

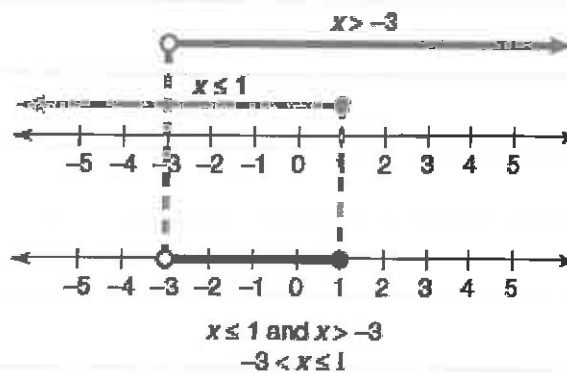
### COMPOUND INEQUALITIES

Remember, a compound inequality is an inequality that is formed by the union, "or," or the intersection, "and," of two simple inequalities.

The compound inequality shown involves "and" and is a conjunction.

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

Represent each part above the number line.

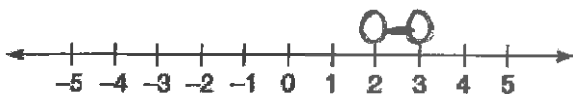


$$x \leq 1 \text{ and } x > -3$$
$$-3 < x \leq 1$$

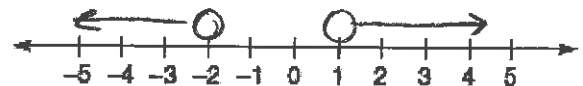
The solution is the region that satisfies both inequalities. Graphically, the solution is the overlapping, or the intersection, of the separate inequalities.

Graph each of the following conjunctions on the given number line.

a)  $x < 3$  and  $x > 2$



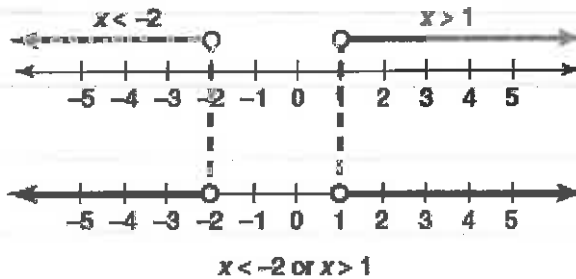
b)  $x > 1$  and  $x < -2$



The compound inequality shown involves "or" and is a disjunction.

$$x < -2 \text{ or } x > 1$$

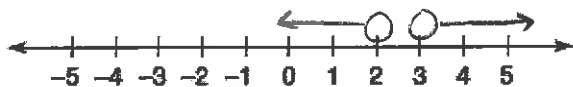
Represent each part above the number line.



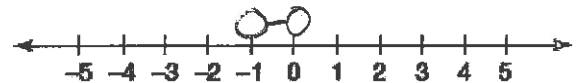
The solution is the region that satisfies either inequality. Graphically, the solution is the union, or all the regions, of the separate inequalities.

Graph each of the following disjunctions on the given number line.

a)  $x < 2 \text{ or } x > 3$



b)  $x > -1 \text{ or } x < 0$

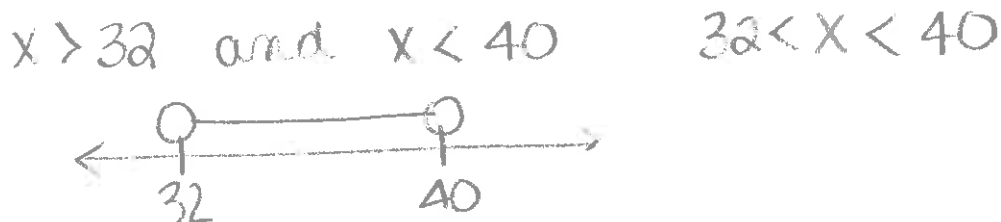


Write a compound inequality to represent the following scenarios. Then represent the situation graphically on a number line.

a) Water becomes non-liquid when it is  $32^\circ\text{F}$  or below, or when it is at least  $212^\circ\text{F}$ .



b) Today's temperatures will be above  $32^\circ\text{F}$ , but not as high as  $40^\circ\text{F}$ .



To Solve a Conjunction (AND):

- Separate the conjunction into 2 inequalities.
- Solve each inequality separately.
- Write the final answer either as a combined inequality or using the word AND.
- Graph the solution on a number line.

Examples:

1.  $6 < x - 6 \leq 9$

$$\begin{array}{r} 6 < x - 6 & x - 6 \leq 9 \\ +6 & +6 \end{array}$$

$$\begin{array}{r} 12 < x & x \leq 15 \\ 12 < x \leq 15 \end{array}$$



2.  $-4 \leq -3x + 1 \leq 12$

$$\begin{array}{r} -4 \leq -3x + 1 & -3x + 1 \leq 12 \\ -1 & -1 \end{array}$$

$$\begin{array}{r} -5 \leq -3x & -3x \leq 11 \\ -3 & -3 \end{array}$$

$$\begin{array}{r} \frac{5}{3} \geq x & x \geq -\frac{11}{3} \\ -\frac{11}{3} \leq x \leq \frac{5}{3} \end{array}$$



To Solve a Disjunction(OR):

- Solve each inequality separately.
- Write the final answer with the word OR.
- Graph the solution on a number line.

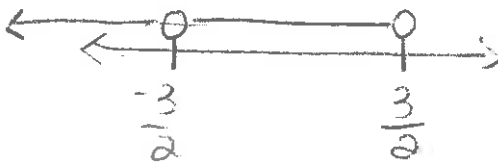
Examples:

1.  $2x + 7 < 10$  or  $-2x + 7 > 10$

$$\begin{array}{r} 2x + 7 < 10 & -2x + 7 > 10 \\ -7 & -7 \end{array}$$

$$\begin{array}{r} 2x < 3 & -2x > 3 \\ \frac{2x}{2} & \frac{-2x}{-2} \end{array}$$

$$\begin{array}{r} x < \frac{3}{2} & x < -\frac{3}{2} \end{array}$$



2.  $1 + 6x > 11$  or  $x - 4 < -5$

$$\begin{array}{r} 1 + 6x > 11 & x - 4 < -5 \\ -1 & +4 \end{array}$$

$$\begin{array}{r} 6x > 10 & x < -1 \\ \frac{6x}{6} & \end{array}$$

$$\begin{array}{r} x > \frac{5}{3} \end{array}$$



