10   Solving Linear Inequalities (Including Word Problems) (2.8)

An inequality statement can be read from left to right or from right to left. (We usually use the variable as our starting point.) The "larger" end of the symbol faces the larger number and the "smaller" end faces the smaller number.

Example

x < 5 can be read "x is less than 5" or "5 is greater than x". (Since we are usually interested in the variable, the first expression is more common.)

$-3 \geq y$ is read "y is less than or equal to -3" (or "-3 is greater than or equal to y").

A number is a "solution" to an inequality if, when the variable is replaced with the number, a true statement results.

Example

Is $\frac{1}{2}$ a solution of $x \leq 1$?

Replace x with $\frac{1}{2}$. Is $\frac{1}{2} \leq 1$ a true statement? Is $\frac{1}{2}$ less than or equal to 1? Yes, $\frac{1}{2}$ is less than 1, so it is a solution. (Don't let the "equal" part of the symbol confuse you. Any number that is less than 1 **or** equal to 1 is a solution.) Notice that this inequality has **many** solutions; there are many numbers that are less than or equal to 1. This is true for most inequalities.

The solutions to an inequality can be "graphed" on a number line.

Example

Graph all the solutions to $x \leq 1$.

Draw a number line. Show several numbers for reference.
Shade the number line to the **left** of 1 (that's where all the
numbers <u>less than 1</u> are!). Also, put a large, filled in dot
right on the 1 to show that it is also a solution (x can be
less than 1 <u>or equal</u> to 1).