Graphing Inequalities in Two Variables

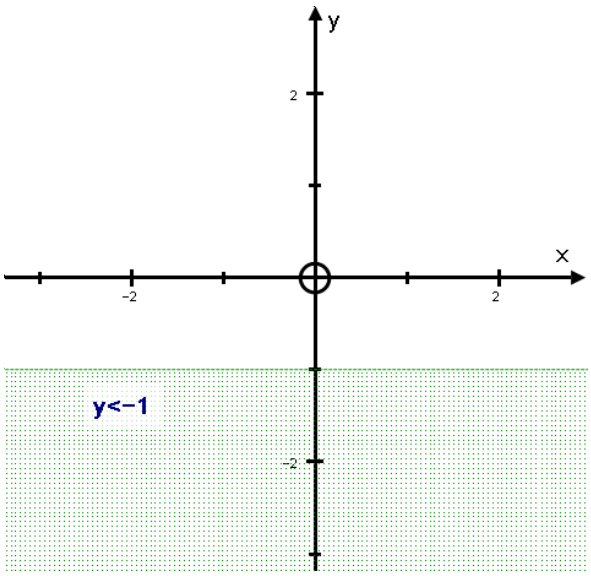
The inequality written in two variables is similar to an equation written in two variables. An easy way to show the solution of an inequality is to graph it in the coordinate plane.
The solution set of an inequality in two variables contains many ordered pairs. The graph of these ordered pairs fills an area on the coordinate plane called a **half-plane**. The graph of an equation defines the **boundary** or edge for each half-plane.

Use these steps to graph $y < -1$

Step 1 Determine the boundary by graphing the related equation, $y = -1$.
Step 2 Draw a *dashed* line since the boundary is *not* part of the graph.
Step 3 Determine which half-plane is the solution. To do this, substitute a point from each half-plane into the inequality. Find which point results in a true statement.

Test the point (-5,-6)
The y – value is -6 and -6<-1
(-5,-6) belongs to the accepted region.

Test the point (3,2)
The y – value is 2 and 2 is not <-1
(3,2) does not belong to the accepted region.



The half-plane that contains (-5,-6) is the solution. Shade the half-plane containing the point. Any point in the shaded region is a solution of the inequality $y < -1$.

When graphing inequalities, the boundary line is not always **dashed**. Consider the graph of $y \leq 5$. Since the inequality means $y < 5$ or $y = 5$, the boundary is part of the solution. This is indicated by graphing a **solid line**.

Example 1: Graph $10x+5y\le 25$

$10x+5y\le 25$
$\Rightarrow 5y\le -10x+25$
$\Rightarrow y\le -2x+5$

Draw the line y=-2x+5

Let us try the point (0, 0)

$-2x+5=-2(0)+5=5$
$y=0$
$0\le 5\Rightarrow y\le -2x+5$

So, the point (0,0) belongs to the accepted region.