

Name _____

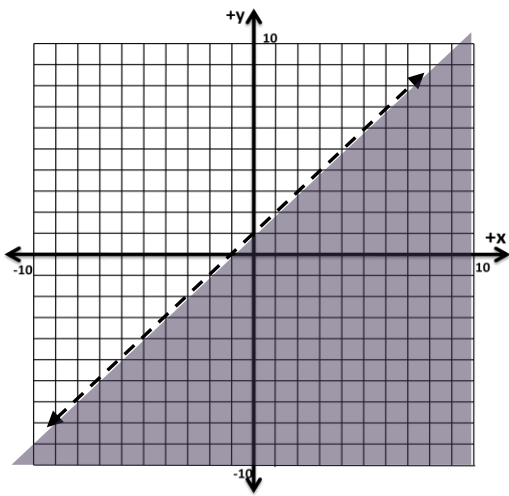
Algebra 2
Lesson 3-3
Systems of Inequalities

A **linear inequality** divides a graph into two regions – one that will contain only true solutions and one that will contain only false solutions. The **boundary line** that divides both regions may, at times, be a part of the solution.

Rules to remember when graphing inequalities and absolute values:

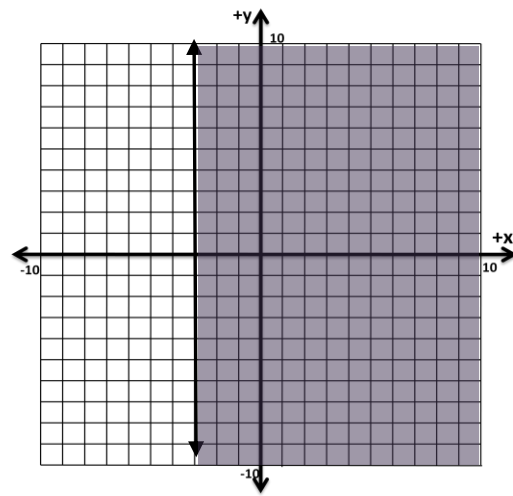
1. Inequalities with a $<$ or $>$ is drawn as a dotted line.
2. Inequalities with a \leq or \geq is drawn as a solid line.
3. Inequalities with a $<$ or \leq are shaded downward.
4. Inequalities with a $>$ or \geq are shaded upward.

Example: Graph $y < x + 1$



This line is dotted and shaded down. Check: Pick (0,0); and plug values in. You get $0 < 1$, a true statement.

Example: Graph $x \geq -3$



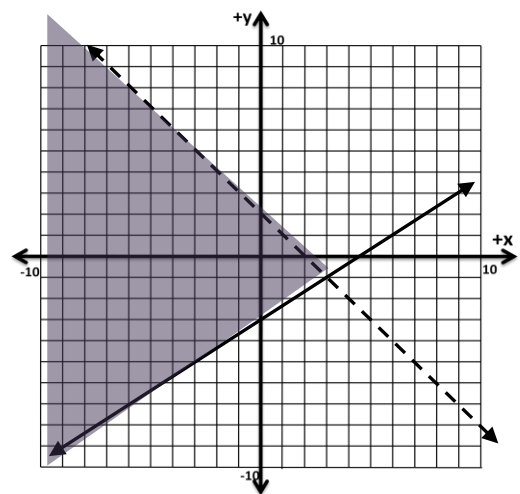
This line is solid and shaded right. Check: Pick (0,0); plug into equation. You get $0 \geq -3$, a true statement.

A simple way to check a graph is to pick a point (x,y) not on the line, but found in the shaded region. Plug it into the given equation. If the result is a true statement, then you have shaded the graph correctly.

REMEMBER: Arrow points **LEFT** ($<$ or \leq), you shade **LOW**
Arrow points **RIGHT** ($>$ or \geq), you shade **UP**

Now consider two inequalities in the same coordinate grad.
The solution in such cases is the area that both equations have in common – overlap.

Example: Graph: $y \geq \frac{2}{3}x - 3$
 $x + y < 2 \longrightarrow y < -x + 2$



Notice that one line is solid and the other is dotted. Also notice the solution area is shaded.

More than two linear inequalities can be graphed in the same grid. What happens in such cases is that the common area shrinks or gets “shaved” by succeeding inequalities. A system of four linear inequalities is sometimes called a linear programming problem. More on this idea in Section 3-4!!

Example: Graph the system of inequalities

$$\begin{aligned}x &\geq 3 \\y &\leq -1 \\y &\geq 2x - 6 \\y &< -x + 4\end{aligned}$$

To check the system you pick a point inside the common area. Put these (x,y) coordinates into each of the four equations. You should get four true statements.

