Inequalities

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Words</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;</td>
<td>greater than</td>
<td>3 &gt; 2</td>
</tr>
<tr>
<td>&lt;</td>
<td>less than</td>
<td>7 &lt; 28</td>
</tr>
<tr>
<td>≥</td>
<td>greater than or equal to</td>
<td>5 ≥ x − 1</td>
</tr>
<tr>
<td>≤</td>
<td>less than or equal to</td>
<td>2y + 1 ≤ 7</td>
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Things that **DON’T** change the sign of an inequality:
- Adding or subtracting from both sides of an equation
- Multiplying or dividing from both sides of an equation with a **POSITIVE** number
- Simplifying either sides of an equation

Things that **DO** change the sign of an inequality:
- Exchanging left and right hand sides
  
  \[2y < 12\]  
  \[12 > 2y\]
- Multiplying or dividing by a **NEGATIVE** number
  
  \[-2y < −4\]  
  Dividing both sides by \(-2\) will change the sign to \(y > 2\)

**Adding or subtracting a Value**

**Solve:** \(x + 3 < 7\)

By subtracting 3 from both sides, we get:

\[x + 3 - 3 < 7 - 3\]

Solution: \(x < 4\)

In other words, \(x\) can be any value less than 4.

**Multiplying or dividing by a value**

**Solve:** \(3y < 15\)

If we divide both sides by 3 we get:

\[3y/3 < 15/3\]

Solution: \(y < 5\)

**Solve:** \(-2y < −8\)

Let us divide both sides by -2 and **reverse the Inequality**:

\[-2y < −8\]

\[⇒ −2y/−2 > −8/−2\]

Solution: \(y > 4\)
Solve $5(3z - 2) \leq 50$ and graph the solution set on a number line

**Step 1:**
Divide both sides by 5. Because we are dividing by a positive number we do not reverse the inequality sign.

$$\frac{5(3z - 2)}{5} \leq \frac{50}{5}$$
$$\Rightarrow 3z - 2 \leq 10$$

The solution set on the number line includes all numbers to the left of 4, and includes 4 itself, which is shown by a closed circle at 4:

Solve $\frac{1}{2}(3 - 5x) < -6$ and graph the solution set on a number line.

**Step 1:**
Multiply both sides by 2.

$$\frac{1}{2}(3 - 5x) \times 2 < -6 \times 2$$
$$\Rightarrow 3 - 5x < -12$$

Because we are multiplying both sides of the equation by a positive number we do not reverse the inequality sign.

The solution set on the number line includes all numbers to the right of 3, but does not includes 3 itself, which is shown by an open circle at 3:

For more information: [http://www.mathsisfun.com/algebra/inequality-solving.html](http://www.mathsisfun.com/algebra/inequality-solving.html)