Examples
Linear Inequalities in One Variable

Based on power point presentations by Pearson Education, Inc.
Revised by Ingrid Stewart, Ph.D.

Learning Objectives

1. Recognize inequality signs and interpret their meaning.
2. Solve simple linear inequalities in one variable.
3. Solve linear compound inequalities in one variable.

Example 1: Solve a Linear Inequality

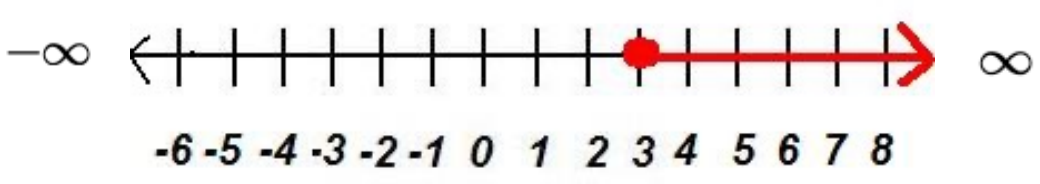
Solve the linear inequality $6x - 15 \geq 3$, then represent the solution set graphically.

$6x - 15 \geq 3$
$6x \geq 18$

Now we must multiply both sides by the reciprocal of 6 or we can say that we must divide both sides by 6!

$x \geq 3$ This is the solution set!

The solution set contains all numbers greater than or equal to ***3*** and following is its graphical representation on the number line:



The red arrow indicates all numbers included in the solution set. There is a dot at 3 to indicate that the number IS included in the solution set!

Example 2: Solve a Linear Inequality

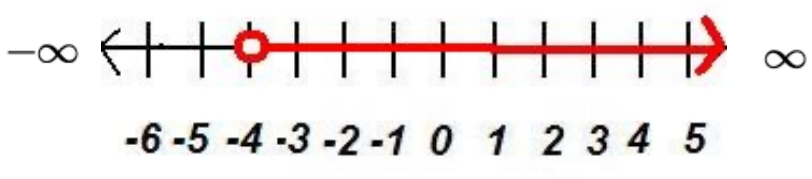
Solve the linear inequality $x - 9 < 5x + 7$, then represent the solution set graphically.

$x - 9 < 5x + 7$
$x - 5x < 7 + 9$
$-4x < 16$

Now we must multiply both sides by the reciprocal of – 4 or we can say that we must divide both sides by – 4!

$x > -4$ This is the solution set! Note that the inequality sign changed direction!

The solution set contains all numbers greater than ***– 4*** and following is its graphical representation o the number line:



The red arrow indicates all numbers included in the solution set. There is a circle at – 4 to indicate that the number is NOT included in the solution set!

Example 3: Solve a Linear Inequality (1 of 2)

Solve the linear inequality $3x + 2(4 - 9x) - 3(x - 3) + x < 0$, then represent the solution set graphically.

$3x + 2(4 - 9x) - 3(x - 3) + x < 0$

$3x + 2(4) + 2(-9x) - 3(x) - 3(-3) + x < 0$ (Used *the Distributive Property!*)

$3x + 8 - 18x - 3x + 9 + x < 0$

$-17x + 17 < 0$

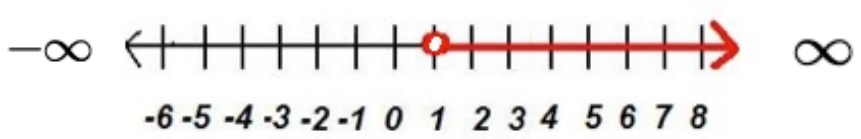
$-17x < -17x$

Now we must multiply both sides by the reciprocal of – 17 or we can say that we must divide both sides by – 17!

$x > 1$ This is the solution set! Note that the inequality sign changed direction!

Example 3: Solve a Linear Inequality (2 of 2)

The solution set contains all numbers greater than ***1*** and following is its graphical representation on the number line:



The red arrow indicates all numbers included in the solution set. There is a circle at 1 to indicate that the number is NOT included in the solution set!

Example 4: Solve a Linear Compound Inequality (1 of 2)

Solve the linear compound inequality $-2 < 5x + 1 \leq 3$, then represent the solution set graphically.

$-2 < 5x + 1 \leq 3$

$-3 < 5x \leq 2$

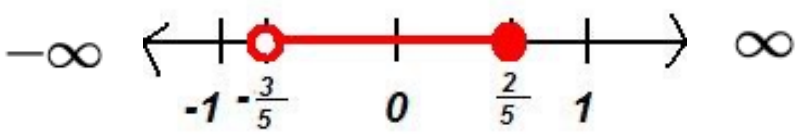
Now we must multiply all three parts by the reciprocal of 5 or we can say that we must divide both sides by 5!

$-\frac{3}{5} < x \leq \frac{2}{5}$ This is the solution set!

We express it as "x is greater thar $-\frac{3}{5}$ **AND** x is less than or equal to $\frac{2}{5}$ ".

Example 5: Solve a Linear Compound Inequality (2 of 2)

The solution set contains all numbers greater than $-\frac{3}{5}$ but less than or equal to $\frac{2}{5}$. Following is its graphical representation on the number line:



The red line indicates all numbers included in the solution set. There is a circle at – 3/5 to indicate that the number is NOT included in the solution set! There is a dot at 2/5 to indicate that the number IS included in the solution set.