5-3

Essential Question: How do we determine the solution set of a compound inequality?

Do Now: Determine whether each compound statement below is true or false.

a) Right now, I am in math class **or** English class.
T F
True

b) Right now, I am sitting **or** writing.
T F
True

c) $5 > 1$ **or** $6 < 3$
T F True

d) $5 < 1$ **or** $6 > 9$
F F
False

Think about this...
For any statements above that were determined to be true, what had to be true to make the statement true? At least one part had to be true

A number is a solution to a compound inequality connected by the word "OR" if the number is a solution to at least one inequality.

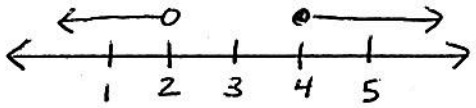
Let's look at some examples....

1. To promote a new teen movie, the local movie theater is offering a discounted ticket rate for anyone who is under 7 years old **or** over 50 years old. Using ***x*** to represent the age of a discounted moviegoer, determine the solution set to the scenario described.

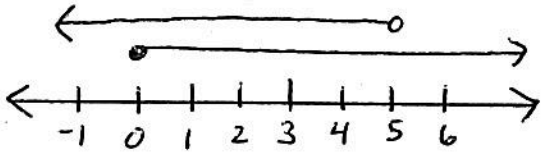
$x < 7$ or $x > 50$

Examples: Graph the solution set to the following compound inequalities.

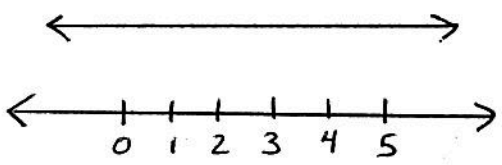
2. $x < 2$ or $x \geq 4$



3. $x \geq 0$ or $x < 5$



Final copy

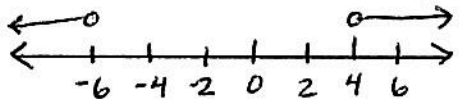


Graphing "OR" Compound Inequalities

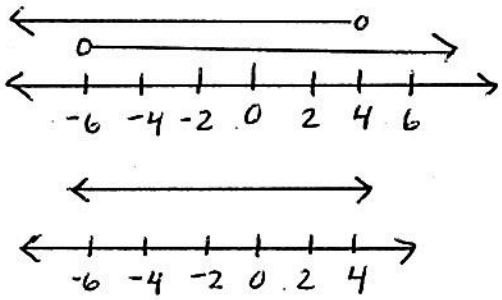
- Graph the first inequality on a number line
- Graph the second inequality on the same number line above the first inequality
- Graph the combination of both inequalities
- If the two graphs overlap, the solution set is all real numbers (a straight line)

More Examples:

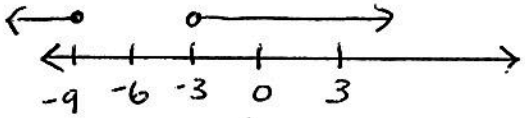
4. $x < -6$ or $x > 4$



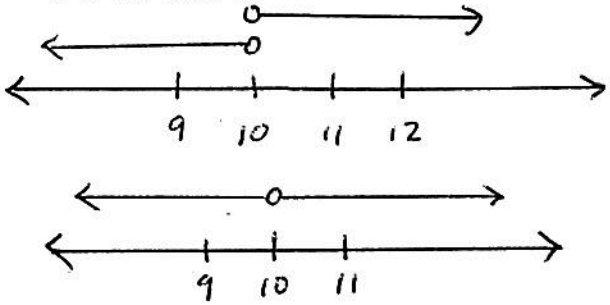
5. $x > -6$ or $x < 4$



6. $x \leq -9$ or $x > -3$



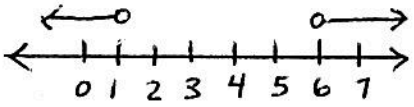
7. $x < 10$ or $x > 10$



8. $3x + 1 < 4$ or $2x - 5 > 7$

$3x < 3 \quad 2x > 12$

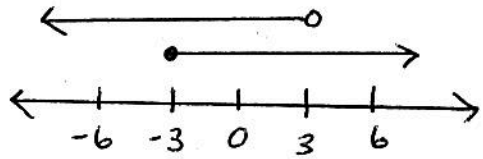
$x < 1$ or $x > 6$

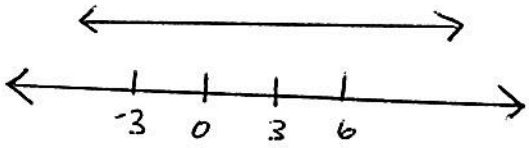


9. $2x \geq x - 3$ or $3x < x + 6$

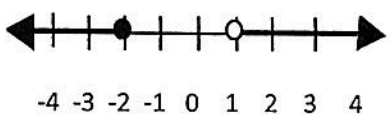
$x \geq -3$ or $2x < 6$

$x < 3$





10. Write a compound inequality for the solution set shown below. Describe the solution set using interval notation.



Interval: $(-\infty, -2] \vee (1, \infty)$

The symbols $\vee$ or $\cup$ can be used to represent the word **OR**

11. Mercury is one of only two elements that is liquid at room temperature. Mercury is non-liquid for temperatures less than -38.0° F or greater than 673.8° F. Write a compound inequality for the temperatures at which mercury is non-liquid.

$x < -38^\circ \quad \vee \quad x > 673.8^\circ$

The TAKE AWAY

A solution to a compound inequality separated by the word "OR" is a solution if it satisfies at least one inequality.

The solution can also satisfy both inequalities.

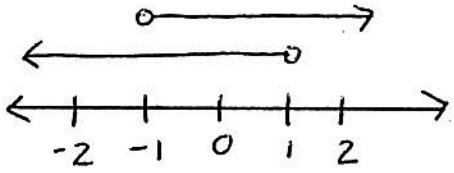
Turn and Talk:

Consider the following compound sentences:

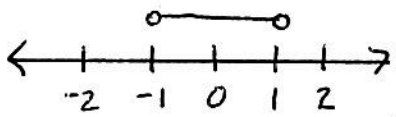
$x < 1$ and $x > -1$ $\qquad$ $x < 1$ or $x > -1$

Does changing the word from **"and"** to **"or"** change the solution set? Justify your response (*explain your reasoning and provide mathematical evidence*).

Yes, changing the connecting word ("and" to "or") changes the solution set from a finite one to an infinite set



"and"



"or"