Skill check

graph the number

1 - |-4|

Chapter 2-1
Inequalities:

Inequality Rules:

Inequality Symbols				
Symbol	<	>	≤	≥
Key Phrases	• is less than • is fewer than	• is greater than • is more than	• is less than or equal to • is at most • is no more than	• is greater than or equal to • is at least • is no less than

EXAMPLE 1 **Writing Inequalities**

Write each sentence as an inequality.

a. A number w minus 3.5 is less than or equal to -2.

b. Three is less than a number n plus 5.

c. Zero is greater than or equal to twice a number x plus 1.

Answers:

SOLUTION

a. A number w minus 3.5 is less than or equal to -2.

$$w - 3.5 \qquad \leq \qquad -2$$

▶ An inequality is $w - 3.5 \leq -2$.

b. Three is less than a number n plus 5.

$$3 \qquad < \qquad n + 5$$

▶ An inequality is $3 < n + 5$.

c. Zero is greater than or equal to twice a number x plus 1.

$$0 \qquad \geq \qquad 2x + 1$$

▶ An inequality is $0 \geq 2x + 1$.

Solution of an inequality:

An inequality can have more that one solution. The set of all solutions of inequalities is called the solution set.

Value of x	$x + 5 \geq -2$	Is the inequality true?
-6	$-6 + 5 \overset{?}{\geq} -2$ $-1 \geq -2$ ✓	yes
-7	$-7 + 5 \overset{?}{\geq} -2$ $-2 \geq -2$ ✓	yes
-8	$-8 + 5 \overset{?}{\geq} -2$ $-3 \ngeq -2$ ✗	no

EXAMPLE 2 **Checking Solutions**

Tell whether -4 is a solution of each inequality.

a. $x + 8 < -3$

b. $-4.5x > -21$

Answers:

SOLUTION

a. $x + 8 < -3$ Write the inequality.

  $-4 + 8 \overset{?}{<} -3$ Substitute -4 for x.

  $4 \not< -3$ ✗   Simplify.

4 is *not* less than -3.

▶ So, -4 is *not* a solution of the inequality.

b. $-4.5x > -21$ Write the inequality.

  $-4.5(-4) \overset{?}{>} -21$ Substitute -4 for x.

  $18 > -21$ ✓   Simplify.

18 is greater than -21.

▶ So, -4 is a solution of the inequality.

Practice:

Tell whether −6 is a solution of the inequality.

3. $c + 4 < -1$ **4.** $10 \leq 3 - m$

5. $21 \div x \geq -3.5$ **6.** $4x - 25 > -2$

Graph of an inequality:

Shows the solution set of the inequality on a number line.

Open circle: is used when a number is not a solution

Closed Circle: is used when a number is a solution.

An arrow to the left or right shows that the graph continues in that direction.

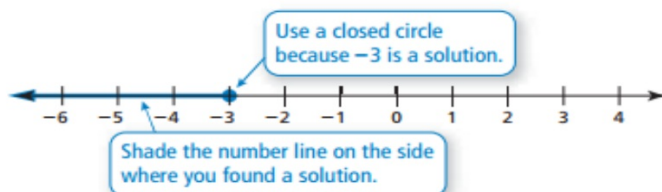**EXAMPLE 3** **Graphing Inequalities**

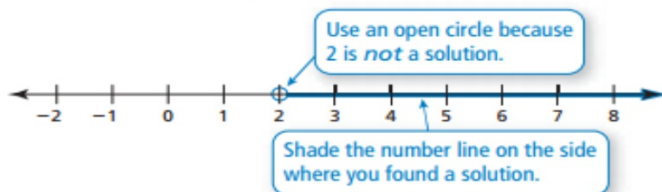Graph each inequality.

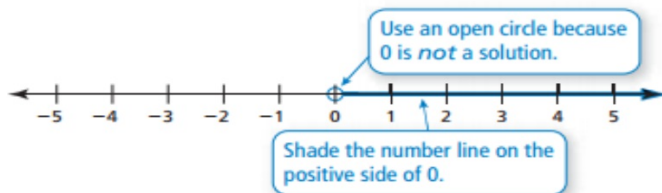**a.** $y \leq -3$ **b.** $2 < x$ **c.** $x > 0$

SOLUTION

a. Test a number to the left of −3.   *y = −4 is a solution.*
   Test a number to the right of −3.   *y = 0 is not a solution.*

Use a closed circle because −3 is a solution.

Shade the number line on the side where you found a solution.

b. Test a number to the left of 2.   *x = 0 is not a solution.*
   Test a number to the right of 2.   *x = 4 is a solution.*

Use an open circle because 2 is not a solution.

Shade the number line on the side where you found a solution.

c. Just by looking at the inequality, you can see that it represents the set of all positive numbers.

Use an open circle because 0 is not a solution.

Shade the number line on the positive side of 0.

YOU MUST BE THIS TALL TO RIDE

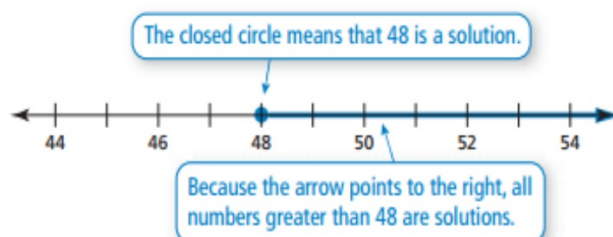# Writing Linear Inequalities from Graphs

EXAMPLE 4   Writing Inequalities from Graphs

The graphs show the height restrictions h (in inches) for two rides at an amusement park. Write an inequality that represents the height restriction of each ride.
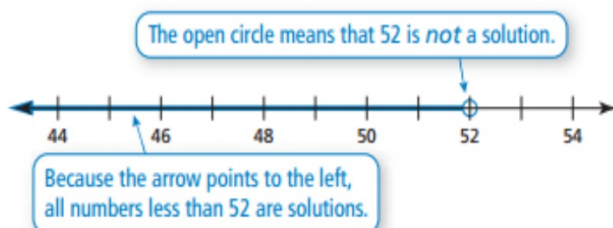
Ride A

$$44 \quad 46 \quad 48 \quad 50 \quad 52 \quad 54$$

Ride B

$$44 \quad 46 \quad 48 \quad 50 \quad 52 \quad 54$$

SOLUTION

Ride A

The closed circle means that 48 is a solution.

Because the arrow points to the right, all numbers greater than 48 are solutions.

Ride B

The open circle means that 52 is *not* a solution.

Because the arrow points to the left, all numbers less than 52 are solutions.

▶ So, $h \geq 48$ represents the height restriction for Ride A, and $h < 52$ represents the height restriction for Ride B.