

5-6 Study Guide and Intervention**Graphing Inequalities in Two Variables**

Graph Linear Inequalities The solution set of an inequality that involves two variables is graphed by graphing a related linear equation that forms a boundary of a **half-plane**. The graph of the ordered pairs that make up the solution set of the inequality fill a region of the coordinate plane on one side of the half-plane.

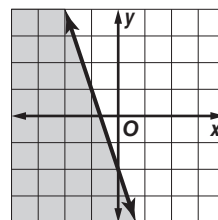
Example Graph $y \leq -3x - 2$.

Graph $y = -3x - 2$.

Since $y \leq -3x - 2$ is the same as $y < -3x - 2$ and $y = -3x - 2$, the boundary is included in the solution set and the graph should be drawn as a solid line.

Select a point in each half plane and test it. Choose $(0, 0)$ and $(-2, -2)$.

$y \leq -3x - 2$	$y \leq -3x - 2$
$0 \leq -3(0) - 2$	$-2 \leq -3(-2) - 2$
$0 \leq -2$ is false.	$-2 \leq 6 - 2$
	$-2 \leq 4$ is true.

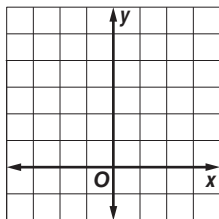


The half-plane that contains $(-2, -2)$ contains the solution. Shade that half-plane.

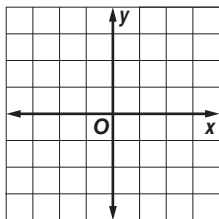
Exercises

Graph each inequality.

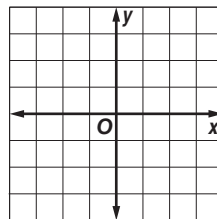
1. $y < 4$



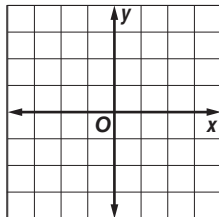
2. $x \geq 1$



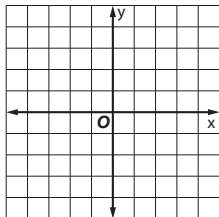
3. $3x \leq y$



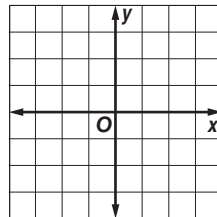
4. $-x > y$



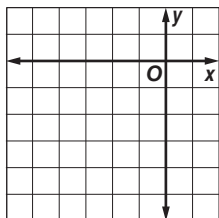
5. $x - y \geq 1$



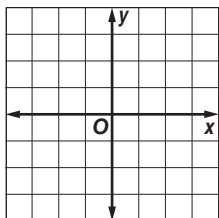
6. $2x - 3y \leq 6$



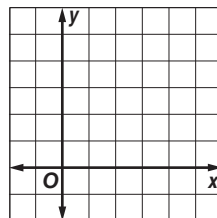
7. $y < -\frac{1}{2}x - 3$



8. $4x - 3y < 6$



9. $3x + 6y \geq 12$



5-6 Study Guide and Intervention *(continued)***Graphing Inequalities in Two Variables**

Solve Linear Inequalities We can use a coordinate plane to solve inequalities with one variable.

Example Use a graph to solve $2x + 2 > -1$.

Step 1 First graph the boundary, which is the related function. Replace the inequality sign with an equals sign, and get 0 on a side by itself.

$$2x + 2 > -1$$

Original inequality

$$2x + 2 = -1$$

Change $>$ to $=$.

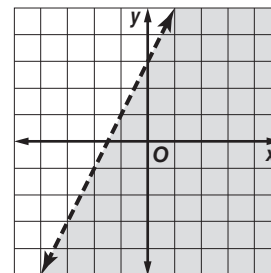
$$2x + 2 + 1 = -1 + 1$$

Add 1 to each side.

$$2x + 3 = 0$$

Simplify.

Graph $2x + 3 = y$ as a dashed line.



Step 2 Choose $(0, 0)$ as a test point, substituting these values into the original inequality give us $3 > -5$.

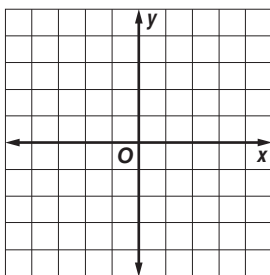
Step 3 Because this statement is true, shade the half plane containing the point $(0, 0)$.

Notice that the x -intercept of the graph is at $-1\frac{1}{2}$. Because the half-plane to the right of the x -intercept is shaded, the solution is $x > -1\frac{1}{2}$.

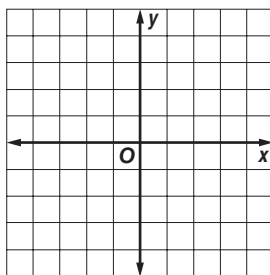
Exercises

Use a graph to solve each inequality.

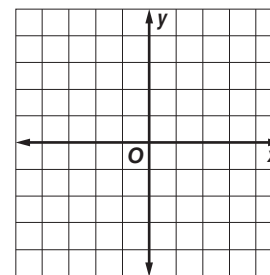
1. $x + 7 \leq 5$



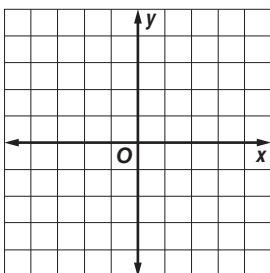
2. $x - 2 > 2$



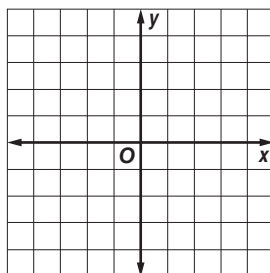
3. $-x + 1 < -3$



4. $-x - 7 \geq -6$



5. $3x - 20 < -17$



6. $-2x + 11 \geq 15$

