

**Objective:** Solve one variable inequalities.

**Example:**

$$3x + 2 < 5$$

$$\begin{array}{r} -2 \quad -2 \\ \hline 3x < 3 \end{array}$$

Subtraction Property of Equality

$$3x < 3$$

$$\frac{3x}{3} < \frac{3}{3}$$

Division Property of Equality

$$x < 1$$

Choose a number  $< 1$  and see if it works.

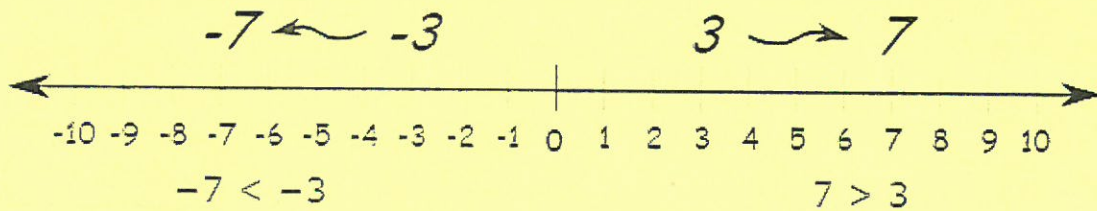
**REMEMBER:**

When multiplying or dividing by a **NEGATIVE**, **FLIP** the inequality sign.

**Why?**

Well, just look at the number line!

For example, from 3 to 7 is an increase,  
but from  $-3$  to  $-7$  is a decrease.



See how the inequality sign reverses (from  $<$  to  $>$ ) ?

**Example:**

$$-2x \geq 8$$

$$\frac{-2x}{-2} \geq \frac{8}{-2}$$

$$x \geq -4$$

Choose a number  $\geq -4$

$$-2(0) \geq 8 ?$$

$$0 \geq 8$$

**No way!**

$$-2x \geq 8$$

$$\frac{-2x}{-2} \leq \frac{8}{-2}$$

$$x \leq -4$$

Choose a number  $\leq -4$

$$-2(-10) \geq 8$$

$$20 \geq 8$$

**yes indeed!**

Switch that sign  
since we divided  
by  $-2$ !

Which is correct???

## Solving Inequalities

Name: \_\_\_\_\_

$$1. \quad -4 + 5x < 31$$

$$\quad +4 \quad +4$$

$$\frac{5x}{5} < \frac{35}{5}$$

$$\boxed{x < 7}$$

lets try  $x=1$

$$-4 + 5(1) < 31$$

$$-4 + 5 < 31$$

$$1 < 31$$

yes

$$3. \quad \frac{x-9}{-2} \geq 5 \quad (-2)$$

$$x-9 \leq -10$$

$$\quad +9 \quad +9$$

$$\boxed{x \leq -1}$$

\* I switched the sign  
since I multiplied  
by  $-2$

$$2. \quad \frac{x}{6} + 3 \leq -2$$

$$\quad -3 \quad -3$$

$$(6) \cdot \frac{x}{6} \leq -5(6)$$

$$\boxed{x \leq -30}$$

lets try  $-36$

$$\frac{-36}{6} + 3 \leq -2$$

$$-6 + 3 \leq -2$$

$$-3 \leq -2$$

yes

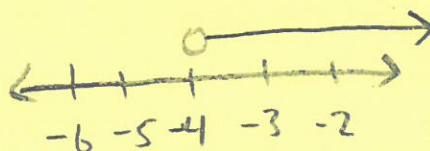
\* dont switch the sign. we  
multiplied by positive 6.

$$4. \quad -8x + 19 + 12x > 3$$

$$19 + 4x > 3$$

$$4x > -16$$

$$\boxed{x > -4}$$



lets try 0

$$19 > 3$$

yes

\* I switched the sign  
since I

## Solving Inequalities

Name: \_\_\_\_\_

5.  $19 \geq 7 - 3x$

$$\frac{12 \geq -3x}{-3 \quad -3}$$

$$\boxed{-4 \leq x}$$

6.  $3(5x + 8) < -21$

$$15x + 24 < -21$$

$$15x < -45$$

$$\boxed{x < -3}$$

7.  $-3x + 11 \geq 6x + 29$

$$-18 \geq 9x$$

$$\boxed{-2 \geq x}$$

8.  $\frac{-4x}{5} - 7 \leq 1$

$$\frac{-4x}{5} \leq 8$$

$$-4x \leq 40$$

$$\frac{-4x}{-4} \leq \frac{40}{-4}$$

$$\boxed{x \geq -10}$$

## Challenge Problems:

\*9.  $\frac{-4x+13}{5} > 3$

$$-4x+13 > 15$$

$$-4x > 2$$

$$x < -\frac{1}{2}$$

\*10.  $-2(3x+2) < -8(x-5)$

$$-6x-4 < -8x+40$$

$$2x < 44$$

$$x < 22$$

\*11.  $-2(2-2x)-4(x+5) \leq -24$

$$-4+4x-4x-20 \leq -24$$

$$-24 \leq -24$$

$$x = \text{any real \#}$$

\*12.  $-2 < \frac{6-2x}{-3} < 4$

$$6 > 6-2x > -12$$

$$0 > -2x > -18$$

$$0 < x < 9$$