

## 6-6 Solving Systems of Linear Inequalities

[Warm Up](#)

[Lesson Presentation](#)

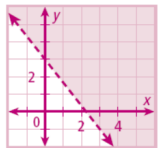
[Lesson Quiz](#)

Holt Algebra 1 Copyright © by Holt, Rinehart and Winston. All Rights Reserved.

## 6-6 Solving Systems of Linear Inequalities

**Warm Up**  
Solve each inequality for  $y$ .

1.  $8x + y < 6$     $y < -8x + 6$
2.  $3x - 2y > 10$     $y < \frac{3}{2}x - 5$
3. Graph the solutions of  $4x + 3y > 9$ .



Holt Algebra 1 Copyright © by Holt, Rinehart and Winston. All Rights Reserved.

## 6-6 Solving Systems of Linear Inequalities

*Objective*

Graph and solve systems of linear inequalities in two variables.

Holt Algebra 1 Copyright © by Holt, Rinehart and Winston. All Rights Reserved.

## 6-6 Solving Systems of Linear Inequalities

**Example 1A: Identifying Solutions of Systems of Linear Inequalities**

Tell whether the ordered pair is a solution of the given system.

$$(-1, -3); \begin{cases} y \leq -3x + 1 \\ y < 2x + 2 \end{cases}$$

$\begin{array}{r l} (-1, -3) & \\ y \leq -3x + 1 & \\ -3 & -3(-1) + 1 \\ -3 & 3 + 1 \\ -3 & 4 \end{array} \begin{array}{l} \\ \\ \leq \\ \\ \end{array} \begin{array}{l} \\ \\ 4 \\ \\ \end{array} \begin{array}{l} \\ \\ \\ \checkmark \\ \end{array}$	$\begin{array}{r l} (-1, -3) & \\ y < 2x + 2 & \\ -3 & 2(-1) + 2 \\ -3 & -2 + 2 \\ -3 & 0 \end{array} \begin{array}{l} \\ \\ < \\ \\ \\ \end{array} \begin{array}{l} \\ \\ \\ \\ \\ \end{array} \begin{array}{l} \\ \\ \\ \checkmark \\ \end{array}$
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

$(-1, -3)$  is a solution to the system because it satisfies both inequalities.

Holt Algebra 1 Copyright © by Holt, Rinehart and Winston. All Rights Reserved.

**6-6 Solving Systems of Linear Inequalities**

**Example 1B: Identifying Solutions of Systems of Linear Inequalities**

Tell whether the ordered pair is a solution of the given system.

$$(-1, 5); \begin{cases} y < -2x - 1 \\ y \geq x + 3 \end{cases}$$

$$\begin{array}{r|l} (-1, 5) & \\ y < -2x - 1 & \\ \hline 5 & -2(-1) - 1 \\ 5 & 2 - 1 \\ 5 & 1 \quad \times \end{array}$$

$$\begin{array}{r|l} (-1, 5) & \\ y \geq x + 3 & \\ \hline 5 & -1 + 3 \\ 5 & 2 \quad \checkmark \end{array}$$

$(-1, 5)$  is not a solution to the system because it does not satisfy both inequalities.

**6-6 Solving Systems of Linear Inequalities**

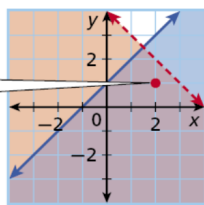
**Remember!**

An ordered pair must be a solution of all inequalities to be a solution of the system.

**6-6 Solving Systems of Linear Inequalities**

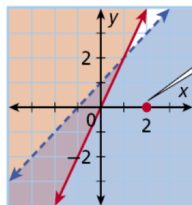
To show all the solutions of a system of linear inequalities, graph the solutions of each inequality. The solutions of the system are represented by the **overlapping shaded regions**. Below are graphs of Examples 1A and 1B on p. 421.

Example 1A



$(2, 1)$  is in the overlapping shaded regions, so it is a solution.

Example 1B



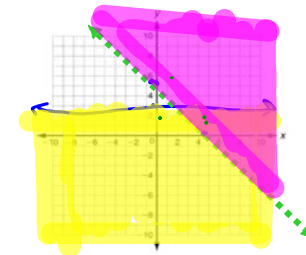
$(2, 0)$  is not in the overlapping shaded regions, so it is not a solution.

**6-6 Solving Systems of Linear Inequalities**

**Example 2A: Solving a System of Linear Inequalities by Graphing**

Graph the system of linear inequalities. Give two ordered pairs that are solutions and two that are not solutions.

$$\begin{cases} y \leq 3 \\ y > -x + 5 \end{cases}$$



**6-6 Solving Systems of Linear Inequalities**

**Example 2B: Solving a System of Linear Inequalities by Graphing**

Graph the system of linear inequalities. Give two ordered pairs that are solutions and two that are not solutions.

$$\begin{cases} -3x + 2y \geq 2 \\ y < 4x + 3 \end{cases}$$

*Handwritten work:*  

$$\frac{2y}{2} = \frac{3x+2}{2}$$

$$y = \frac{3}{2}x + 1$$

Holt Algebra 1 Copyright © by Holt, Rinehart and Winston. All Rights Reserved.

**6-6 Solving Systems of Linear Inequalities**

In Lesson 6-4, you saw that in systems of linear equations, if the lines are parallel, there are no solutions. With systems of linear inequalities, that is not always true.

Holt Algebra 1 Copyright © by Holt, Rinehart and Winston. All Rights Reserved.

**6-6 Solving Systems of Linear Inequalities**

**Example 3A: Graphing Systems with Parallel Boundary Lines**

Graph the system of linear inequalities.

$$\begin{cases} y \leq -2x - 4 \\ y > -2x + 5 \end{cases}$$

This system has no solutions.

Holt Algebra 1 Copyright © by Holt, Rinehart and Winston. All Rights Reserved.

**6-6 Solving Systems of Linear Inequalities**

**Example 3B: Graphing Systems with Parallel Boundary Lines**

Graph the system of linear inequalities.

$$\begin{cases} y > 3x - 2 \\ y < 3x + 6 \end{cases}$$

Holt Algebra 1 Copyright © by Holt, Rinehart and Winston. All Rights Reserved.

**6-6 Solving Systems of Linear Inequalities**

**Example 3C: Graphing Systems with Parallel Boundary Lines**

Graph the system of linear inequalities.

$$\begin{cases} y \geq 4x + 6 \\ y \geq 4x - 5 \end{cases}$$

Holt Algebra 1 Copyright © by Holt, Rinehart and Winston. All Rights Reserved.

**6-6 Solving Systems of Linear Inequalities**

**Check It Out! Example 3a**

Graph the system of linear inequalities.

$$\begin{cases} y > x + 1 \\ y \leq x - 3 \end{cases}$$

Holt Algebra 1 Copyright © by Holt, Rinehart and Winston. All Rights Reserved.

**6-6 Solving Systems of Linear Inequalities**

**Check It Out! Example 3c**

Graph the system of linear inequalities.

$$\begin{cases} y > -2x + 3 \\ y > -2x \end{cases}$$

Holt Algebra 1 Copyright © by Holt, Rinehart and Winston. All Rights Reserved.

**6-6 Solving Systems of Linear Inequalities**

**Example 4: Application**

In one week, Ed can mow at most 9 times and rake at most 7 times. He charges \$20 for mowing and \$10 for raking. He needs to make more than \$125 in one week. Show and describe all the possible combinations of mowing and raking that Ed can do to meet his goal. List two possible combinations.

*m = mowing*  
*r = raking*

$$\begin{aligned} m &\leq 9 \\ r &\leq 7 \\ 20m + 10r &> 125 \end{aligned}$$

Holt Algebra 1 Copyright © by Holt, Rinehart and Winston. All Rights Reserved.



