

## Section 1.7 Linear Inequalities and Absolute Value Inequalities

- |                             |  |
|-----------------------------|--|
| $<$ means "is less than"    | $\leq$ means "is less than or equal to"    |
| $>$ means "is greater than" | $\geq$ means "is greater than or equal to" |

**Solving linear inequalities is similar to solving linear equations.**

1. We simplify both sides of the inequality.
    - Clear parentheses
    - Clear fractions or decimals, if any
    - Combine like terms
  2. Add or subtract to combine the variable terms on one side of the inequality.
  3. Add or subtract to combine the constant terms on the other side of the inequality.
  4. Multiply or divide both sides by the coefficient of the variable to get the solution.
- REMEMBER: When you multiply or divide both sides by a negative number, switch the direction of the inequality.**

### Vocabulary

- An **interval** is the set of all real numbers between two given numbers.
- An **endpoint** of an inequality is a point on a number line that separates values that are solutions from values that are not.

The endpoints used in interval notation are always written from left to right. That is, the smaller number is written first, followed by a comma, followed by the larger number.

Set-builder notation and interval notation are used to represent solution sets.

| Symbols             | Notation you will use | It means...  |
|---------------------|-----------------------|--|
| $<$ $>$             | $($ or $)$            | Parentheses are used to indicate that an endpoint is <b>not included</b> as the solution.  |
| $\leq$ $\geq$       | $[$ or $]$            | Brackets are used to indicate that an endpoint is <b>included</b> as the solution.   |
| $-\infty$ $+\infty$ | $($ and $)$           | Parentheses are used when an interval continues on indefinitely to the left or right on a number line, we will use the symbol $-\infty$ (negative infinity) or $+\infty$ (positive infinity) |

The symbol for infinity  $\infty$  (or  $-\infty$ ) is not a number. It is used to indicate that the interval is to include all real numbers from some point on (either in the positive direction or the negative direction) without end.

Example 1: Express each interval in set-builder notation and graph the interval on a number line.