

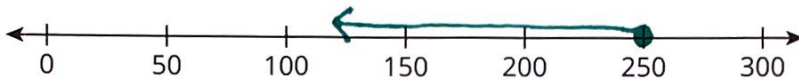


# Equations Versus Inequalities

In this lesson, you will reason about *inequalities*. An **inequality** is any mathematical sentence that has an inequality symbol.

➤ For each situation, define a variable and write a mathematical statement to represent it. Then, sketch a graph of your mathematical statement.

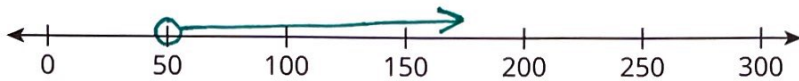
- 1 The number of diners in a restaurant must be no more than 250.



$d = \text{diners}$

$$d \leq 250$$

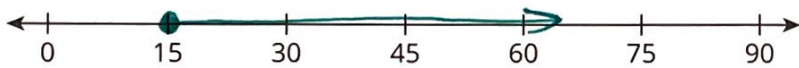
- 2 An online store offers free shipping on orders over \$50.



$f = \text{amount to receive free shipping}$

$$f > 50$$

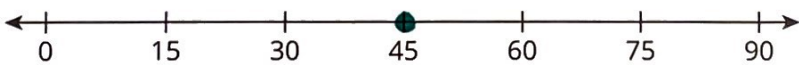
- 3 A salesperson must sell at least 15 cars each month to earn a bonus.



$c = \text{number of cars sold}$

$$c \geq 15$$

- 4 The length of a dance class is 45 minutes.



$t = \text{length of a dance class}$

$$t = 45$$

## DID YOU KNOW?...

You can show the solution to any inequality on a number line with a ray whose starting point is an open or closed circle. A closed circle means that the starting point is part of the solution set of the inequality. An open circle means that the starting point is not a part of the solution set of the inequality.



► Analyze the worked example.

**WORKED EXAMPLE**

You can solve the inequality  $13 < x + 11$  and represent the solution on a number line.

$$\begin{array}{r} 13 < x + 11 \\ -11 \quad -11 \\ \hline 2 < x \end{array}$$



You can rewrite  $2 < x$  as  $x > 2$ .

You can check your work by choosing one value from your solution set and one value outside your solution set.

$$\begin{array}{l} \text{Check: } 13 \stackrel{?}{<} 5 + 11 \\ 13 < 16 \end{array}$$

$$\begin{array}{l} 13 \stackrel{?}{<} 0 + 11 \\ 13 > 11 \end{array}$$

- 7** Solve each inequality and graph the solution set on the number line. Then check your solution set.

**a**  $10 + x \geq 45$   
 $-10 \quad -10$

$$x \geq 35$$

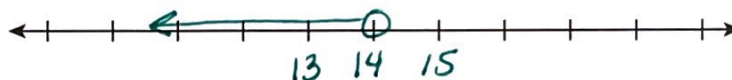
$$\begin{array}{l} 10 + 40 \geq 45 \\ 50 \geq 45 \checkmark \end{array}$$



**b**  $x < 5 + 9$

$$x < 14$$

$$10 < 14 \checkmark$$

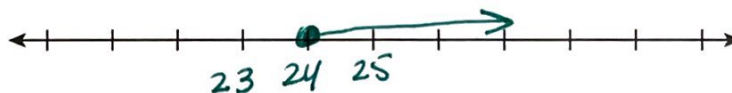


**c**  $x - 3 \geq 21$

$$+3 \quad +3$$

$$x \geq 24$$

$$\begin{array}{l} 30 - 3 \geq 21 \\ 27 \geq 21 \checkmark \end{array}$$



- 8** Choose one of the inequalities from Question 7 and write a real-world situation that you can model with the algebraic statement.

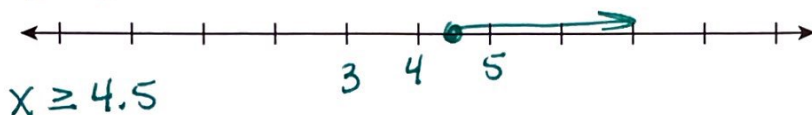


## ACTIVITY 2 Continued

You can multiply or divide each side of an inequality by the same positive value and still maintain the relationship.

7 Solve each inequality and graph the solution set on the number line.

a)  $\frac{10x}{10} \geq \frac{45}{10}$



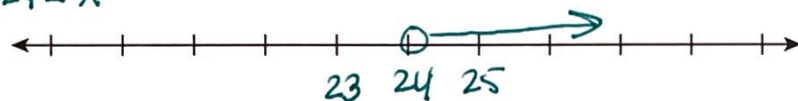
b)  $\frac{x}{3} \leq 21 \cdot 3$

$x \leq 63$



c)  $3 < \frac{1}{8}x \cdot \frac{8}{1}$

$24 < x$



8 Choose one of the inequalities from Question 7 and write a real-world situation that you can model with the algebraic statement.