6.7 Graph Linear Inequalities in Two Variables

Before You graphed linear equations in two variables.

Now You will graph linear inequalities in two variables.

Why? So you can analyze a music competition, as in Ex. 56.

Key Vocabulary
• linear inequality in two variables
• graph of an inequality in two variables

A **linear inequality in two variables**, such as $x - 3y < 6$, is the result of replacing the $=$ sign in a linear equation with $<$, $\leq$, $>$, or $\geq$. A **solution of an inequality in two variables** x and y is an ordered pair (x, y) that produces a true statement when the values of x and y are substituted into the inequality.

EXAMPLE 1 TAKS PRACTICE: Multiple Choice

Which ordered pair is *not* a solution of $x - 4y \leq 7$?

Ⓐ (0, 0)   Ⓑ (7, −1)   Ⓒ (9, 2)   Ⓓ (−2, 1)

Solution

Check whether each ordered pair is a solution of the inequality.

Test (0, 0):	$x - 4y \leq 7$	**Write inequality.**
	$0 - 4(0) \leq 7$	**Substitute 0 for x and 0 for y.**
	$0 \leq 7$ ✓	**Simplify.**
Test (7, −1):	$x - 4y \leq 7$	**Write inequality.**
	$7 - 4(-1) \leq 7$	**Substitute 7 for x and −1 for y.**
	$11 \leq 7$ ✗	**Simplify.**

So, (0, 0) is a solution of $x - 4y \leq 7$ but (7, −1) is *not* a solution.

▶ The correct answer is B. Ⓐ Ⓑ Ⓒ Ⓓ

✓ GUIDED PRACTICE for Example 1

Tell whether the ordered pair is a solution of $-x + 2y < 8$.

1. (0, 0)   **2.** (0, 4)   **3.** (3, 5)

GRAPH OF AN INEQUALITY In a coordinate plane, the **graph of an inequality in two variables** is the set of points that represent all solutions of the inequality. The *boundary line* of a linear inequality divides the coordinate plane into two **half-planes**. Only one half-plane contains the points that represent the solutions of the inequality.