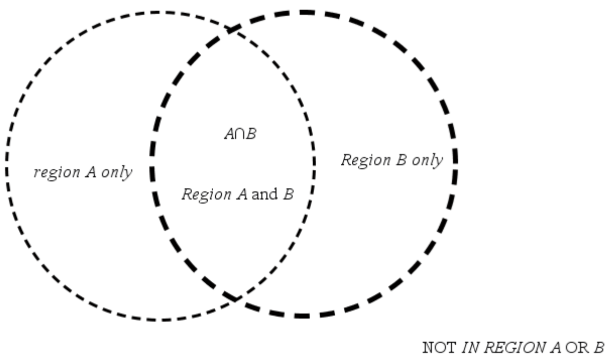
Name______________________________________ICP Compound Inequalities 9-11-15 CONJUNCTIONS and DISJUNCTIONS

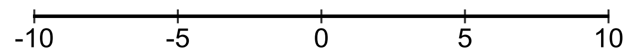
1. A conjunction is merging of solution sets of two inequalities. These solution sets________ agree (MUST, CAN)
2. A conjunction is the INTERSECTION of solutions sets, only the members of both solution sets are solutions to the compound inequality separated by an AND

   I will represent this with a Venn Diagram and three number line graphs

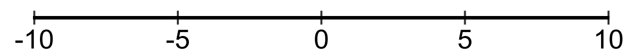
Compound inequality $x > -4$ AND $x < 6$ This is a CONJUNCTION because of the AND statement



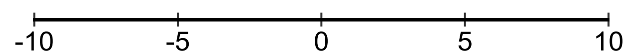
Graph the solution set of x > -4



Graph the solution set of x < 6

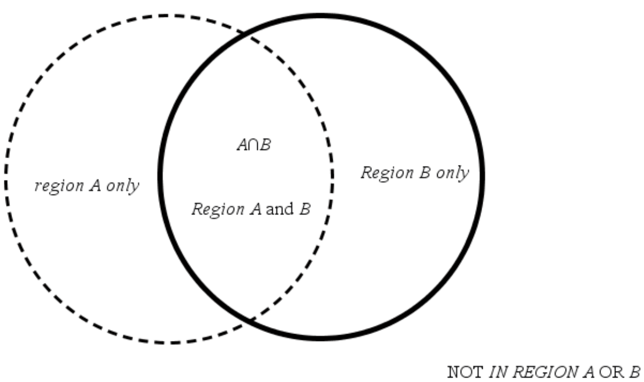


Graph the solution set of $x > -4$ AND $x < 6$

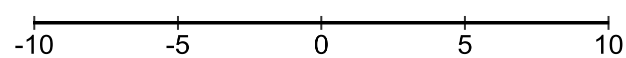


We can think of the solutions of this compound inequality as the numbers we can put in both solutions sets only
We cannot put any of the "boundary solutions" in the solution set because of the > and < symbols

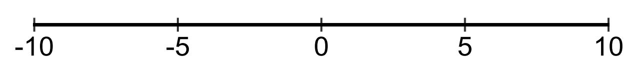
Compound inequality $x > -8$ AND $x \le -1$ This is a CONJUNCTION because of the AND statement



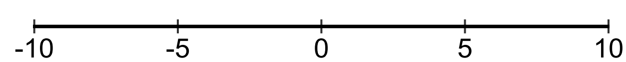
Graph the solution set of x > -8



Graph the solution set of x $\le$ -1



Graph the solution set of $x > -8$ AND $x \le -1$



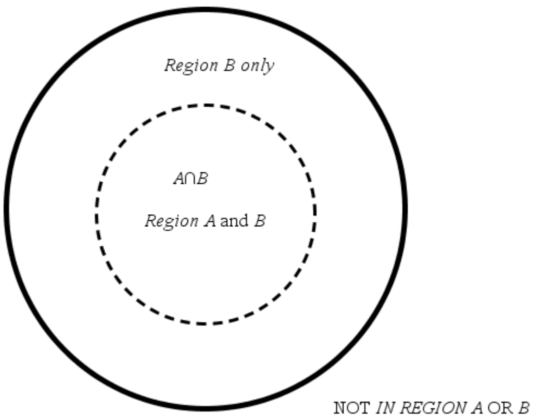
We can think of the solutions of this compound inequality as the numbers we can put in both solutions sets only
We can ONLY put the "boundary solutions" in the solution set from x $\le$ -1 because of the > and < symbols

Special Cases of CONJUNCTION

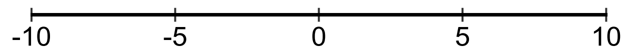
(two inequalities going the same way (always take the SMALLER set)

(two inequalities going the opposite direction sharing NOTHING in common NO SOLUTIONS)

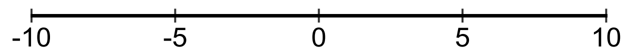
Compound inequality $x \geq 0 \quad \text{AND} \quad x > 3$ This is a CONJUNCTION because of the AND statement



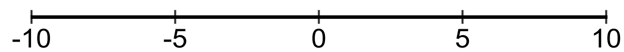
Graph the solution set of $x \geq 0$



Graph the solution set of $x > 3$

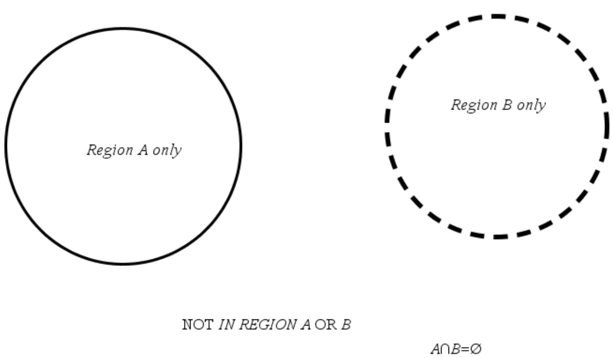


Graph the solution set of $x \geq 0 \quad \text{AND} \quad x > 3$

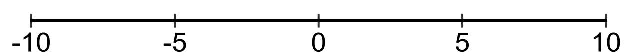


We can think of the solutions of this compound inequality as the numbers we can put in both solutions sets only
We cannot put any of the "boundary solutions" in the solution set because of the > symbol.
$x > 3$ is a SUBSET of the set $X \geq 0$, but 3 is NOT a member of solution set $x > 3$, this is why we CANNOT use a solid dot on $x = 3$

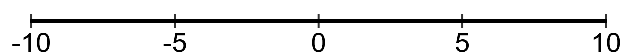
Compound inequality $x > 7 \quad \text{AND} \quad x \leq 2$ This is a CONJUNCTION because of the AND statement



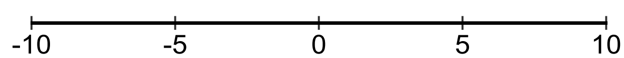
Graph the solution set of $x > 7$



Graph the solution set of $x \leq 2$



Graph the solution set of $x > 7 \quad \text{AND} \quad x \leq 2$



We can think of the solutions of this compound inequality as the numbers we can put in both solutions sets only
Since we cannot put solutions in both sets we MUST state that the solutions of $x > 7 \quad \text{AND} \quad x \leq 2$ do NOT exist!

Practice Conjunction Problems Solve each of the compound inequalities

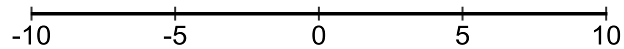
Given UNSIMPLIFIED compound inequality

$2x > 7 \quad \text{AND} \quad x - 5 \leq 2$

WORK to simplify

Simplified Compound inequality

Graph of the solution set of the compound inequality



IF NO solutions state so ______________________________

If ALL solutions state so ______________________________

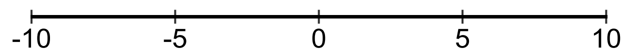
Given UNSIMPLIFIED compound inequality

$2x > 7 \quad \text{AND} \quad x - 5 \leq -2$

WORK to simplify

Simplified Compound inequality

Graph of the solution set of the compound inequality



IF NO solutions state so ______________________________

If ALL solutions state so ______________________________

Briefly discuss in your group how ONE negative sign totally changes the two problems

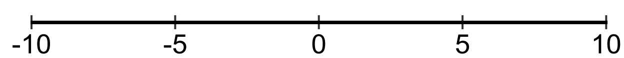
Given UNSIMPLIFIED compound inequality

$-3x \geq 9 \quad \text{AND} \quad x - 6 < 4$

WORK to simplify

Simplified Compound inequality

Graph of the solution set of the compound inequality



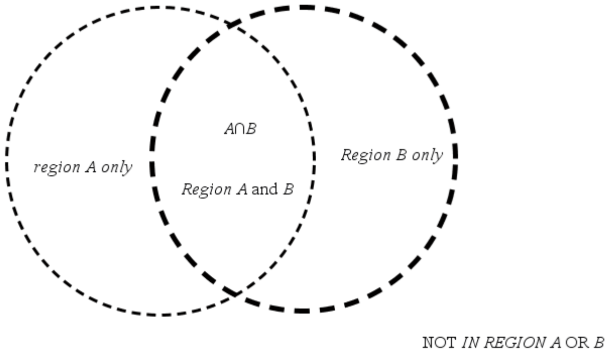
IF NO solutions state so ______________________________

If ALL solutions state so ______________________________

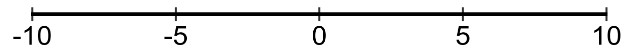
Briefly discuss in your group how ONE negative sign totally changes this problem

1. A disjunction is collection of solutions from either of sets of two inequalities. These solution sets________ agree (MUST, CAN)
2. A disjunction is the UNION of solutions sets, ANY of the members of both solution sets are solutions to the compound inequality separated by an OR
   I will represent this with a Venn Diagram and three number line graphs

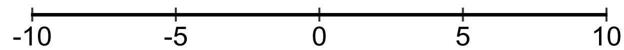
Compound inequality $x > 3 \quad \text{OR} \quad x < -7$ This is a DISJUNCTION because of the OR statement



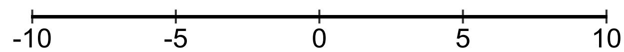
Graph the solution set of x > 3



Graph the solution set of x <- 7

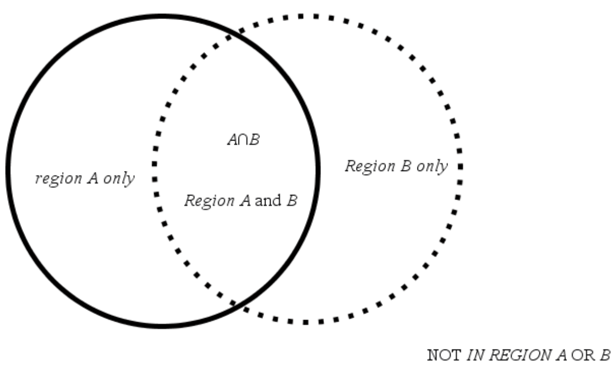


Graph the solution set of $x > 3 \quad \text{OR} \quad x < -7$

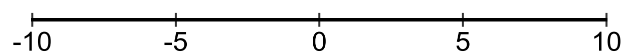


We can think of the solutions of this compound inequality as the numbers we can put in EITHER solutions set
We cannot put any of the "boundary solutions" in the solution set because of the > and < symbols

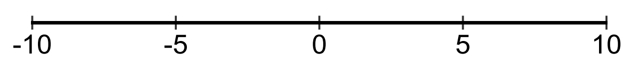
Compound inequality $x > 9 \quad \text{OR} \quad x \le 4$ This is a DISJUNCTION because of the OR statement



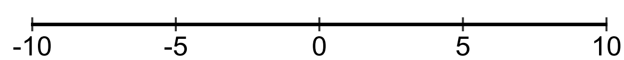
Graph the solution set of x > 9



Graph the solution set of $x \le 4$



Graph the solution set of $x > 9 \quad \text{OR} \quad x \le 4$



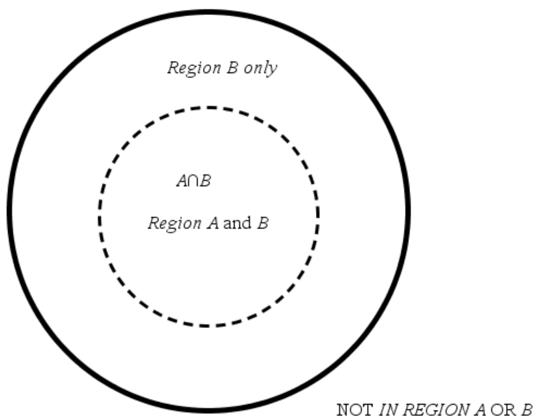
We can think of the solutions of this compound inequality as the numbers we can put in both solutions sets only
We can ONLY put the "boundary solutions" in the solution set from $x \le 4$ because of the $\le$ symbol

Special Cases of DISJUNCTION

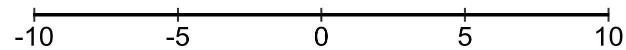
(two inequalities going the same way (always take the LARGER set)

(two inequalities going the opposite direction sharing ANYTHING in common ALL SOLUTIONS)

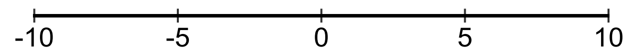
Compound inequality $x \geq -2 \quad \text{OR} \quad x > 3$ This is a DISJUNCTION because of the OR statement



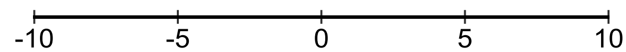
Graph the solution set of $x \geq -2$



Graph the solution set of $x > 3$

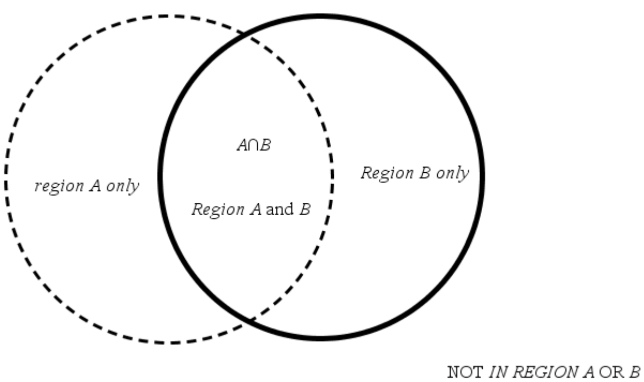


Graph the solution set of $x \geq -2 \quad \text{OR} \quad x > 3$

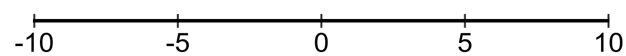


We can think of the solutions of this compound inequality as the numbers we can put in EITHER AND BOTH solution sets
We cannot put any of the “boundary solutions” in the solution set because of the > symbol.
$x > 3$ is a SUBSET of the set $X \geq -2$, but since 3 is a member of at least one solution sets $x > 3$ OR $x \geq -2$, this is why we CAN use a solid dot on $x = 3$

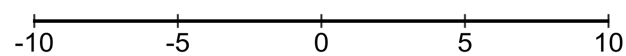
Compound inequality $x \geq -9 \quad \text{OR} \quad x < 1$ This is a DISJUNCTION because of the OR statement



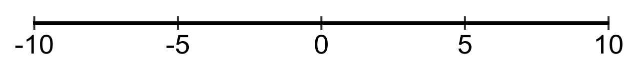
Graph the solution set of $x \geq -9$



Graph the solution set of $x < -1$



Graph the solution set of $x \geq -9 \quad \text{OR} \quad x < 1$



We can think of the solutions of this compound inequality as the numbers we can put in EITHER or BOTH solutions sets
Since we can ALWAYS put solutions in either set we MUST state that the solutions of $x \geq -9 \quad \text{OR} \quad x < 1$ has ALL REAL NUMBERS AS SOLUTIONS

Practice Disjunction Problems Solve each of the compound inequalities

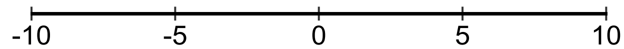
Given UNSIMPLIFIED compound inequality

$2x-1>7 \quad \text{OR} \quad x+5\le -2$

WORK to simplify

Simplified Compound inequality

Graph of the solution set of the compound inequality



IF NO solutions state so ______________________________

If ALL solutions state so ______________________________

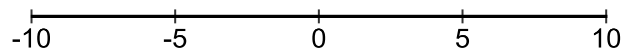
Given UNSIMPLIFIED compound inequality

$2x-1>-7 \quad \text{OR} \quad x-5\le -2$

WORK to simplify

Simplified Compound inequality

Graph of the solution set of the compound inequality



IF NO solutions state so ______________________________

If ALL solutions state so ______________________________

Briefly discuss in your group how ONE negative sign totally changes the two problems

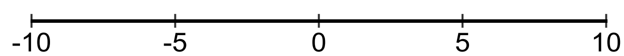
Given UNSIMPLIFIED compound inequality

$-4x>-12 \quad \text{OR} \quad x-8\ge 1$

WORK to simplify

Simplified Compound inequality

Graph of the solution set of the compound inequality



IF NO solutions state so ______________________________

If ALL solutions state so ______________________________

Briefly discuss in your group how ONE negative sign totally changes this problem