

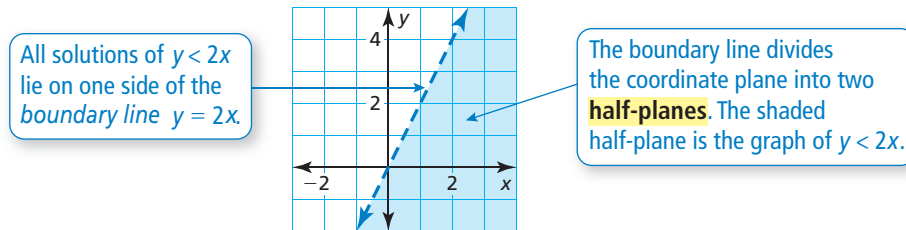
Linear Inequalities in Two Variables

A **linear inequality in two variables**, x and y , can be written as

$$ax + by < c \quad ax + by \leq c \quad ax + by > c \quad ax + by \geq c$$

where a , b , and c are real numbers. A **solution of a linear inequality in two variables** is an ordered pair (x, y) that makes the inequality true.

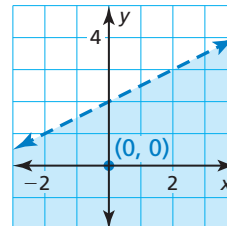
The **graph of a linear inequality** in two variables shows all the solutions of the inequality in a coordinate plane.



Graphing a Linear Inequality in Two Variables	
Step 1	Graph the boundary line for the inequality. Use a dashed line for $<$ or $>$. Use a solid line for \leq or \geq .
Step 2	Test a point that is not on the boundary line to determine whether it is a solution of the inequality.
Step 3	When the test point is a solution, shade the half-plane that contains the point. When the test point is <i>not</i> a solution, shade the half-plane that does <i>not</i> contain the point.

Example 1 Graph $-x + 2y < 4$ in a coordinate plane.

Step 1 Graph $-x + 2y = 4$, or $y = \frac{1}{2}x + 2$. Use a dashed line because the inequality symbol is $<$.



Step 2 Test $(0, 0)$.

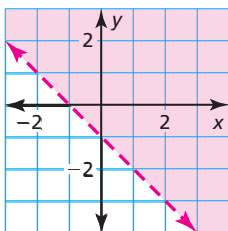
$$\begin{array}{ll}
 -x + 2y < 4 & \text{Write the inequality.} \\
 -(0) + 2(0) \stackrel{?}{<} 4 & \text{Substitute.} \\
 0 < 4 \quad \checkmark & \text{Simplify.}
 \end{array}$$

Step 3 Because $(0, 0)$ is a solution, shade the half-plane that contains $(0, 0)$.

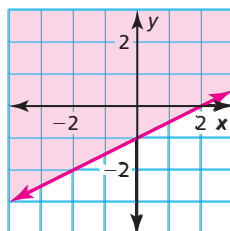
Practice

Check your answers at BigIdeasMath.com.

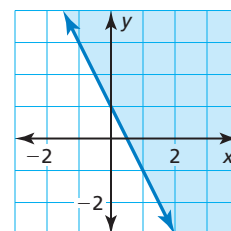
1. Graph $x + y > -1$ in the coordinate plane.



2. Graph $x - 2y \leq 2$ in the coordinate plane.



3. Write an inequality that represents the graph.



$$y \geq -2x + 1$$