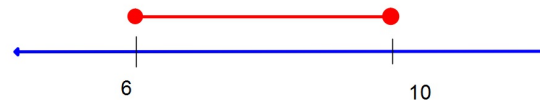


Compound Inequalities - when two inequalities are connected with one of the following two words: **AND** **OR**

Model the following statement with a compound inequality and graph it on a number line.

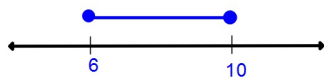
All real numbers that are at least 6 and no more than 10  
to the right of 6 and at the same time to the left of 10



A compound inequality involving the word AND can be written two different ways.

$$n \geq 6 \text{ AND } n \leq 10$$

I call this a **between** inequality.



It can be written as one statement:

$$6 \leq n \leq 10$$

Write a compound inequality to describe the temperatures in °F for which water is in a liquid state of matter.

Water is liquid above 32°F and below 212°F

$$32 < T < 212$$

Write the following compound inequality as two separate inequalities.

$$-13 < W < 20$$

$W > -13$  AND  $W < 20$

Graph each compound inequality on a number line.

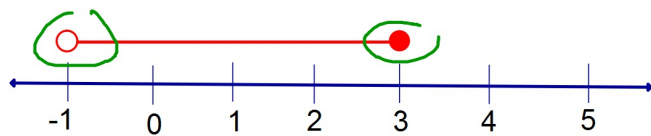
$$C \geq 2 \text{ and } C \leq 9$$



$$-11 < M < 45$$



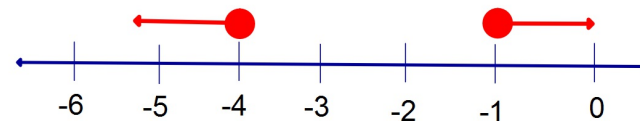
Write a compound inequality to model this graph:



$$-1 < x \leq 3$$

$$x > -1 \text{ AND } x \leq 3$$

Write a compound inequality to model the graph below.



$$M \leq -4 \text{ OR } M \geq -1$$

## Compound Inequalities involving the word OR

Can't be written as one statement like compound inequalities using AND because they are two separate parts of the number line that have no connection at all.

## Solving compound inequalities.

Solve this compound inequality and graph the solution.

$$\begin{array}{lcl}
 6x + 1 < 25 & \text{OR} & 4 - 5x < -36 \\
 \begin{array}{r} -1 \quad -1 \\ 6x < 24 \\ x < 4 \end{array} & & \begin{array}{r} -4 \quad -4 \quad -40 \\ -5x < -40 \\ \frac{-5x}{-5} < \frac{-40}{-5} \\ x > 8 \end{array} \\
 \text{Sol:} & & \text{Graph:} \\
 \underline{x < 4 \text{ or } x > 8} & & \begin{array}{c} \leftarrow 0 \qquad \qquad \qquad 0 \rightarrow \\ | \qquad \qquad \qquad | \\ 4 \qquad \qquad \qquad 8 \end{array}
 \end{array}$$

Solve this compound inequality and graph the solution.

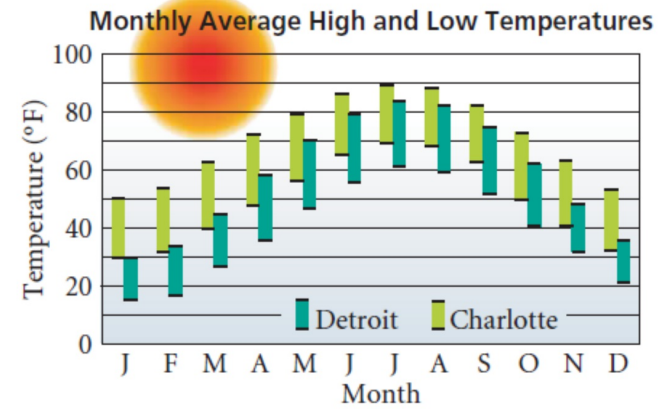
$$\begin{array}{lcl}
 4Q + 5 - 6Q \leq 12 & \text{AND} & 10Q - 8 < 36 \\
 \begin{array}{r} -2Q + 5 \leq 12 \\ -5 \quad -5 \\ -2Q \leq 7 \\ Q \geq -3.5 \end{array} & & \begin{array}{r} +8 \quad +8 \\ 10Q < 44 \\ \frac{10Q}{10} < \frac{44}{10} \\ Q < 4.4 \end{array} \\
 \text{Sol:} & & \text{Graph:} \\
 Q \geq -3.5 \text{ AND } Q < 4.4 & & \begin{array}{c} \bullet \qquad \qquad \qquad \circ \\ | \qquad \qquad \qquad | \\ -3.5 \qquad \qquad \qquad 4.4 \end{array} \\
 \underline{-3.5 \leq Q < 4.4} & &
 \end{array}$$

Solve this compound inequality and graph the solution.

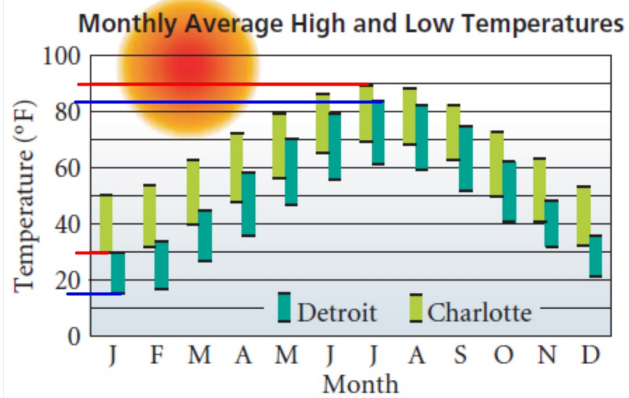
$$\begin{array}{lcl}
 17 < 2x + 1 \leq 35 & & \text{You could also split this compound into two inequalities and solve them separately} \\
 \begin{array}{r} -1 \quad -1 \quad -1 \\ 16 < 2x \leq 34 \\ \frac{16}{2} < \frac{2x}{2} \leq \frac{34}{2} \end{array} & & \begin{array}{l} 17 < 2x+1 \quad \text{and} \quad 2x+1 \leq 35 \\ -1 \quad -1 \quad -1 \quad -1 \\ \frac{16 < 2x}{2} \quad \quad \quad \frac{2x \leq 34}{2} \\ 8 < x \quad \text{and} \quad x \leq 17 \end{array} \\
 \text{Sol:} & & \text{Graph:} \\
 8 < x \leq 17 & & \begin{array}{c} \circ \qquad \qquad \qquad \bullet \\ | \qquad \qquad \qquad | \\ 8 \qquad \qquad \qquad 17 \end{array} \\
 x > 8 \text{ and } x \leq 17 & &
 \end{array}$$

You can now finish Hwk #18.

**Meteorology** The graph below shows the average monthly high and low temperatures for Detroit, Michigan, and Charlotte, North Carolina.



Write a compound inequality for the yearly temp range for each city.



Detroit  
 $15 \leq t \leq 85$

Charlotte  
 $30 \leq t \leq 90$