4.7 Piecewise Functions

Essential Question _____

_____

Evaluating Piecewise Functions

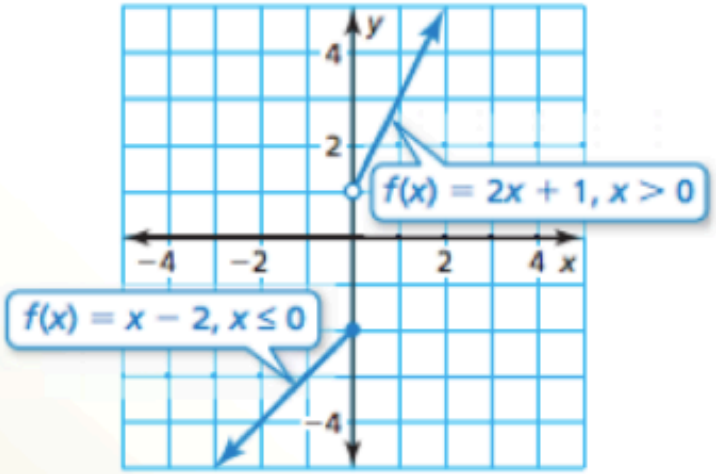
Core Concept

Piecewise Function

A _____ is a function defined by two or more equations. Each "piece" of the function applies to a different part of its domain. An example is shown below.

$$f(x) = \begin{cases} x - 2, & \text{if } x \leq 0 \\ 2x + 1, & \text{if } x > 0 \end{cases}$$

- The expression $x - 2$ represents the value of f when x is less than or equal to 0.
- The expression $2x + 1$ represents the value of f when x is greater than 0.



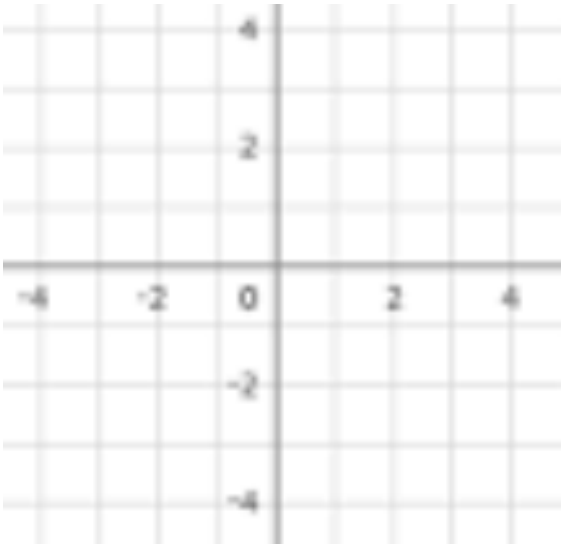
EXAMPLE 1 Evaluating a Piecewise Function

Evaluate the function f above when (a) $x = 0$ and (b) $x = 4$.

Graphing and Writing Piecewise Functions

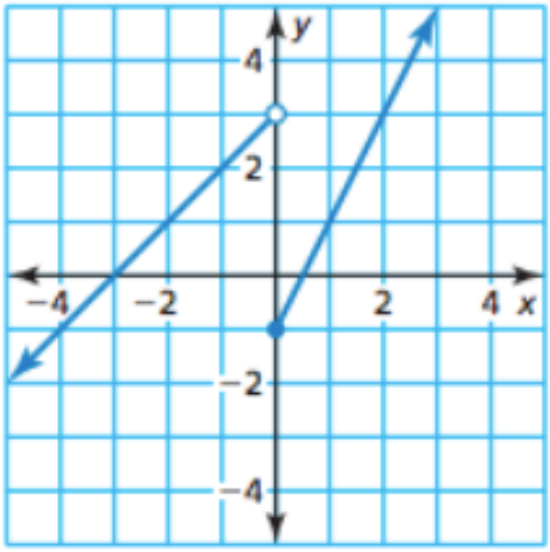
EXAMPLE 2 Graphing a Piecewise Function

Graph $y = \begin{cases} -x - 4, & \text{if } x < 0 \\ x, & \text{if } x \geq 0 \end{cases}$. Describe the domain and range.



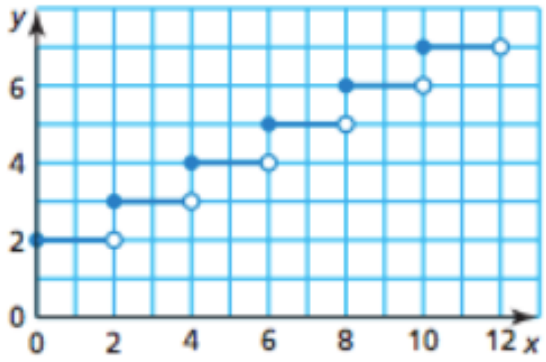
EXAMPLE 3 Writing a Piecewise Function

Write a piecewise function for the graph.



Graphing and Writing Step Functions

A _____ is a piecewise function defined by a constant value over each part of its domain. The graph of a step function consists of a series of line segments.



$$f(x) = \begin{cases} 2, & \text{if } 0 \le x < 2 \\ 3, & \text{if } 2 \le x < 4 \\ 4, & \text{if } 4 \le x < 6 \\ 5, & \text{if } 6 \le x < 8 \\ 6, & \text{if } 8 \le x < 10 \\ 7, & \text{if } 10 \le x < 12 \end{cases}$$

EXAMPLE 4 Graphing and Writing a Step Function

You rent a karaoke machine for 5 days. The rental company charges \$50 for the first day and \$25 for each additional day. Write and graph a step function that represents the relationship between the number x of days and the total cost y (in dollars) of renting the karaoke machine.

Step 1 Use a table to organize the information.

Number of days	Total cost (dollars)

Step 2 Write the step function.

$$f(x) = \begin{cases} 50, \\ 75, \\ 100, \\ 125, \\ 150, \end{cases}$$

Step 3 Graph the step function.