

# Inequalities

1.7

# Properties

Trichotomy Property : For all real numbers “a” and “b”  $a < b$ ,  $a > b$ , or  $a = b$ .

Nonnegative Property : For all  $a$ ,  $a^2$  is positive or 0.

Transitive Property : If  $a < b$  and  $b < c$ , then  $a < c$ .

Addition Property : If  $a < b$ , then  $a + c < b + c$ .

Reciprocal Property : If  $a > 0$ , then  $1/a > 0$

# Multiplication/Division

If  $a < b$ , then  $ac < bc$ , as long as  $c > 0$ .

If  $a < b$  and  $c < 0$ , then  $ac > bc$ .

**SWITCH** the inequality whenever you multiply or divide by a negative.

I repeat, **SWITCH** the inequality when you multiply or divide by a negative.

# Solving Inequalities

1. Make sure you switch the inequality if you multiply or divide by a negative.
2.  $x < a$  means  $a > x$ . Try to put the variable on the left side so the solution is easier to understand.
3. The solution is a **set** of numbers instead of just one or two numbers.

# Interval Notation

All real numbers.  $\square$  ;  $(-\infty, \infty)$

$x < a$  ;  $(-\infty, a)$

$x > a$  ;  $(a, \infty)$

$a < x < b$  ;  $(a, b)$

$a \leq x \leq b$  ;  $[a, b]$

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$a \leq x < b$  ;  $[a, b)$

Solve. Express answers in interval notation.

$$\text{EX: } 4x + 7 \geq 3x - 6$$

$$\text{EX: } -5 < 2x + 1 < 12$$

$$\text{EX: } -14 \leq 2x - 8 \leq 10$$

$$\text{EX: } 0 \leq -5x + 7 \leq 24$$

$$\text{EX: } \frac{2}{3} > \frac{4}{5}x - 2 > \frac{1}{2}$$

# Absolute Value Inequalities

- Consider both cases due to the absolute value.
- In the second case, be sure to SWITCH the inequality AND the signs on the right side.
- Separate the cases by “AND” if the original inequality is  $< or \leq$ . Separate the cases by “OR” if the original inequality is  $> or \geq$ .

**Solve. Write the solution set in interval notation.**

$$\text{EX: } |x| > 3$$

$$\text{EX: } |2x + 4| \leq 3$$

$$\text{EX: } |-3x + 7| \geq x + 4$$

$$\text{EX: } |7x - 6| < 0$$

$$\text{EX: } (2x - 1)^{-1} > 0$$