Graphing Systems of Inequalities

To graph a system of inequalities, graph **each** inequality on the same Cartesian grid.

> **Recall**: To graph an inequality, first graph the boundary line, test a point, then shade the appropriate region.

When graphing a system of inequalities, the **OVERLAPPING shaded region is the final solution.**

NOTE: For clarity, each inequality will be graphed on separate grids first, then will be shown on the same grid.

Example 1:

$$\begin{cases} x + y > 0 \\ -x + y \geq -1 \end{cases}$$

First let's look at the inequality $x + y > 0$, whose boundary line is the equation $x + y = 0$.

$$x + y = 0$$

x	y	
-1	-1+y=0	$\rightarrow y = 1$
0	0+y=0	$\rightarrow y = 0$
1	1+y=0	$\rightarrow y = -1$

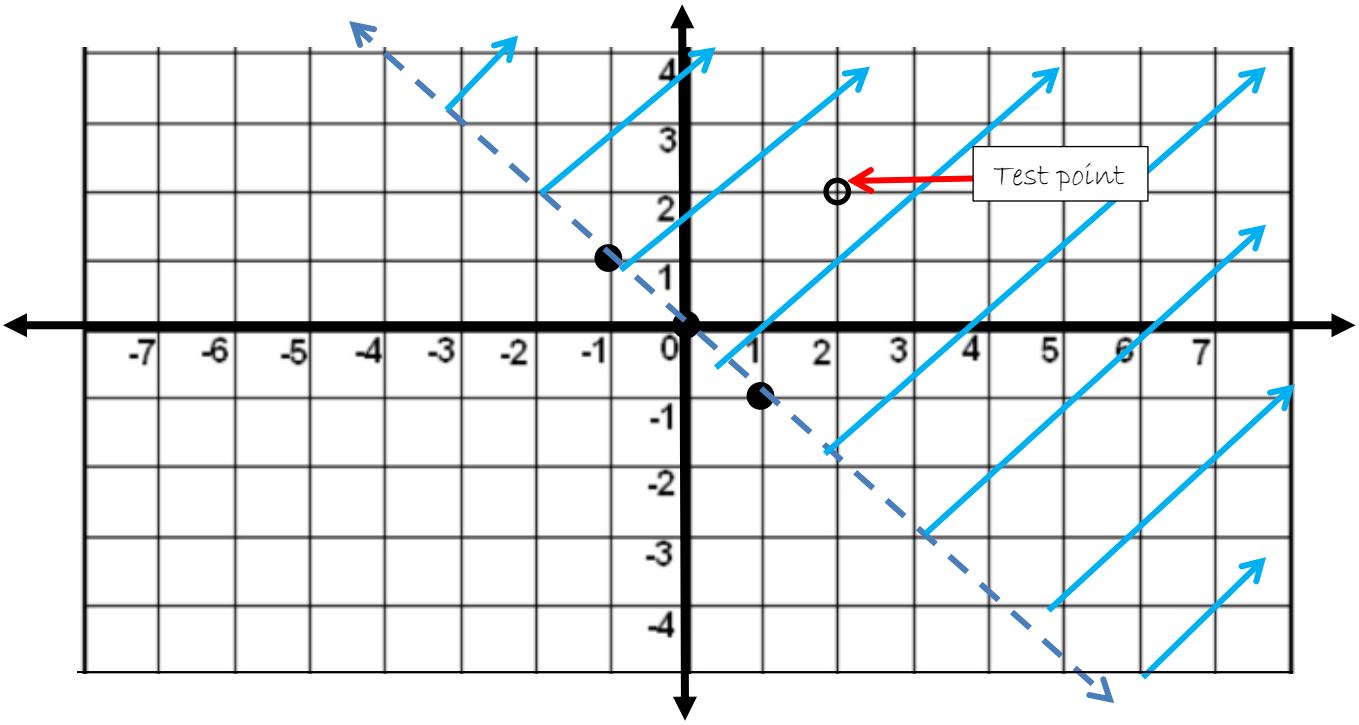
So the points $(-1,1), (0,0), (1,-1)$ are on the boundary line.

Then we pick a test point. Try $(2,2)$.

$$x + y > 0$$
$$2 + 2 > 0$$
$$4 > 0$$

True, → we shade the region that includes the test point.

NOTE: The boundary line is DASHED not SOLID.



Now we'll graph the second inequality $-x + y \geq -1$ whose boundary line is the equation $-x + y = -1$.

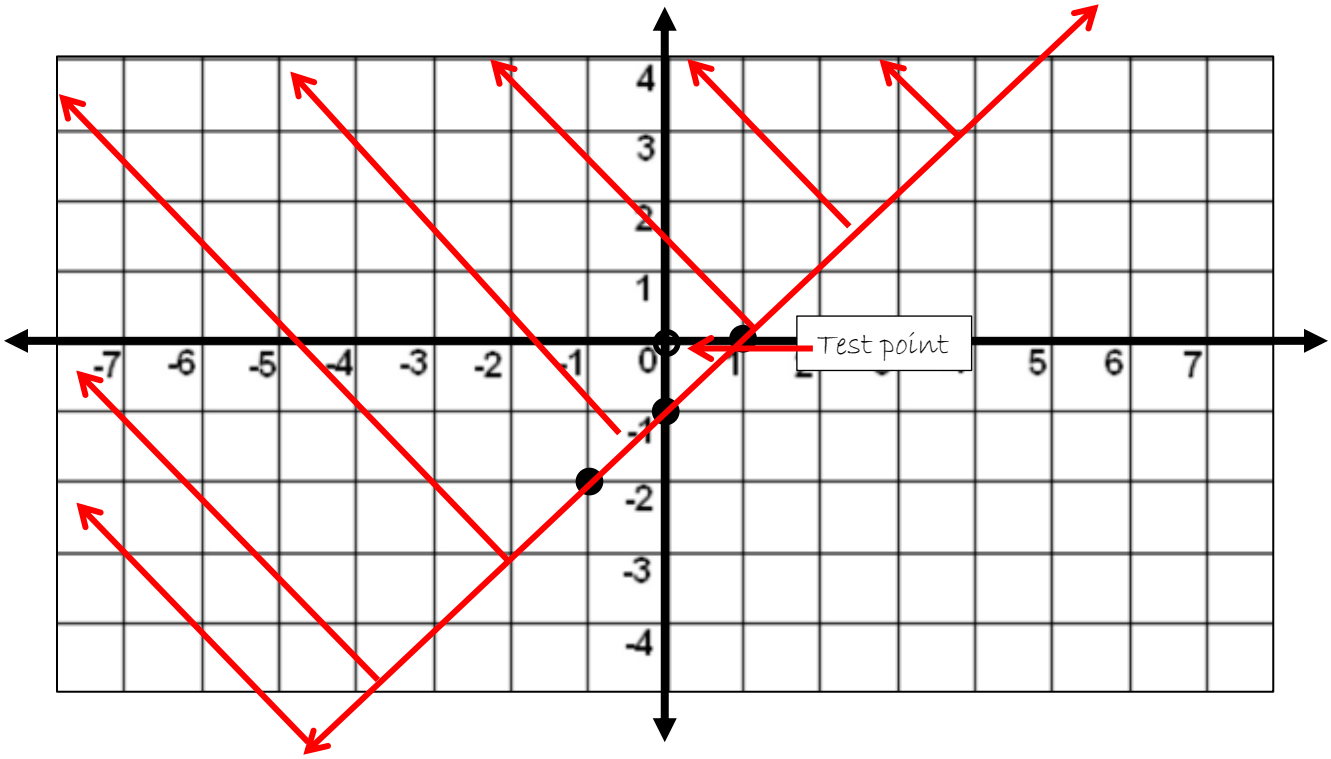
x	y		
-1	-(-1)+y=-1	→	$y = -2 \rightarrow (-1, -2)$
0	-(0)+y=-1	→	$y = -1 \rightarrow (0, -1)$
1	-(1)+y=-1	→	$y = 0 \rightarrow (1, 0)$

Then we pick a test point. Try $(0,0)$.

$$-x + y \geq -1$$
$$0 + 0 \geq -1$$
$$0 \geq -1$$

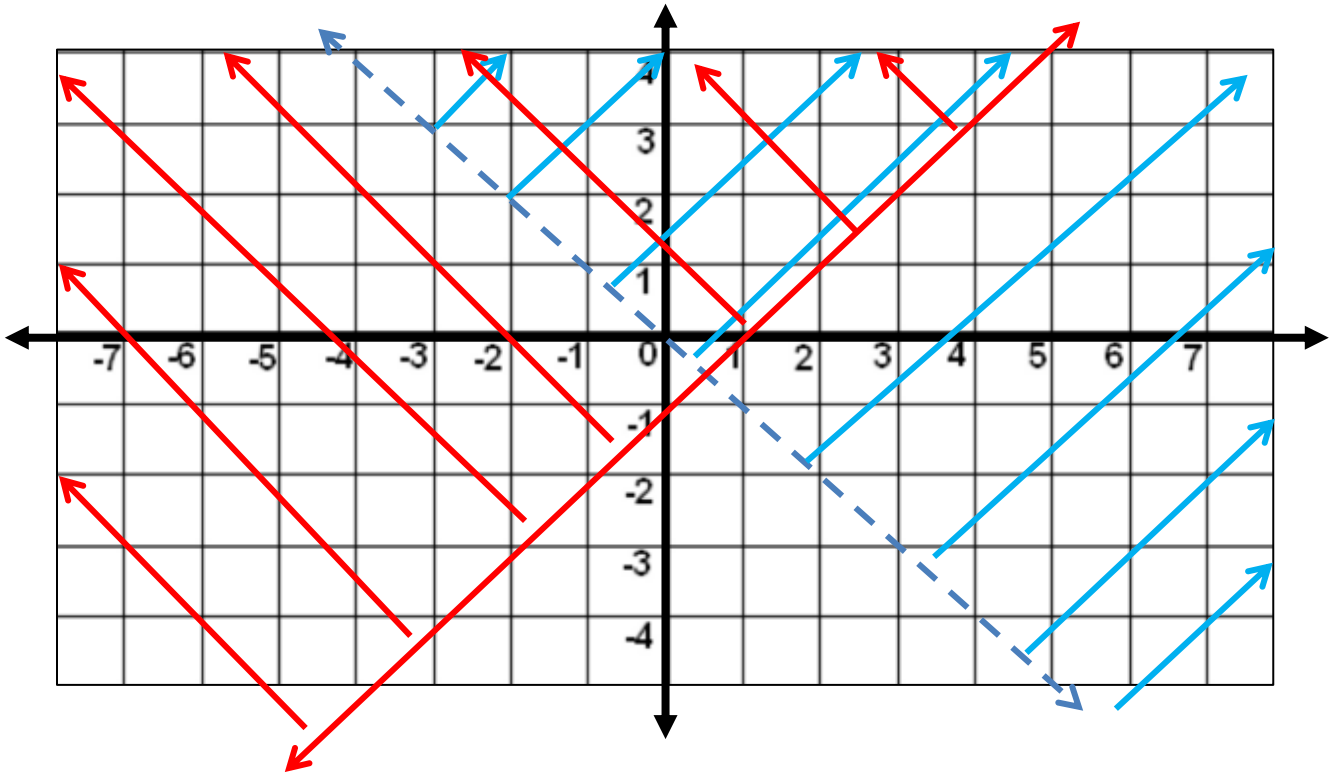
True → we shade the region that includes the test point.

NOTE: The boundary line is SOLID not dashed.



The graph below shows both inequalities on the same grid.

The overlapping region is the final solution.



Graphing Systems of Inequalities Practice Problems

Graph the system on the grid below:

$$\begin{cases} x + y \leq 0 \\ -x + y > -2 \end{cases}$$