# Section 1.7 Linear Inequalities in One Variable

**Review of Writing Sets Using Set-Builder and Interval Notation**

There are two types of notations we can use to describe a certain set of numbers, **set-builder notation** and **interval notation**.

For example, suppose we want to describe the set of all real numbers less than $10$. Using set-builder notation, we write this set as $\{x \mid x < 10\}$. The graph below shows how we can represent this set on a number line.


The open circle at $10$ represents that $10$ is not included in the set. The interval that describes this set is called an open infinite interval and is written as $(-\infty, 10)$ when written in interval notation.

Unlike equations which usually have a finite number of solutions (or no solution at all), inequalities often have infinitely many solutions. We typically describe the solutions to an inequality in one of three ways:

1) Graph the solution on a number line.
2) Write the solution in set builder notation.
3) Write the solution in interval notation.

**Objective 1: Solving Linear Inequalities**

***Definition*:** A **linear inequality** is an inequality that can be written in the form $ax+b<c$ where *a*, *b* and *c* are real numbers and $a \neq 0$.

Note that the inequality symbol "<" in the definition above can be replaced with either >, $\leq$, or $\geq$.

The technique to use when solving linear inequalities is to isolate the variable on one side.

**Remember to reverse the direction of the inequality symbol when multiplying or dividing both sides of an inequality by a negative number.**

**Objective 2: Solving Three-Part Inequalities**

The technique to use when solving three-part inequalities is to simplify until the variable is "sandwiched" in the middle. It is good practice to rewrite the inequality so that the smaller of the two outside numbers is on the left. A number is a solution to a three-part inequality if it is a solution to **both** inequalities.