Algebra I
Lesson 3.6 – Solving Compound Inequalities
Mrs. Snow, Instructor

Did you know that not only is there a maximum speed limit on highways, but there is also a minimum speed limit? Yep, the Texas Transportation Code 545.363 clearly outlines minimum limits. That means if you drive slower than the minimum you may get a what? "slow poke" ticket? Now a minimum speed limit combined with a maximum speed limit is a **compound inequality.**

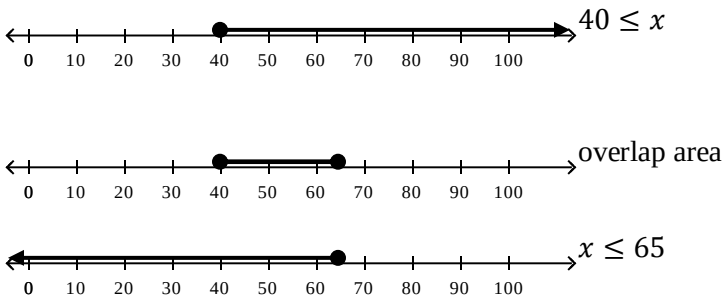
Vocabulary:
Compound inequality – an inequality that has both maximum and minimum limits. When seen as a written statement, the words AND or OR will be used.
And – compound inequalities using AND have a solution that will be the numbers that make each part of the compound inequality true.
Intersection – the overlapping solution area of "AND" compound inequalities.
Or – compound inequalities using OR have a solution that will make <u>either</u> part of the inequality true.
Union: - the combined regions of "OR" compound inequalities.

A highway speed limit is posted as: "Speed limit 65 MPH and Minimum speed limit 40 MPH." Write the highway speed limits as a compound inequality and graph.

Max speed is 65 mph
Min speed is 40 mph
x is my speed

40 is less than or equal to speed and speed is less than or equal to 65 mph

$$40 \leq x \ \ and \ x \leq 65$$
$$40 \leq x \leq 65$$



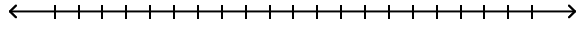
1. What is the upper bound for your speed?
2. What is the lowest speed allowed?
3. Identify your variable

4. Write a statement describing the inequality
5. Translate your statement into a math terms

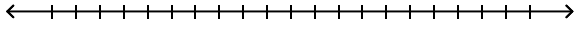
6. graph, *be careful identifying the overlap area*

Graph:

$3 < h \leq 10$



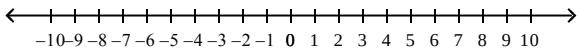
$-2 \leq x < 5$



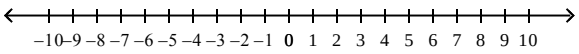
Using OR:

Graph:

$x < 4 \; or \; x > 10$

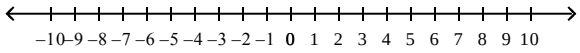


$r \geq 4 \; or \; r < 6$

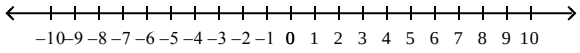


Of course there is more? We can have **compound inequality equations**! Solve and graph:

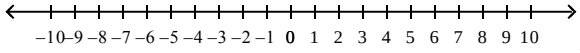
$$5 \leq x + 7 < 15$$
$$5 \leq x + 7 \; and \; x + 7 < 15$$
$$5 - 7 \leq x + 7 - 7 \; and \; x + 7 - 7 < 15 - 7$$
$$-2 \leq x \; and \; x < 8$$



$-2 \leq x$



$overlap \; area$



$x < 8$

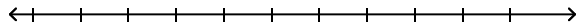
1. Break the inequality into separate parts using AND
2. Solve each inequality separately.
3. Graph each inequality
4. Solution is the overlapping area.

Solve and graph the compound inequalities:

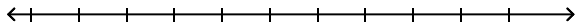
$-9 < x - 10 < -5$

$-4 \leq 3n + 5 < 11$

$2 + r < 12 \; \; or \; \; r + 5 > 19$



$7x \geq 21 \; \; or \; \; 2x < x$



Write a compound inequality from the given graph: