

# Graphing Inequalities in Two Variables

(Pages 535–539)

The solution set for an inequality in two variables contains ordered pairs whose graphs fill an area on the coordinate plane called a **half-plane**. An equation defines the **boundary** or edge of the half-plane.

<b>Graphing Inequalities in Two Variables</b>	<p><b>Step 1</b> Find the boundary by graphing the equation related to the inequality.</p> <p><b>Step 2</b> If the inequality symbol is <math>&lt;</math> or <math>&gt;</math>, draw the boundary as a <i>dashed</i> line. If the inequality symbol is <math>\leq</math> or <math>\geq</math>, draw the boundary as a <i>solid</i> line to show that the points on the boundary are included in the solution set.</p> <p><b>Step 3</b> Determine which of the two half-planes contains the solutions by choosing a point in each half-plane and testing its coordinates in the inequality. If the coordinates make the inequality true, shade that half-plane.</p>
---	--

## EXAMPLE

Graph  $y - 2x \leq 1$ .

Solve the inequality for  $y$ :  $y \leq 2x + 1$ .

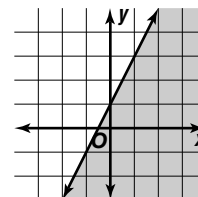
Step 1: Find the boundary by graphing  $y = 2x + 1$ .

Step 2: Draw the line as a solid line since the inequality symbol is less than or equal to.

Step 3: Select a point in each of the half-planes and test it in the inequality.

<b>Test (0, 0)</b>	<b>Test (-1, 1)</b>
$y - 2x \leq 1$	$y - 2x \leq 1$
$0 - 2(0) \leq 1$	$1 - 2(-1) \leq 1$
$0 \leq 1$ True	$3 \leq 1$ False

Therefore, the half-plane that contains the point (0, 0) should be shaded.



## PRACTICE

Graph each inequality.

- $x > 4$
- $x + y \leq 2$
- $3x - 2y \leq -6$
- $2x + 10 < 0$
- $x - y \geq -4$
- $y > -3$

For Exercises 7–8, write an inequality and graph the solution.

- The difference between two numbers is less than or equal to 1.
- Three times a number is greater than another number.
- Jobs** A librarian shelves  $s$  books. Then she checks in  $c$  more books. Together she handles more than 50 books. Write an inequality in two variables to express this situation.



10. **Standardized Test Practice** Which ordered pair is a solution of  $x + 2y \leq -7$ ?

- A (0, 0)                      B (8, -8)                      C (-5, 3)                      D (-1, 0)

Answers: 1–8. See Answer Key for graphs. 7.  $x - y \leq 1$  8.  $3x < y$  9.  $c + s > 50$  10. B