

**Solving 1-Step Inequalities with Multiplication, Division, & Fractions**

**Let's Conduct a Mathematical Experiment**

We know that the process of isolating a variable can include multiplying both sides of a mathematical statement by some number in order to get our **variable's coefficient to be 1**.

Recall:

$$-\frac{x}{4} = 2$$

*x being div. by (-4)*

$$4 > 2$$

*True*

$$-4 \cdot -\frac{x}{4} = 2 \cdot -4$$

*multiply by -4*

$$-4 \cdot 4 > 2 \cdot -4$$

$$-4x = -8$$

$$-16 > -8$$

*false no! -16 > -8*

$$1x = -8$$

Is this a still a true statement?

$$x = -8$$

How should the comparison be stated to be true?

$$-16 < -8$$

**Key Ideas**

When you multiply both sides of an inequality by a negative number,

you change the meaning of the comparison, so you must reverse the symbol!

\*\*Since dividing is the same as Multiply by the reciprocal

when you divide both sides of an inequality by a negative number,

you must also reverse the symbol!

**Complete the examples in your group by filling in the correct symbol.**

**Example 1**

$$-3n > -12$$

$$\frac{-3n}{-3} < \frac{-12}{-3}$$

*divide by -3*

$$n < 4$$



Did you reverse the symbol? Why or why not?

*Yes because we ÷ by a neg.*

Check to make sure your choice is correct.

*Choose 2 because 2 is less than 4  
\* plug in n=2 -3(2) > -12  
-6 > -12 ✓*

**Example 2**

$$\frac{b}{2} \leq -9$$

$$2 \cdot \frac{b}{2} \leq -9 \cdot 2$$

*mult. by 2*

$$b \leq -18$$



Did you reverse the symbol? Why or why not?

*No because we multiplied by a positive*

Check to make sure your choice is correct.

*choose -20 because -20 is less than -18  
\* plug in n=-20 -20 <= -9  
-10 <= -9 ✓*

### Group You Trys

#### REMEMBER!

- The sign of your final answer does NOT affect the inequality symbol.
- What matters is the sign of the number YOU multiply/divide both sides by.
- Choose EASY numbers to substitute when you check your answer! (0, 1, multiples of 10, etc.)

Solve Using Algebra	$-3 \cdot \frac{c}{3} < 2 \cdot -3$ $c > -6$	$\frac{4x}{4} > \frac{-32}{4}$ $x > -8$
Check Your Solution	<p>Yes because you multiply by -3.</p> $-\frac{(-3)}{3} < 2 \quad \frac{3}{3} < 2 \quad 1 < 2 \quad \checkmark$	<p>No because we multiply by 4</p> $4(-6) > -32$
Graph		
Solve Using Algebra	$\frac{-2f}{-2} \leq \frac{10}{-2}$ $f \geq -5$	$-3 \cdot 7 < -\frac{d}{3} \cdot -3$ $d < 21$
Check Your Solution	<p>Yes because you divide by negative number.</p> $-2(-1) \leq 10$	<p>Yes you multiply by -3.</p> $-3(-18) < 7$
Graph		

### Solving 1-Step Inequalities with Addition & Subtraction

No tricks! Simply use inverse operations: + to undo - and - to undo +.

Ex. 1

$$\begin{array}{r} x + 2 > 3 \\ -2 \quad -2 \\ \hline x > 1 \end{array}$$

Ex. 2

$$\begin{array}{r} -4 + y \leq 3 \\ +4 \quad +4 \\ \hline y \leq 7 \end{array}$$

You Try

$$\begin{array}{r} k - 7 \geq -10 \\ +7 \quad +7 \\ \hline k \geq -3 \end{array}$$