# 6-5 Solving Linear Inequalities



## 6-5 Solving Linear Inequalities

### Warm Up

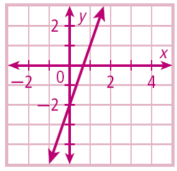
**Graph each inequality.**

**1.** $x > -5$



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

$y = 3x - 2$



## 6-5 Solving Linear Inequalities

### *Objective*

Graph and solve linear inequalities in two variables.

## 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.

## 6-5 Solving Linear Inequalities

### Example 1A: Identifying Solutions of Inequalities

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

**(−2, 4); $y < 2x + 1$**

| $y < 2x + 1$ | |
|---|---|
| $4$ | $2(-2) + 1$ |
| $4$ | $-4 + 1$ |
| $4 <$ | $-3$ ✗ |

*Substitute (−2, 4) for (x, y).*

(−2, 4) is not a solution.

## 6-5 Solving Linear Inequalities

### Example 1B: Identifying Solutions of Inequalities

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

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

| $y > x - 4$ | |
|---|---|
| $1$ | $3 - 4$ |
| $1 >$ | $-1$ ✓ |

*Substitute (3, 1) for (x, y).*

(3, 1) is a solution.

## 6-5 Solving Linear Inequalities

**Check It Out! Example 1**

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

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

$5 < 4 + 1$

$5 < 5$

Not a solution

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

$1 > 1 - 7$

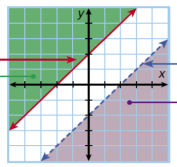
$1 > -6$ ✓

## 6-5 Solving Linear Inequalities

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.

## 6-5 Solving Linear Inequalities

| Graphing Linear Inequalities | |
|---|---|
| Step 1 | Solve the inequality for $y$ (slope-intercept form). |
| Step 2 | Graph the boundary line. Use a solid line for ≤ or ≥. Use a dashed line for < or >. |
| Step 3 | Shade above the line for $y >$ or ≥. Shade below the line for $y <$ or $y \leq$. Check an answer. (0, 0) is a good one to check. |

## 6-5 Solving Linear Inequalities

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

**Graph the solutions of the linear inequality.**

$y \leq 2x - 3$

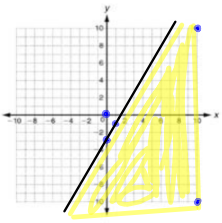
(0, 0)

$0 \leq 2(0) - 3$

$0 \leq -3$

$-10 \leq 20 - 3$

$-10 \leq 17$



## 6-5 Solving Linear Inequalities

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

**Graph the solutions of the linear inequality.**

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

$5(0) + 2(0) > -8$ $0 > -8$

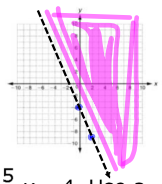
**Step 1** Solve the inequality for $y$.

$5x + 2y > -8$

$-5x \quad -5x$

$2y > -5x - 8$

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



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

## 6-5 Solving Linear Inequalities

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

**Graph the solutions of the linear inequality.**

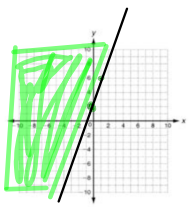
**$4x - y + 2 \leq 0$**

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

$4x - y + 2 \leq 0$

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

$y \geq 4x + 2$



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

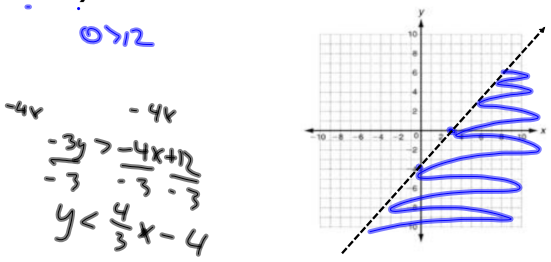
 

## 6-5 Solving Linear Inequalities

**Check It Out! Example 2a**

Graph the solutions of the linear inequality.

$4x - 3y > 12$





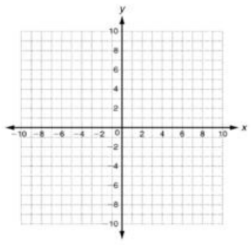
 

## 6-5 Solving Linear Inequalities

**Check It Out! Example 2b**

Graph the solutions of the linear inequality.

$2x - y - 4 > 0$



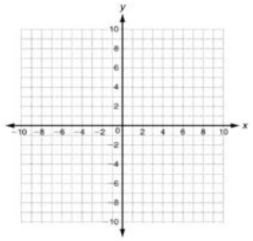
 

## 6-5 Solving Linear Inequalities

**Check It Out! Example 2c**

Graph the solutions of the linear inequality.

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



## 6-5 Solving Linear Inequalities

**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.

$40n + 15b \leq 285$

$n$ = necklace

$b$ = bracelet

$40n \leq 285$

$n = 7.125$

$\frac{15b}{15} \leq \frac{285}{15}$

$b \leq 19$

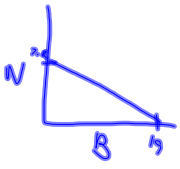
## 6-5 Solving Linear Inequalities

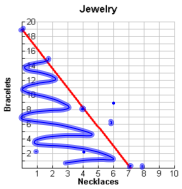
**Example 3b**

b. Graph the solutions.

$n = 7.125$

$b = 19$





## 6-5 Solving Linear Inequalities

**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.

$2g + 2.5b \leq 6$

$g$ = green

$b$ = black

$2g \leq 6$

$g \leq 3$

$\frac{2.5b}{2.5} \leq \frac{6}{2.5}$

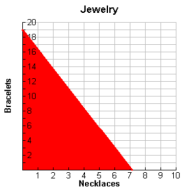
$b \leq 2.4$

## 6-5 Solving Linear Inequalities

### Example 3c

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



## 6-5 Solving Linear Inequalities

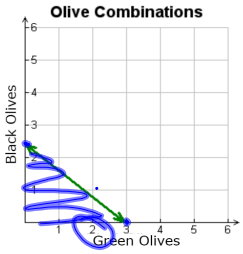
### Check It Out! Example 3 Continued

$y \le -0.80x + 2.4$

$2g + 2.5b \le 6$

$2(2)$

$4 + 2.5b \le 6$

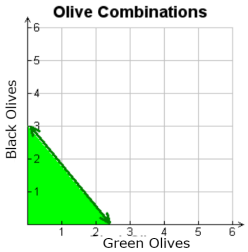


## 6-5 Solving Linear Inequalities

### Check It Out! Example 3 Continued

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

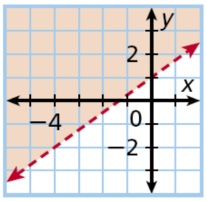


## 6-5 Solving Linear Inequalities

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

**Write an inequality to represent the graph.**




$y$-intercept: 1; slope: $\frac{3}{4}$

Write an equation in slope-intercept form.

$y = mx + b \rightarrow y = \frac{3}{4}x + 1$

The graph is shaded *above* a *dashed* boundary line.

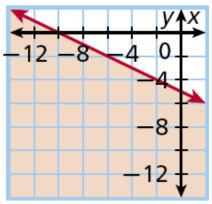
Replace = with > to write the inequality $y > \frac{3}{4}x + 1$.

## 6-5 Solving Linear Inequalities

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

**Write an inequality to represent the graph.**




$y$-intercept: −5 slope: $-\frac{1}{2}$

Write an equation in slope-intercept form.

$y = mx + b \rightarrow y = -\frac{1}{2}x - 5$

The graph is shaded *below* a *solid* boundary line.

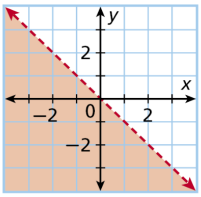
Replace = with ≤ to write the inequality $y \le -\frac{1}{2}x - 5$.

## 6-5 Solving Linear Inequalities

### Check It Out! Example 4a

**Write an inequality to represent the graph.**




$y$-intercept: 0 slope: −1

Write an equation in slope-intercept form.

$y = mx + b \rightarrow y = -1x$

The graph is shaded *below* a *dashed* boundary line.

Replace = with < to write the inequality $y < -x$.

## 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.


$1.50x + 2.00y \leq 12.00$



Dec 11-8:49 AM