

LESSON
5.7**Study Guide**

For use with the lesson "Graph Linear Inequalities in Two Variables"

GOAL Graph linear inequalities in two variables.**Vocabulary**

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 .

In a coordinate plane, the **graph of an inequality in two variables** is the set of points that represent all solutions of the inequality.

EXAMPLE 1 Checking solutions**Tell whether the ordered pair is a solution of the inequality.**

a. $3x - y > 7$; (4, 3)

b. $\frac{1}{2}x - 3y \leq 8$; (10, -3)

Solution

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

$$3x - y > 7 \quad \text{Write original inequality.}$$

$$3(4) - 3 \stackrel{?}{>} 7 \quad \text{Substitute 4 for } x \text{ and 3 for } y.$$

$$9 > 7 \checkmark \quad \text{Simplify.}$$

So, (4, 3) is a solution of $3x - y > 7$.b. $\frac{1}{2}x - 3y \leq 8$ Write original equation.

$$\frac{1}{2}(10) - 3(-3) \stackrel{?}{\leq} 8 \quad \text{Substitute 10 for } x \text{ and } -3 \text{ for } y.$$

$$14 \leq 8 \quad \text{Simplify.}$$

Because $14 \leq 8$ is not true, (10, -3) is *not* a solution of the inequality.**Exercises for Example 1****Tell whether the ordered pair is a solution of $-5x + 2y < 11$.**

1. (2, 6)

2. (-1, 4)

3. (-3, -4)

Tell whether the ordered pair is a solution of $\frac{1}{3}x + 4y \geq 16$.

4. (12, 4)

5. (3, 3)

6. (18, 2)

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EXAMPLE 2 Graph a linear inequality in two variables

Graph the inequality $3x - y \leq 1$.

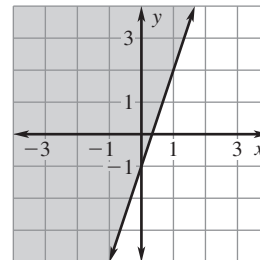
Solution

STEP 1 Graph the equation $3x - y = 1$.
The inequality is \leq , so use a solid line.

STEP 2 Test $(0, 0)$ in $3x - y \leq 1$.

$$3(0) \stackrel{?}{\leq} 1$$

$$0 \leq 1 \checkmark$$



STEP 3 Shade the half-plane that contains $(0, 0)$, because $(0, 0)$ is a solution of the inequality.

EXAMPLE 3 Graph a linear inequality in one variable

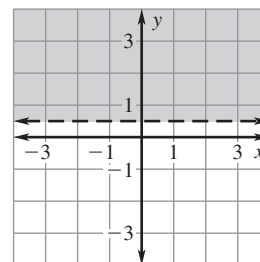
Graph the inequality $y > \frac{1}{2}$.

Solution

STEP 1 Graph the equation $y = \frac{1}{2}$. The inequality is $>$ so use a dashed line.

STEP 2 Test $(0, 0)$ in $y > \frac{1}{2}$. You substitute only the y -coordinate because the inequality does not have the variable x .

$$0 \stackrel{?}{>} \frac{1}{2}$$



STEP 3 Shade the half-plane that does *not* contain $(0, 0)$, because $(0, 0)$ is not a solution of the inequality.

Exercises for Examples 2 and 3

Graph the inequality.

7. $x + y \geq -2$

8. $5x - 2y < 6$

9. $x \leq 1$