

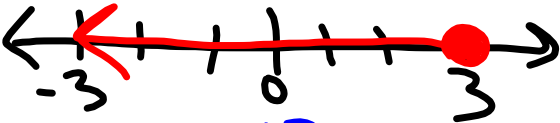
## Warm Up (9/13/17)

Solve and Graph the following inequalities:

$$1. \quad 2x \geq 3(x-1)$$

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

$$-x \geq -3 \quad \rightarrow \quad -x \geq (-3) \cdot (-1)$$

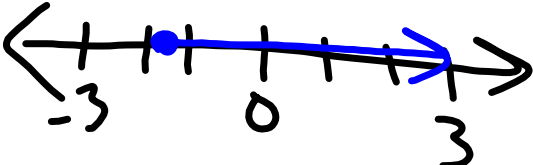
$$x \leq 3 \quad \text{Flip the inequality}$$


$$2. \quad -7x + 4 \leq 17$$

$$\begin{array}{r} -7x + 4 \leq 17 \\ -4 \quad -4 \\ \hline -7x \leq 13 \\ \frac{-7x}{-7} \leq \frac{13}{-7} \end{array}$$

$$x \geq -\frac{13}{7}$$

Note:  
 $-\frac{13}{7} \approx -1.857$



Divided by a negative. So flip the inequality

## Solving Inequalities joined by "And" or "Or"

Discussion:

Let's discuss the difference between "and" and "or".

If I say that you're in English class<sup>F</sup> AND Math<sup>T</sup> class, is that a true statement?

Overall, False.

If I say you're in English class<sup>F</sup> OR Math Class<sup>T</sup> right now, is that a true statement?

Overall, True

Truth Values for "And" are only true if both statements are true.



Truth Values for "Or" statements are true if only ONE of them are true



### Example

Determine the truth value of the following mathematical statements:

$$10 + 2 \neq 12 \quad \text{and} \quad 8 - 3 > 0$$

$12 \neq 12$        $5 > 0$   
 F      Overall, False      T

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$$3 < 5 + 4 \quad \text{or} \quad 6 + 4 = 9$$

$3 < 9$  T       $10 = 9$  F

Overall, True

## Compound Inequalities

Compound inequalities are two inequalities separated by an "and" or an "or".



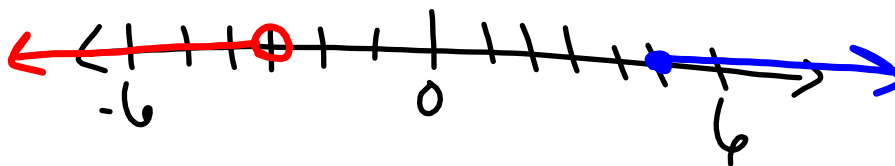
**Side Note:** "No Solution" can be an acceptable answer, though these cases are rarely explored



**For example:**

$$x < -3 \text{ and } x \geq 5$$

Let's graph to find out why...



The graph is going in two separate directions. Since it's an "and" statement BOTH inequalities must be true at the same time. If they were, there would be an intersection. But since there's no intersection both can't be true at the same time. Therefore, there's no solution to this compound inequality.

## Compound Inequalities with "And"

Can be represented in two ways:

Example:

1.  $x > -1$  and  $x < 3$

2.  $-1 < x < 3$

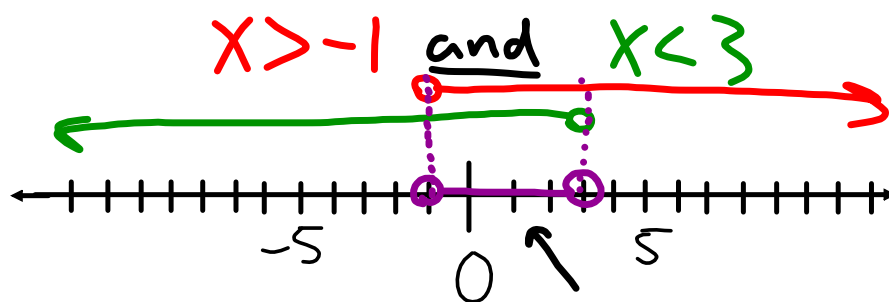
*These have the same meaning*

*more likely to see this version*

We must solve both inequalities in order to come up with a solution.

*In other words, we solve each inequality separate from each other.*

Let's try to represent our answer by graphing



*The intersection is our solution set*

Solve and graph the following compound inequality:

$$x + 1 < -1 \quad \text{and} \quad x - 2 \geq -6$$

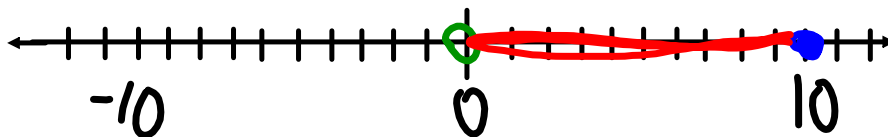
$-1 \quad -1$        $+2 \quad +2$

$x < -2$       and       $x \geq -4$

In green      In blue

Solve and graph the following compound inequality:

$$\begin{array}{l} 2 < \textcircled{x} + 2 \leq 12 \rightarrow 2 < x + 2 \\ \underline{-2 \quad -2 \quad -2} \qquad \text{AND} \\ 0 < x \leq 10 \qquad \qquad \qquad x + 2 < 12 \\ \text{Starting point} \qquad \qquad \qquad \text{End point} \end{array}$$



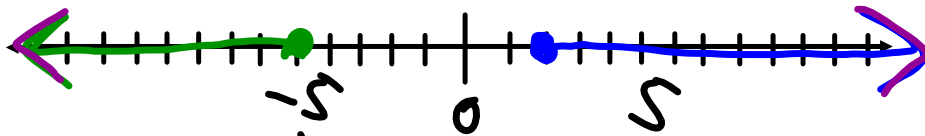
## Compound Inequalities with an "Or"

Compound "Or" statements will only appear the following way:

Ex:  $x \leq -5$  or  $x \geq 2$

The same Inequality  $\downarrow$   
 $-5 \geq x$

Graphing them looks like the following:



Important!

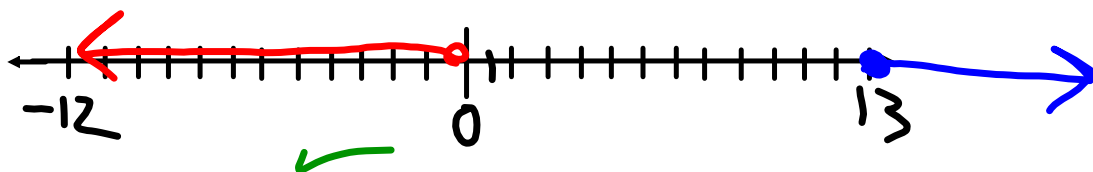
The direction of the inequality sign  
Does Not determine the direction  
of your arrows!



Example:

Solve and Graph the following compound inequality:

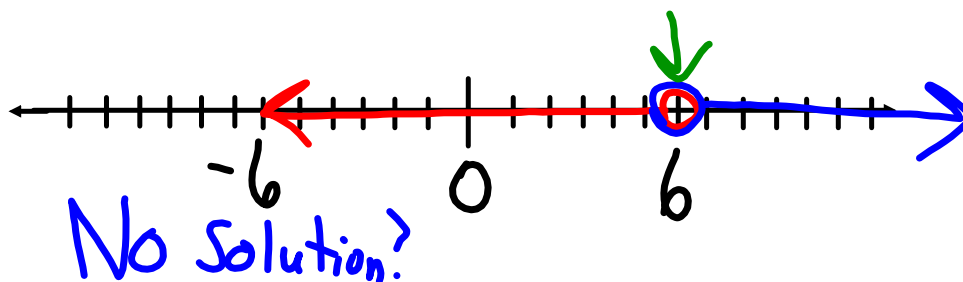
$$\begin{array}{r}
 5x + 1 < 0 & \text{or} & 8 \leq x - 5 \\
 \underline{-1 \quad -1} & & \underline{+5 \quad +5} \\
 5x < -1 & & 13 \leq x \\
 \underline{\quad \quad 5} & & \\
 x < -\frac{1}{5} & \text{or} & 13 \leq x
 \end{array}$$



Example:

Solve and graph the following Compound inequality:

$$\begin{array}{ccc} x - \cancel{2} < 4 & \text{or} & x - \cancel{2} > 4 \\ \hline \begin{array}{cc} +2 & +2 \end{array} & \downarrow & \begin{array}{cc} +2 & +2 \end{array} \\ x < 6 & \text{or} & x > 6 \end{array}$$



# Homework

Page S.98, Exercise Set #3-8

Due Monday  
Sept. 18

