



# *PIECEWISE FUNCTIONS*

L1.3

Evaluate the function.

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

a. When  $x = -1$

b. When  $x = 1$

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$$\begin{aligned} f(x) &= x - 2 \\ &= (-1) - 2 \\ &= -3 \end{aligned}$$

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Evaluate the function.

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

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$$x \leq 0$$

$$\begin{aligned} f(x) &= x - 2 \\ &= (-1) - 2 \\ &= -3 \end{aligned}$$

b. When  $x = 1$

$$x > 0$$

$$\begin{aligned} f(x) &= 2x + 1 \\ &= 2(1) + 1 \\ &= 3 \end{aligned}$$

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

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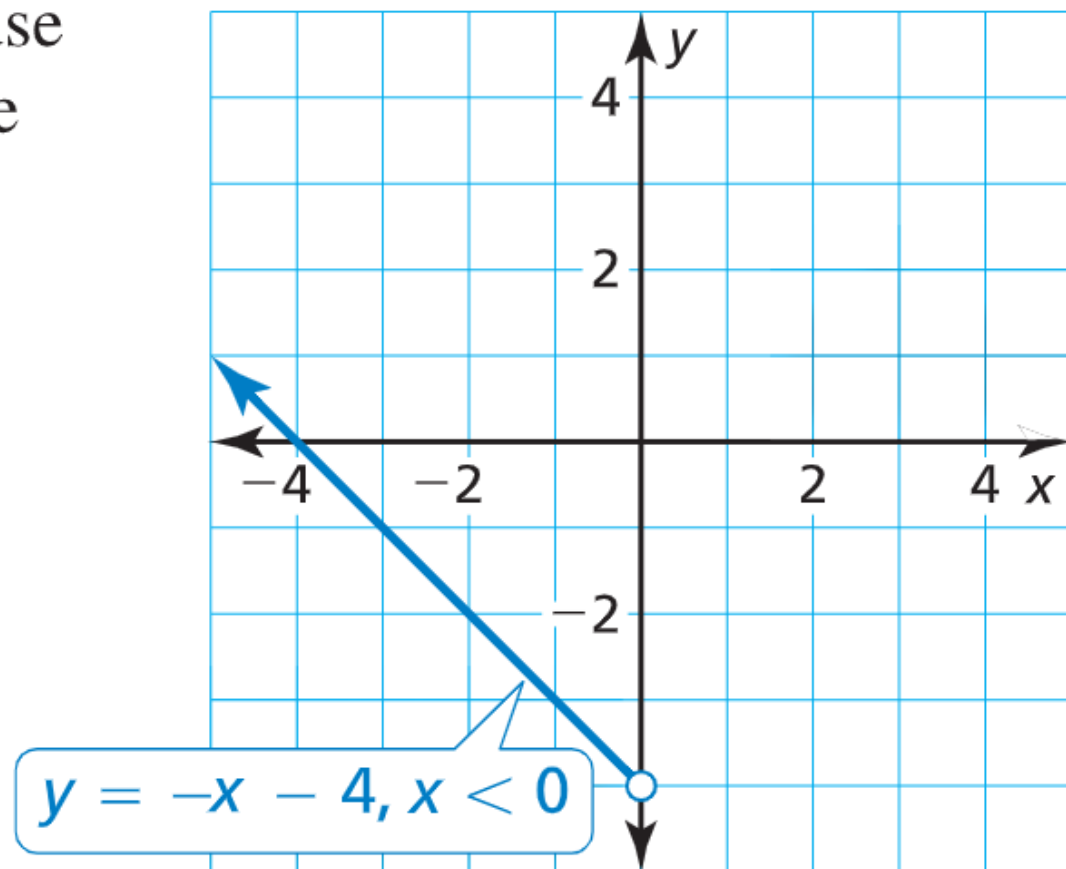
## **SOLUTION**

**Step 1** Graph  $y = -x - 4$  for  $x < 0$ . Because  $x$  is not equal to 0, use an open circle at  $(0, -4)$ .

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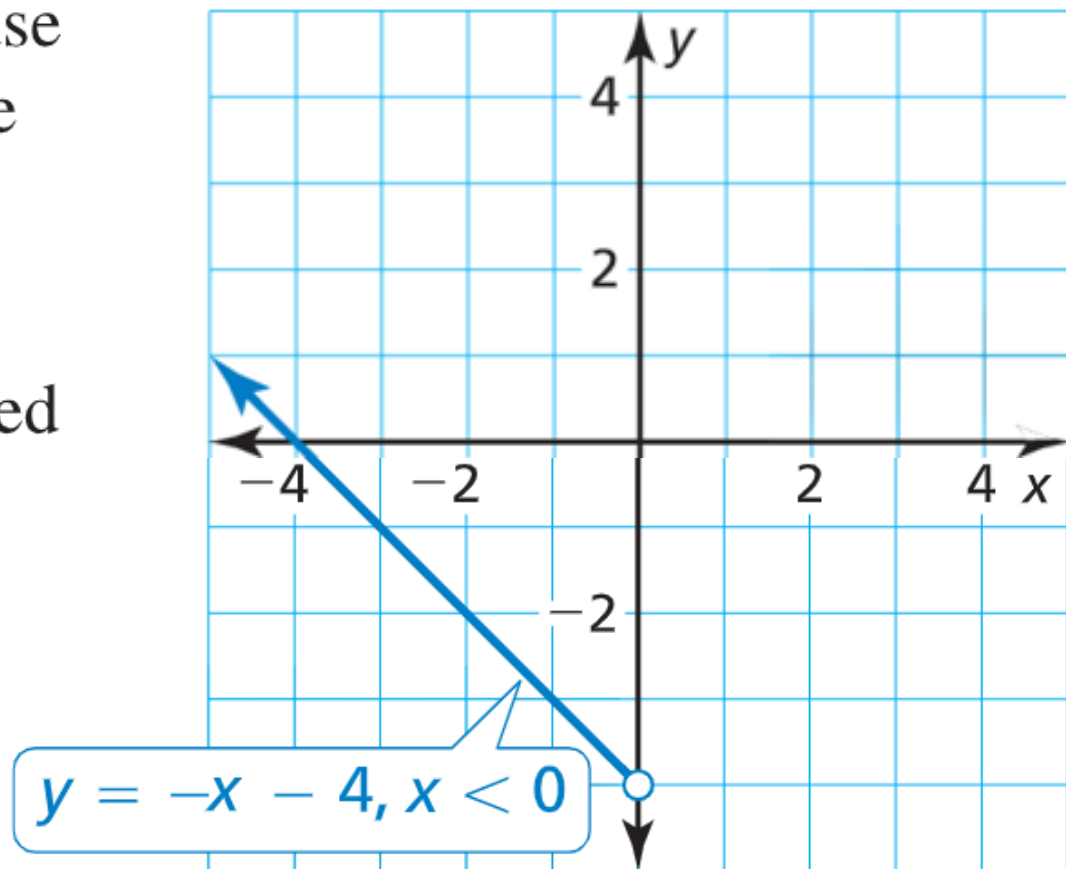


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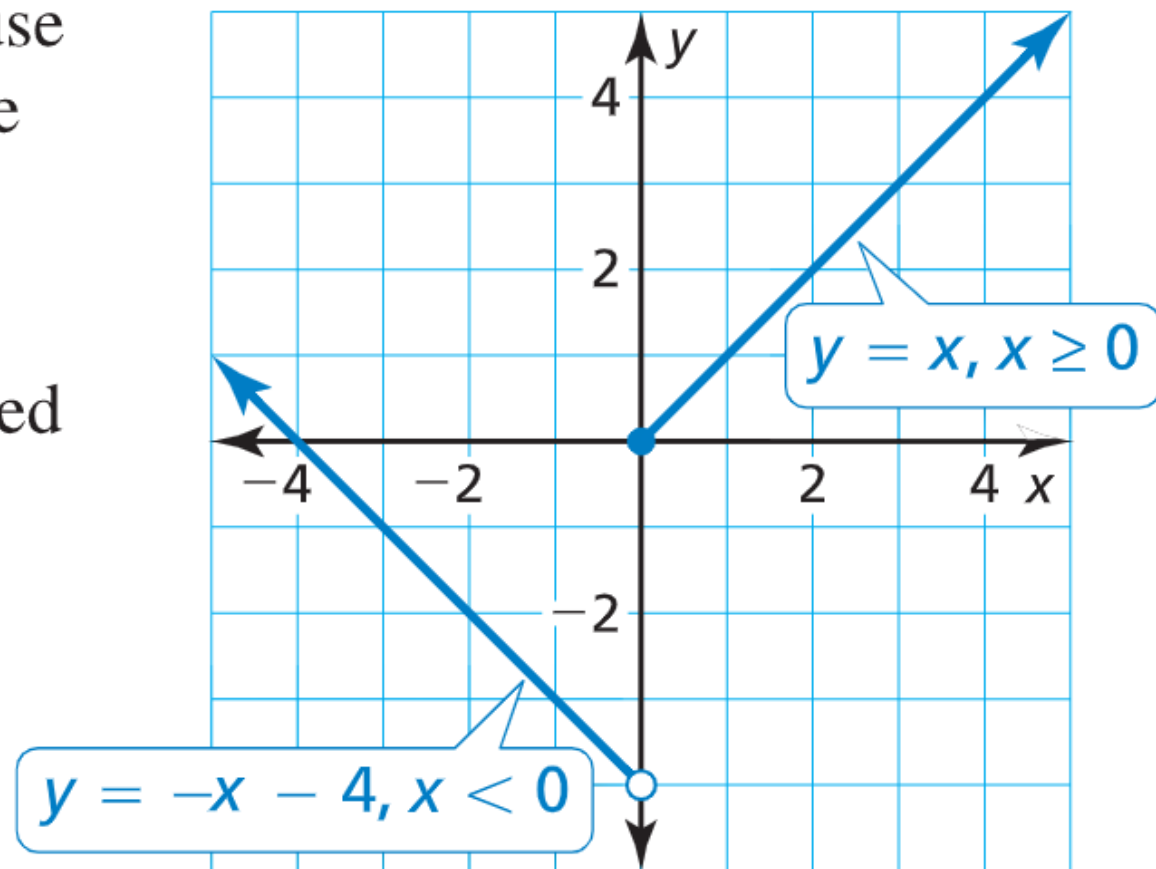


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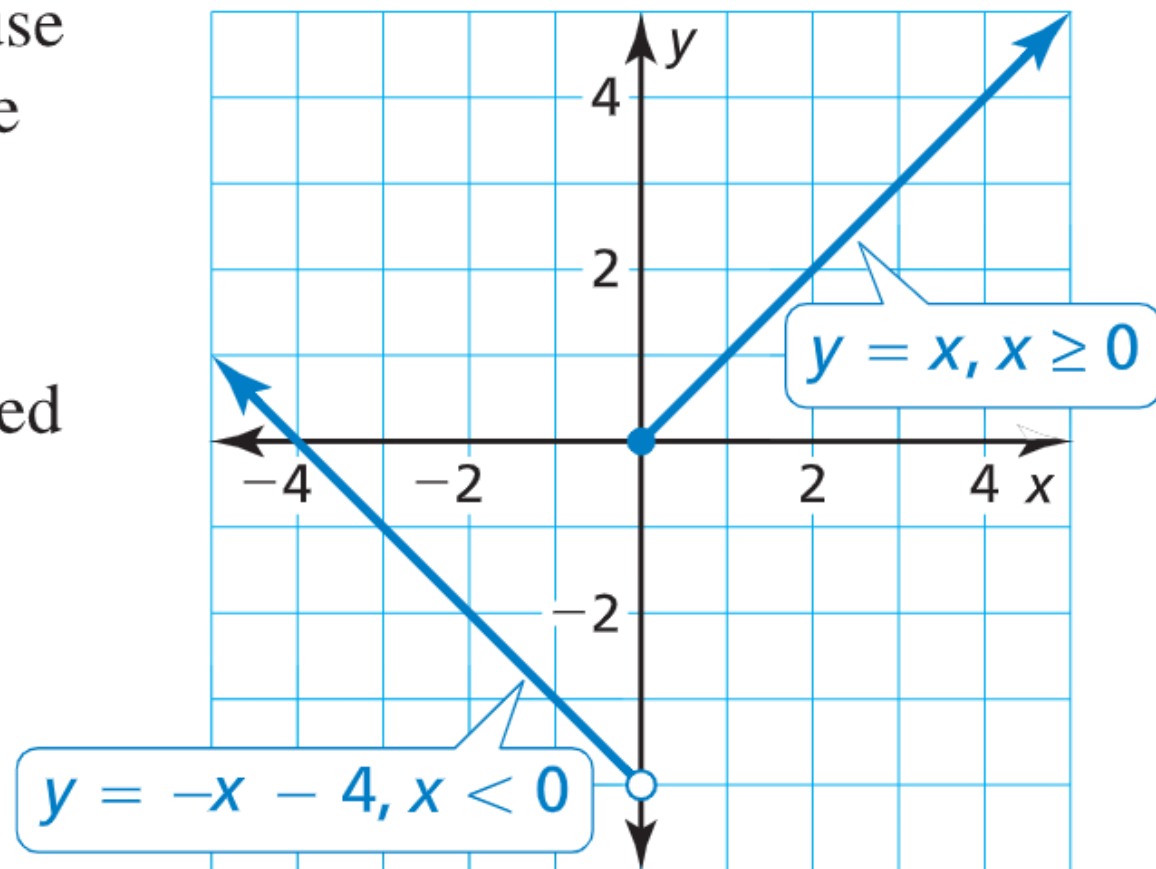
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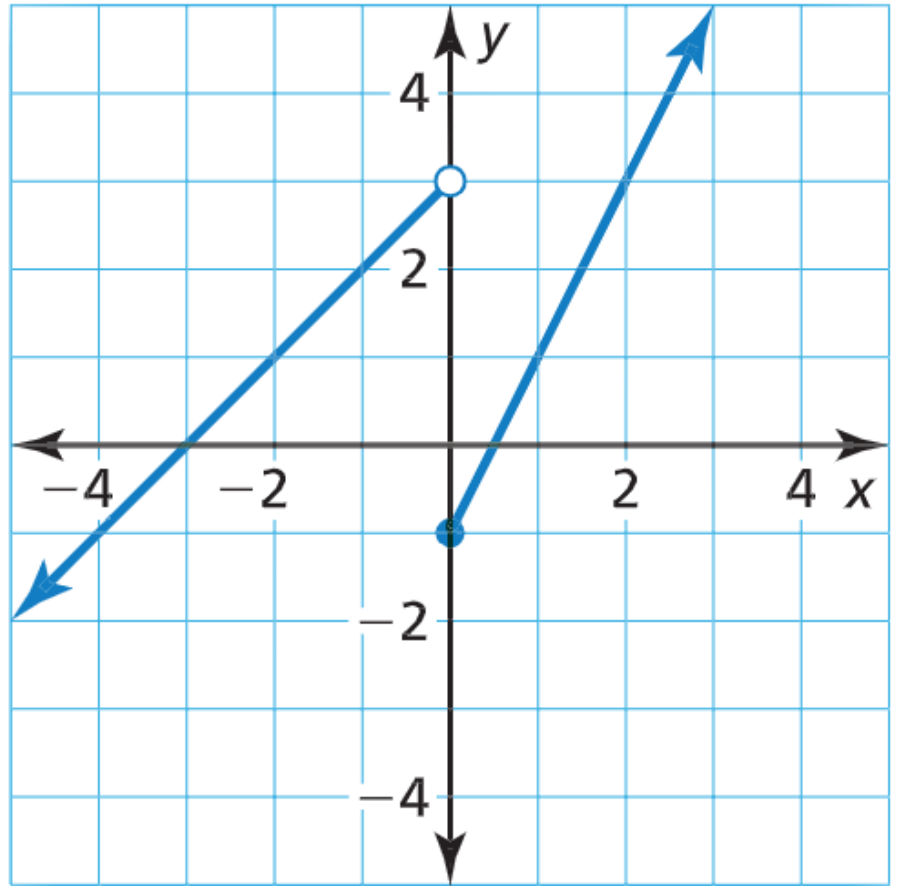
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► The domain is all real numbers.  
The range is  $y > -4$ .

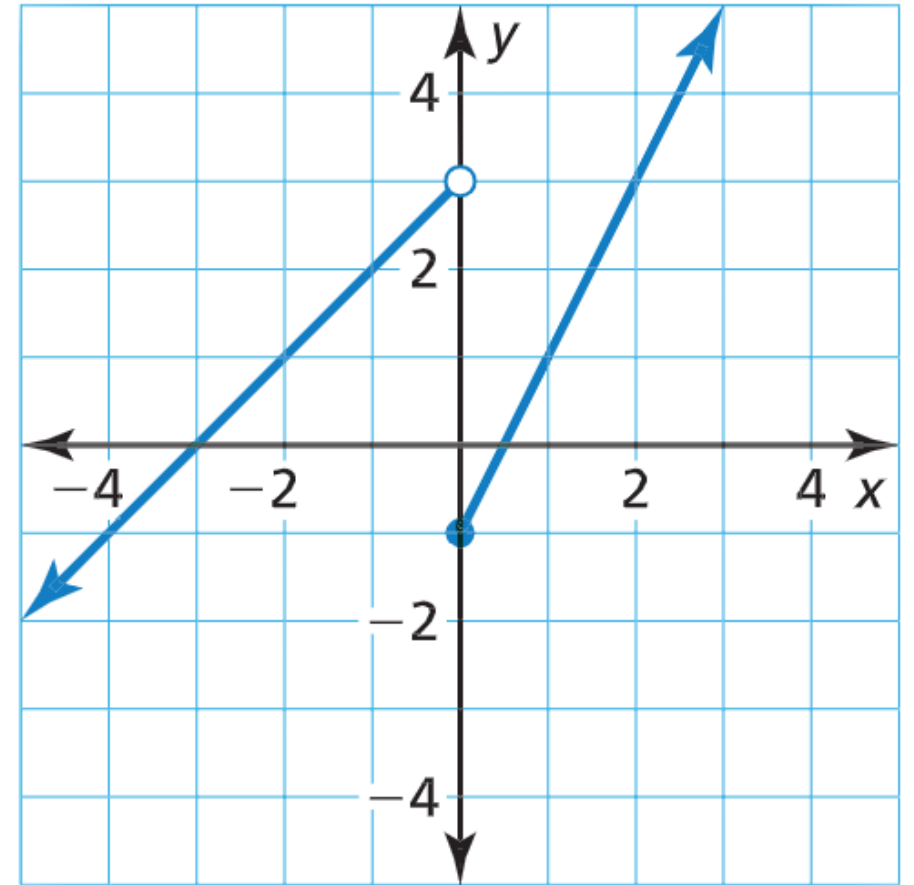


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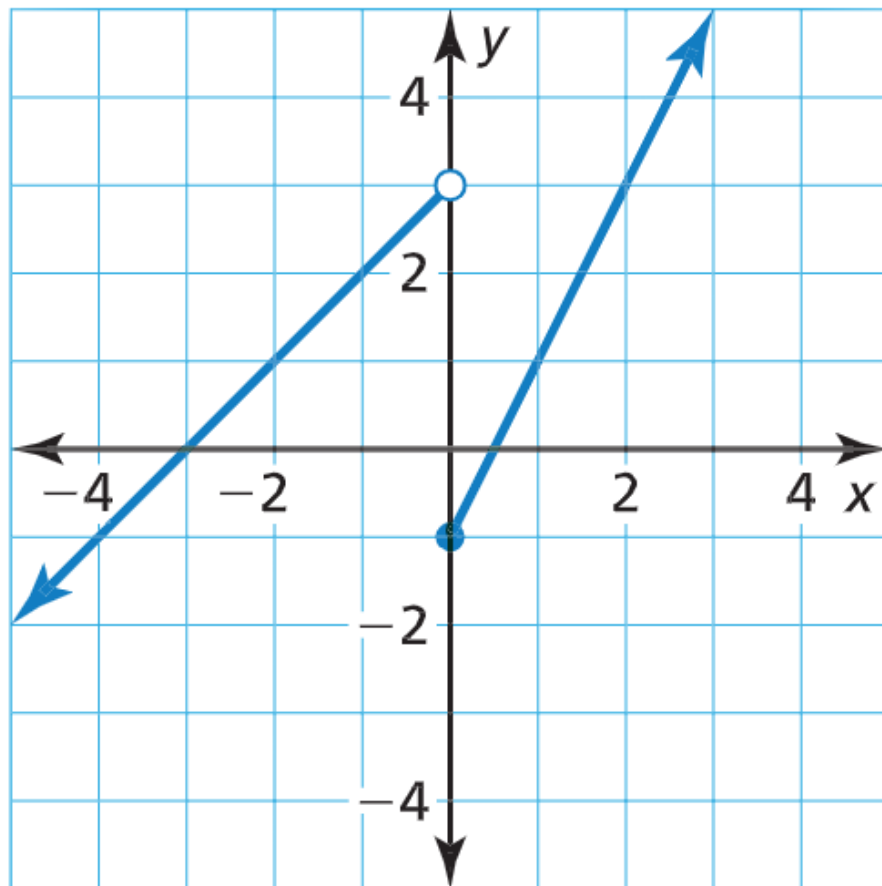
**SOLUTION**



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## SOLUTION

Each “piece” of the function is linear.

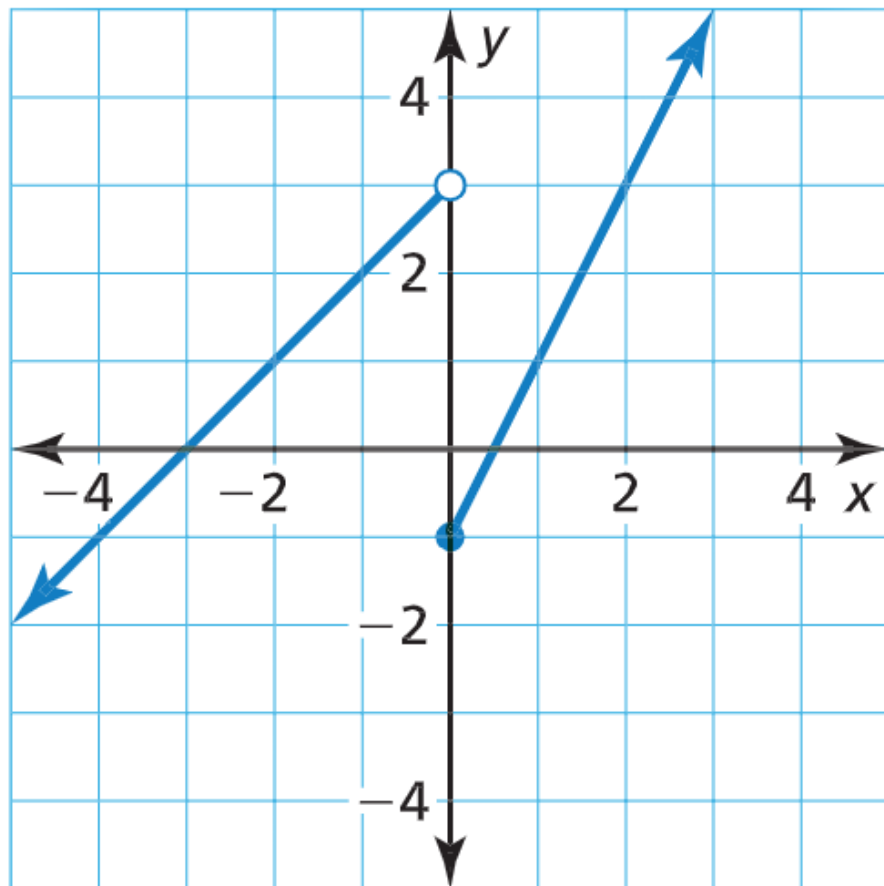


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Each “piece” of the function is linear.

**Left Piece** When  $x < 0$ , the graph is the line given by  $y = x + 3$ .



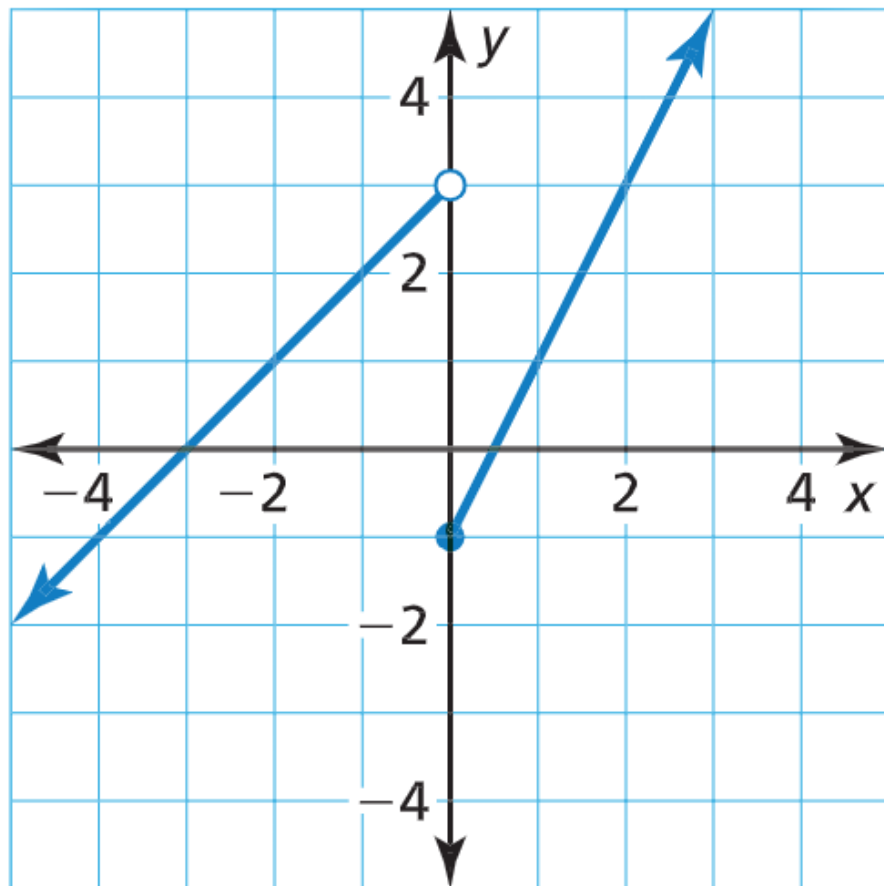
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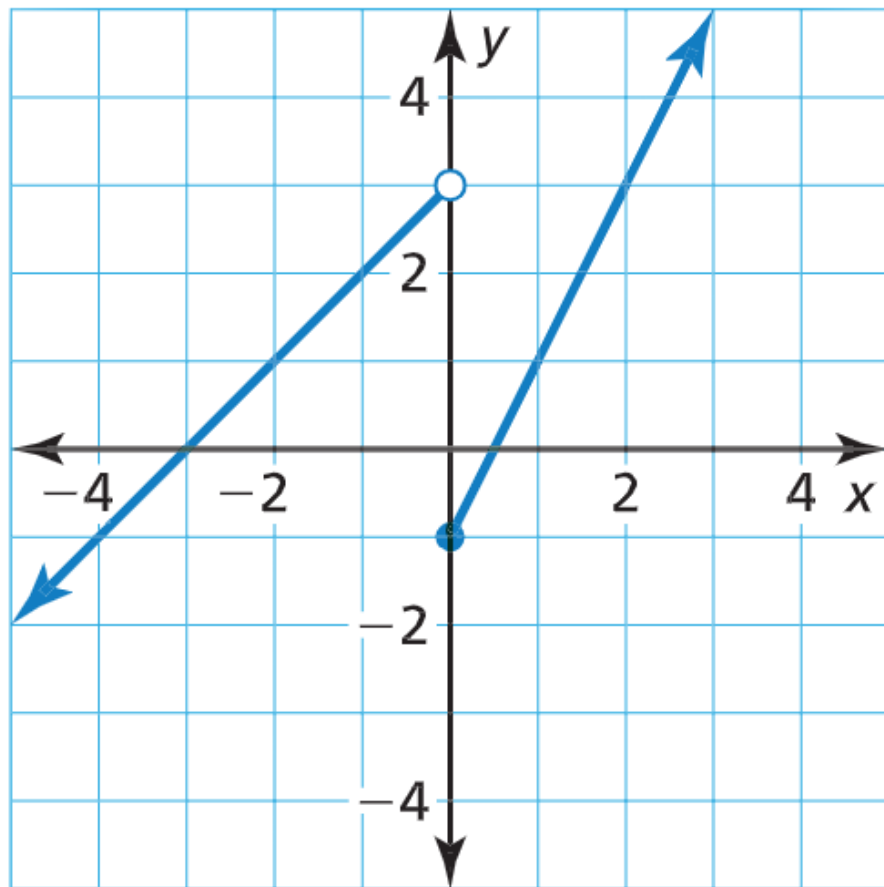
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► So, a piecewise function for the graph is

$$f(x) = \begin{cases} x + 3, & \text{if } x < 0 \\ 2x - 1, & \text{if } x \geq 0 \end{cases}$$





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.

## SOLUTION

**Step 1** Use a table to organize the information

Number of days	Total cost (dollars)
$0 < x \leq 1$	50
$1 < x \leq 2$	75
$2 < x \leq 3$	100
$3 < x \leq 4$	125
$4 < x \leq 5$	150

**Step 2** Write the step function

$$f(x) = \begin{cases} 50, & \text{if } 0 < x \leq 1 \\ 75, & \text{if } 1 < x \leq 2 \\ 100, & \text{if } 2 < x \leq 3 \\ 125, & \text{if } 3 < x \leq 4 \\ 150, & \text{if } 4 < x \leq 5 \end{cases}$$

**Step 3** Graph the step function

