

5-3 Study Guide and Intervention

Inequalities

Write Inequalities A mathematical sentence that contains any of the symbols listed below is called an **inequality**.

$<$	$>$	\leq	\geq
<ul style="list-style-type: none"> • is less than • is fewer than 	<ul style="list-style-type: none"> • is greater than • is more than • exceeds 	<ul style="list-style-type: none"> • is less than or equal to • is no more than • is at most 	<ul style="list-style-type: none"> • is greater than or equal to • is no less than • is at least

Example 1 Write an inequality for the sentence.

Fewer than 70 students attended the last dance.

Words	<i>Fewer than</i> 70 students attended the last dance.
Symbols	Let s = the number of students.
Inequality	$s < 70$

You can substitute a value for a variable in an inequality and determine whether the value makes the inequality true or false.

Example 2 For the given value, state whether each inequality is *true* or *false*.

a. $5y - 6 < 14; y = 5$

$5y - 6 < 14$

Write the inequality.

$5(5) - 6 < 14$

Replace the variable with the given value.

$19 < 14$

Simplify.

This sentence is false.

b. $r - 16 \geq -12; r = 4$

$r - 16 \geq -12$

$4 - 16 \geq -12$

$-12 \geq -12$

Although $-12 > -12$ is false, $-12 = -12$ is true. So, this sentence is true.

Exercises

Write an inequality for each sentence.

- The maximum diving depth is no more than 45 feet below sea level.
- Adult male elephants can weigh over 12,000 pounds.
- The maximum fee for any student is \$15.
- You must be at least 38 inches tall to ride the roller coaster.

For the given value, state whether the inequality is *true* or *false*.

5. $m + 8 \geq 5; m = -3$

6. $4 - p < -2; p = 6$

7. $b + 12 \leq 15; b = -1$

8. $j - 7 < -8; j = 0$

5-3 Study Guide and Intervention (continued)

Inequalities

Graph Inequalities Inequalities can be graphed on a number line. This helps you see which values make the inequality true. You can also write inequalities for a graph.

An *open dot* indicates that the number marked *does not* make the sentence true.
 A *closed dot* indicates that the number marked *does* make the sentence true.
 The direction of the line indicates whether numbers *greater than* or *less than* the number marked make the sentence true.

Example 1 Graph each inequality on a number line.

a. $x > 8$



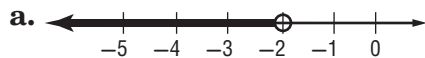
The **open dot** means 8 *does not* make the sentence true. The line means that numbers greater than 8 make the sentence true.

b. $x \leq 8$

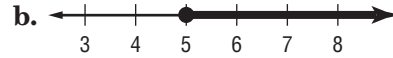


The **closed dot** means 8 *does* make the sentence true. The line means that numbers less than 8 make the sentence true.

Example 2 Write an inequality for each graph.



The open dot means -2 is not included in the graph. The arrow points left, so the graph includes all numbers less than -2 .
 The inequality is $x < -2$.

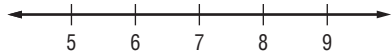


The closed dot means 5 is included in the graph. The arrow points right, so the graph includes all numbers greater than 5.
 The inequality is $x \geq 5$.

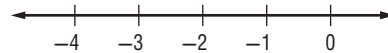
Exercises

Graph each inequality on a number line.

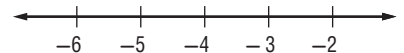
1. $x > 7$



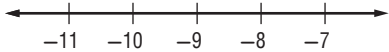
2. $a \leq -2$



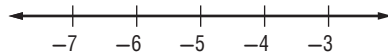
3. $d < -4$



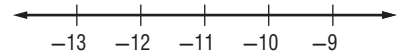
4. $w > -9$



5. $t \geq -5$



6. $n < -11$



Write the inequality for each graph.

