

**6-5 Solving Linear Inequalities**


Warm Up  
Lesson Presentation  
Lesson Quiz

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**6-5 Solving Linear Inequalities**

**Warm Up**  
Graph each inequality.

1.  $x > -5$       2.  $y \leq 0$

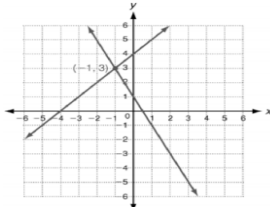


3. Write  $-6x + 2y = -4$  in slope-intercept form, and graph.  
 $y = 3x - 2$

$-x < 5$   
 $+x \quad +x$   
 $0 < x + 5$   
 $-5 \quad -5$   
 $-5 < x \quad x \neq 5$

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**6.1**

3.   
(-1, -3)

**6.2**

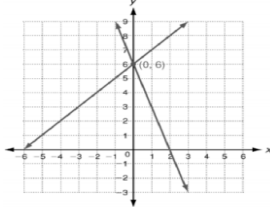
1. (-1, -3)  
5. (5, -2)  
7. (1, -2)

**6.3**

3. (2, -3)  
5. (4, -6)

**6.4**

1. infinitely many solutions  
5. consistent, dependent; infinitely many solutions

4.   
(0, 6)

**6-5 Solving Linear Inequalities**

**Objective**

Graph and solve linear inequalities in two variables.

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## 6-5 Solving Linear Inequalities

A **linear inequality** is similar to a linear equation, but the equal sign is replaced with an inequality symbol. A **solution of a linear inequality** is any ordered pair that makes the inequality true.

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## 6-5 Solving Linear Inequalities

### Example 1A: Identifying Solutions of Inequalities

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

$$(-2, 4); y < 2x + 1$$

$$\begin{array}{r|l} y < 2x + 1 \\ 4 & 2(-2) + 1 \\ 4 & -4 + 1 \end{array} \quad \text{Substitute } (-2, 4) \text{ for } (x, y).$$

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### Example 1B: Identifying Solutions of Inequalities

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

$$(3, 1); y > x - 4$$

$$\begin{array}{r|l} y > x - 4 \\ 1 & 3 - 4 \\ 1 & > -1 \quad \checkmark \end{array} \quad \text{Substitute } (3, 1) \text{ for } (x, y).$$

(3, 1) is a solution.

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### Check It Out! Example 1

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

a.  $(4, 5); y < x + 1$

b.  $(1, 1); y > x - 7$

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When the inequality is written as  $y \leq$  or  $y \geq$ , the points on the boundary line are solutions of the inequality, and the line is **solid**.

When the inequality is written as  $y <$  or  $y >$ , the points on the boundary line are not solutions of the inequality, and the line is **dashed**.

When the inequality is written as  $y >$  or  $y \geq$ , the points **above** the boundary line are solutions of the inequality.

When the inequality is written as  $y <$  or  $y \leq$ , the points **below** the boundary line are solutions of the inequality.

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#### Graphing Linear Inequalities

<b>Step 1</b>	<b>Solve the inequality for <math>y</math> (slope-intercept form).</b>
<b>Step 2</b>	<b>Graph the boundary line. Use a solid line for <math>\leq</math> or <math>\geq</math>. Use a dashed line for <math>&lt;</math> or <math>&gt;</math>.</b>
<b>Step 3</b>	<b>Shade above the line for <math>y &gt;</math> or <math>\geq</math>. Shade below the line for <math>y &lt;</math> or <math>y \leq</math>. Check an answer. <math>(0, 0)</math> is a good one to check.</b>

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#### Example 2A: Graphing Linear Inequalities in Two Variables

Graph the solutions of the linear inequality.  
 $y \leq 2x - 3$

$0 < 2(0) - 3$   
 $0 < -3$

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#### Example 2B: Graphing Linear Inequalities in Two Variables

Graph the solutions of the linear inequality.  
 $5x + 2y > -8$

**Step 1** Solve the inequality for  $y$ .

$$5x + 2y > -8$$

$$\underline{-5x} \quad \underline{-5x}$$

$$2y > -5x - 8$$

$$y > -\frac{5}{2}x - 4$$

**Step 2** Graph the boundary line  $y = -\frac{5}{2}x - 4$ . Use a dashed line for  $>$ .

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**Example 2C: Graphing Linear Inequalities in two Variables**

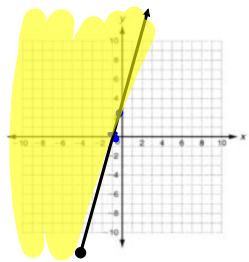
Graph the solutions of the linear inequality.

$$4x - y + 2 \leq 0$$

**Step 1** Solve the inequality for y.

$$4x - y + 2 \leq 0$$

$$\frac{-y}{-1} \leq \frac{-4x - 2}{-1}$$

$$y \geq 4x + 2$$


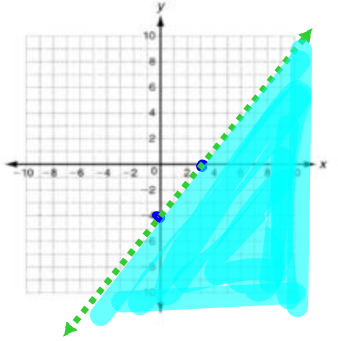
**Step 2** Graph the boundary line  $y \geq 4x + 2$ . Use a solid line for  $\geq$ .

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**Check It Out! Example 2a**

Graph the solutions of the linear inequality.

$$4x - 3y > 12$$


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**Check It Out! Example 2b**

Graph the solutions of the linear inequality.

$$2x - y - 4 > 0$$

$$\frac{-y}{-1} > \frac{-2x + 4}{-1}$$

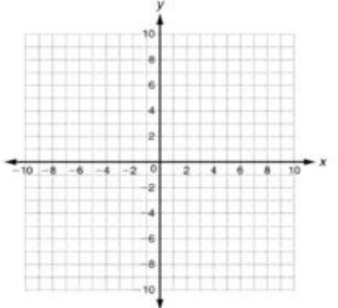
$$y < 2x - 4$$


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**Check It Out! Example 2c**

Graph the solutions of the linear inequality.

$$y \geq -\frac{2}{3}x + 1$$


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**Example 3a: Application**

Ada has at most 285 beads to make jewelry. A necklace requires 40 beads, and a bracelet requires 15 beads.

Write a linear inequality to describe the situation.

neck :  $n$   
bracelets :  $b$

$$40n + 15b \leq 285$$

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**Example 3b**

b. Graph the solutions.

$$15b \leq 285$$

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**Example 3c**

c. Give two combinations of necklaces and bracelets that Ada could make.

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**Check It Out! Example 3**

**What if...?** Dirk is going to bring two types of olives to the Honor Society induction and can spend no more than \$6. Green olives cost \$2 per pound and black olives cost \$2.50 per pound.

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**Check It Out! Example 3 Continued**

$y \leq -0.80x + 2.4$

**Olive Combinations**

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**Check It Out! Example 3 Continued**

c. Give two combinations of olives that Dirk could buy.

**Olive Combinations**

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**Example 4A: Writing an Inequality from a Graph**

Write an inequality to represent the graph.

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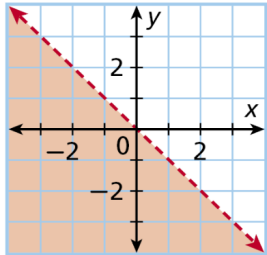
**Example 4B: Writing an Inequality from a Graph**

Write an inequality to represent the graph.

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**6-5 Solving Linear Inequalities****Check It Out! Example 4a**

Write an inequality to represent the graph.

**6-5 Solving Linear Inequalities****Lesson Quiz: Part I**

1. You can spend at most \$12.00 for drinks at a picnic. Iced tea costs \$1.50 a gallon, and lemonade costs \$2.00 per gallon. Write an inequality to describe the situation. Graph the solutions, describe reasonable solutions, and then give two possible combinations of drinks you could buy.

$$1.50x + 2.00y \leq 12.00$$