describe what happens to the width of the parabola as x approaches positive and negative infinity.

   The function continues to grow wider and wider as x approaches both positive and negative infinity.

2. Determine the domain of the function.

   Growing wider without end means that the domain of this function is all real numbers, or $-\infty < x < \infty$.

3. Describe what happens to the y-values of the parabola as x approaches positive and negative infinity.

   The function starts at 0 at $x = 0$, then becomes more negative at either end as x approaches both positive and negative infinity.

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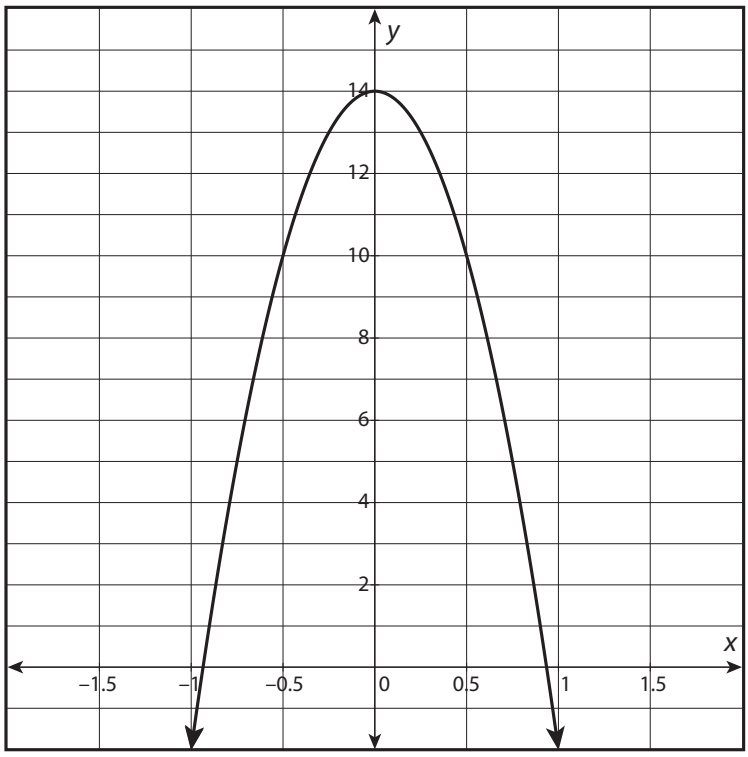
4. Determine the range of the function.

   The function starts at 0 and grows more negative. This means the range of this function is $-\infty < f(x) \leq 0$.

Example 3

Amit is a diver on the swim team. Today he's practicing by jumping off a 14-foot platform into the pool. Amit's height in feet above the water is modeled by $f(x) = -16x^2 + 14$, where x is the time in seconds after he leaves the platform. About how long will it take Amit to reach the water? Describe the domain and range of this function.

1. Sketch a graph of the situation.



2. Identify the x-intercepts of the function.

   Using graphing technology, the x-intercepts occur when $x \approx -0.94$ and $x \approx 0.94$.

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3. Determine a reasonable domain for this context.

The x-values in this problem represent the time in seconds after Amit leaves the platform. In this context, negative values of x do not make sense.

The positive x-intercept represents the moment Amit makes contact with the water. It will take him 0.94 second to reach the water.

A reasonable domain of this context is 0 to 0.94 seconds, or $0 \leq x \leq 0.94$.

4. Determine the range of this function.

The domain of this function represents the time when Amit leaves the platform to the time he reaches the water. The corresponding range would be Amit's height above the water as he jumps from the platform and lands in the water.

Amit's starting height is 14 feet above the water, and when he lands in the water, the height is 0. A reasonable range is 0 to 14 feet, or $0 \leq f(x) \leq 14$.

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