



Solving Inequalities

Inequality

- ▶ An inequality is a statement that compares two expressions by using the symbols $<$, $>$, \leq , \geq , or \neq .
- ▶ It says that two quantities are not equal.



$$A < B$$

A is less than B.



$$A > B$$

A is greater than B.



$$A \leq B$$

A is less than or equal to B.



$$A \geq B$$

A is greater than or equal to B.



$$A \neq B$$

A is not equal to B.

Phrases of Inequality

- The chart shows some common phrases that indicate inequalities in word problems.

Inequalities			
$<$	$>$	\leq	\geq
less than	greater than	at most	at least
fewer than	more than	no more than	no less than
		less than or equal to	greater than or equal to

Properties of Inequality

KEY CONCEPT

Properties of Inequality

Addition Property of Inequality

Words For any real numbers, a , b , and c :

If $a > b$, then $a + c > b + c$.

If $a < b$, then $a + c < b + c$.

Example

$$3 < 5$$

$$3 + (-4) < 5 + (-4)$$

$$-1 < 1$$

Subtraction Property of Inequality

Words For any real numbers, a , b , and c :

If $a > b$, then $a - c > b - c$.

If $a < b$, then $a - c < b - c$.

Example

$$2 > -7$$

$$2 - 8 > -7 - 8$$

$$-6 > -15$$



Examples

- Solve $t - 45 \leq 13$. Check your solution.



Examples

- ▶ Solve $t - 45 \leq 13$. Check your solution.
- ▶ $t - 45 \leq 13$
- ▶ $t - 45 + 45 \leq 13 + 45$
- ▶ $t \leq 58$
- ▶ Check: use 58, a number greater than 58, and a number less than 58

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Examples

- Solve $s + 19 > 56$. Check your solution.



Examples

- ▶ Solve $s + 19 > 56$. Check your solution.
- ▶ $s + 19 > 56$
- ▶ $s + 19 - 19 > 56 - 19$
- ▶ $s > 37$
- ▶ Check: a number greater than 37, and a number less than 37

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Properties of Equality

- ▶ If you multiply or divide both sides by a negative number, you must **reverse** the inequality symbol.

Properties of Inequality

KEY CONCEPT

Properties of Inequality

Multiplication Property of Inequality

Words For any real numbers, a , b , and c , where

c is positive: if $a > b$, then $ac > bc$.

if $a < b$, then $ac < bc$.

c is negative: if $a > b$, then $ac < bc$.

if $a < b$, then $ac > bc$.

Examples

$$-2 < 3$$

$$4(-2) < 4(3)$$

$$-8 < 12$$

$$5 > -1$$

$$(-3)(5) < (-3)(21)$$

$$-15 < 3$$

Division Property of Inequality

Words For any real numbers, a , b , and c , where

c is positive: if $a > b$, then $\frac{a}{c} > \frac{b}{c}$.

if $a < b$, then $\frac{a}{c} < \frac{b}{c}$.

c is negative: if $a > b$, then $\frac{a}{c} < \frac{b}{c}$.

if $a < b$, then $\frac{a}{c} > \frac{b}{c}$.

Examples

$$-18 < -9$$

$$\frac{-18}{3} < \frac{-9}{3}$$

$$-6 < -3$$

$$12 > 8$$

$$\frac{12}{-2} < \frac{8}{-2}$$

$$-6 < -4$$



Examples



► Solve $\frac{1}{4}n > 750$.



Examples



► Solve $\frac{1}{4}n > 750$.

► $\frac{1}{4}n > 750$

► $4 * \frac{1}{4}n > 4 * 750$

► $n > 3000$

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Examples

► Solve $-\frac{2}{5}p < -14$.

Examples

► Solve $-\frac{2}{5}p < -14$.

► $-\frac{2}{5}p < -14$

► $-\frac{5}{2} * -\frac{2}{5}p > -\frac{5}{2} * -14$

► $p > 35$



Examples

► Solve $14h > 91$



Examples

► Solve $14h > 91$

► $14h > 91$

► $\frac{14h}{14} > \frac{91}{14}$

► $h > 6.5$

Examples

► Solve $-5t \geq 275$

► $-5t \geq 275$

► $\frac{-5t}{-5} \leq \frac{275}{-5}$

► $t \leq -55$



Examples

► Solve $-m \leq \frac{m+4}{9}$

Examples

► Solve $-m \leq \frac{m+4}{9}$

► $-m \leq \frac{m+4}{9}$

► $-m * 9 \leq \frac{m+4}{9} * 9$

► $-9m \leq m + 4$

► $-9m - m \leq m - m + 4$

► $-10m \leq 4$

► $\frac{-10m}{-10} \geq \frac{4}{-10}$

► $m \geq -\frac{2}{5}$

