*For help on graphing inequalities, see Unit 7 Section 5!*

A system of linear inequalities in two variables, or simply a system of linear inequalities, consists of two or more linear inequalities in the same variables. For example:

$$x - y > 7$$
$$2x + y < 8$$

The solution of a system of inequalities is an ordered pair that is a solution of each inequality in the system.

**Example 1:** Is (3, -5) a solution to the system of inequalities above?

How about (5, -2)?

Remember this?:

$$y \leq -x - 3$$
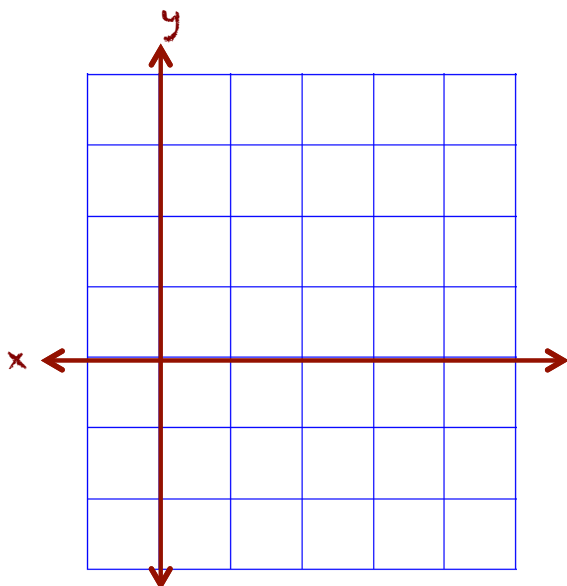$$0 \leq -0 - 3$$
$$0 \leq -3$$

$y = mx + b$

Graph Linear Inequalities
1) Put the line in slope-intercept form and graph it.
2) Dashed line for < or >.
   Solid line for ≤ or ≥.
3) Shade depending on test point or shortcut.

$(0,0)$

*Sully teaches how to graph*

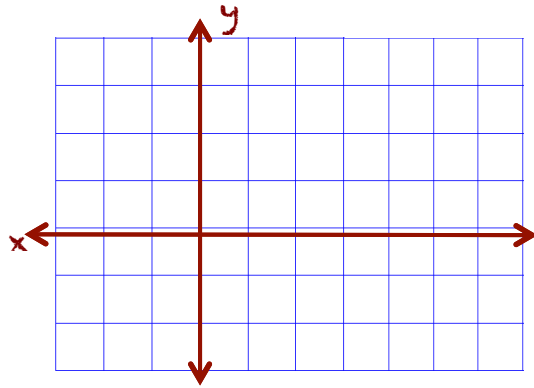**Example 2:**
Solve the following system of inequalities by graphing:

$$3x + 2y \leq 6$$
$$x < 2$$

### Example 3:

Solve the following system of inequalities by graphing:

$$y \geq -1$$
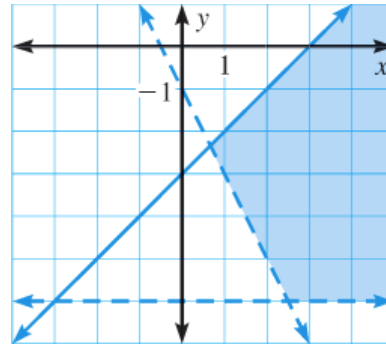$$x > -2$$
$$x + 2y \leq 4$$

### Example 4:

Is (0, -1) a solution to the following system of inequalities?

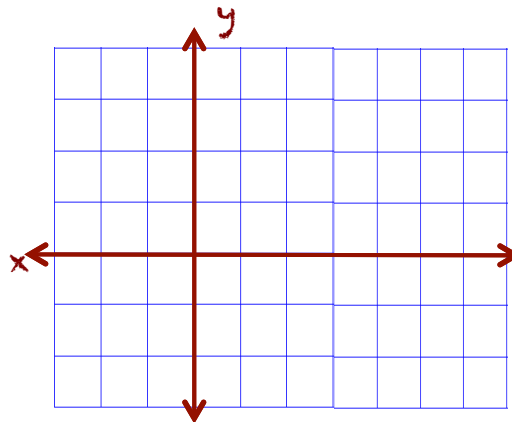What about (2, -2)?

What about (2, -5)?

What about (3, 0)?

### Example 5:

$y > \frac{1}{2}x + 1$
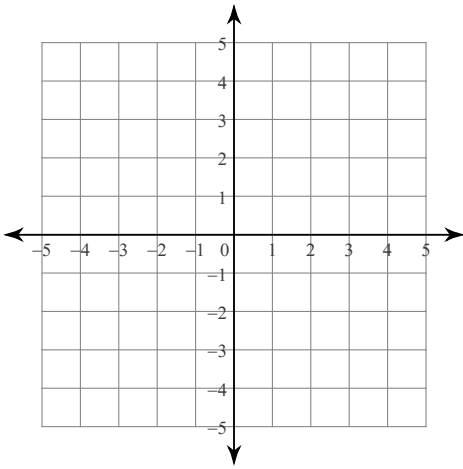
$y \leq \frac{1}{2}x - 2$
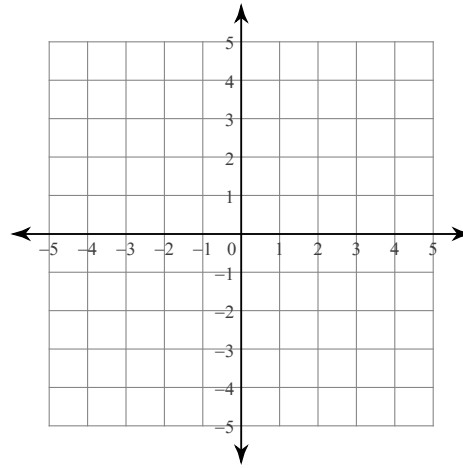
Now, summarize your notes here!

# 8.5 Practice... Use a ruler! Shade beautifully!

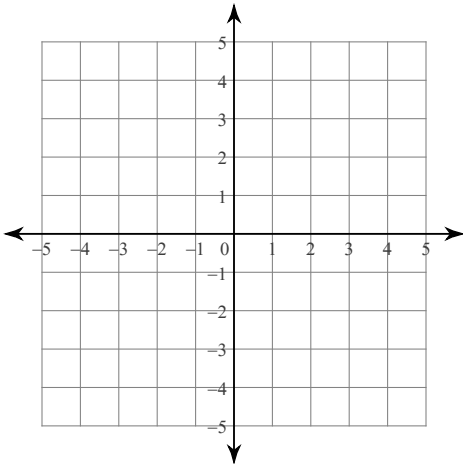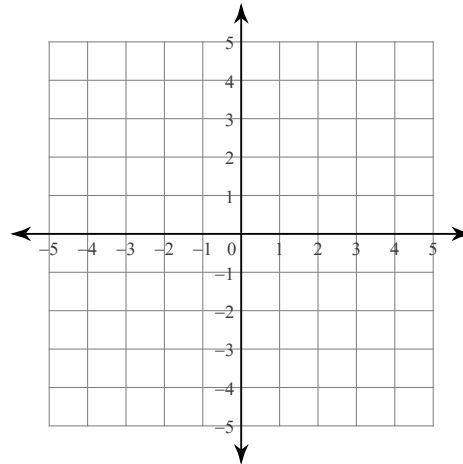Solve each system of inequalities by graphing!

1) $y \geq -3x - 2$
   $y < x + 2$

2) $y \geq -\dfrac{1}{2}x - 2$
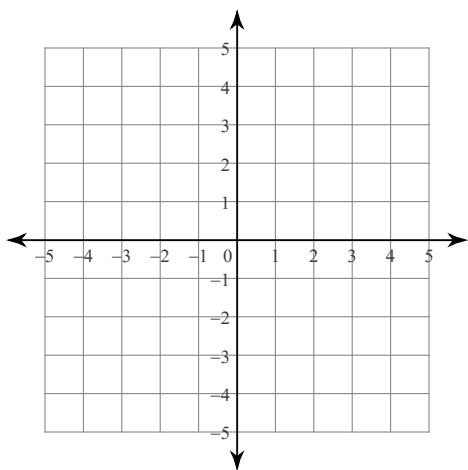
   $y < -\dfrac{5}{2}x + 2$
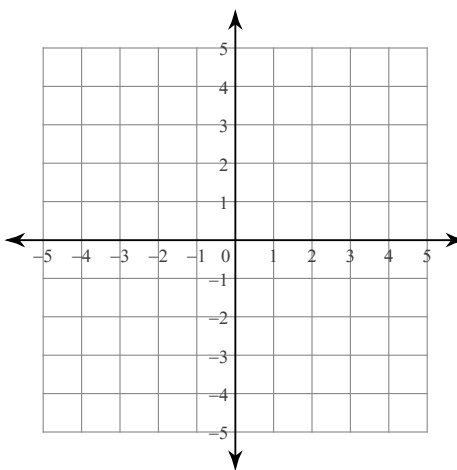
3) $y \geq 1$
   $y \geq x - 1$

4) $y \leq x - 1$
   $x \leq 3$
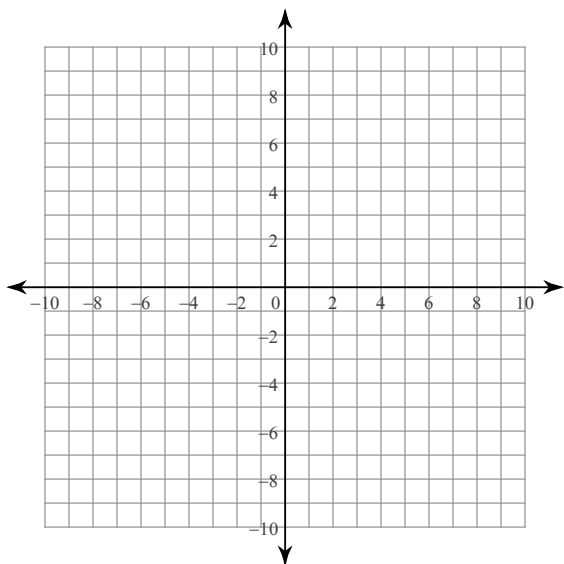
5) $x - 2y \geq 2$
   $x - 2y < -4$
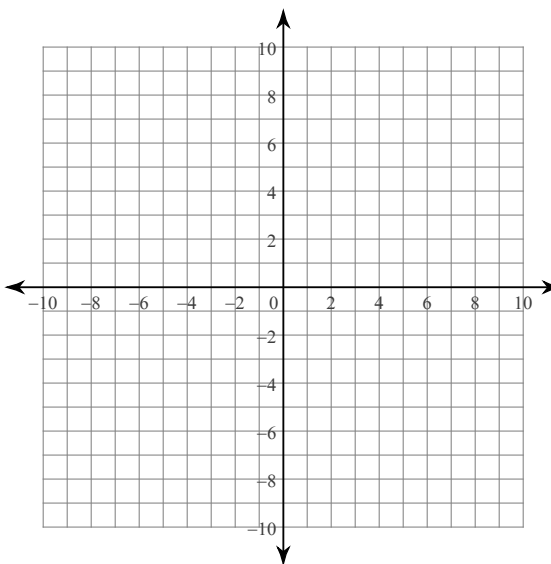
6) $5x + 3y > -9$
   $x + 3y \leq 3$

7) $y \leq -\dfrac{5}{4}x - 8$

   $y < \dfrac{5}{4}x + 2$

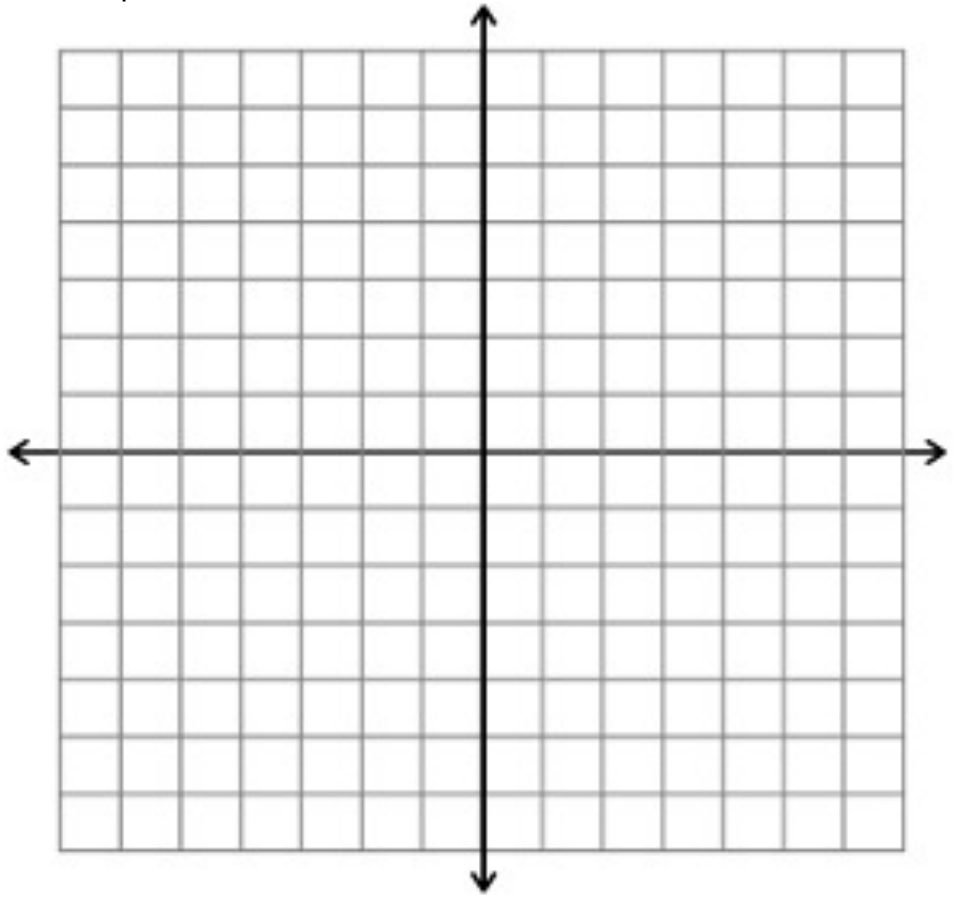8) $y \leq -\dfrac{8}{7}x + 7$

   $y \geq -\dfrac{8}{7}x + 2$

9) Is (0, 7) a solution to question number 8 above?

## Application and Extension

1.    Solve the following system of inequalities.

$y \geq -2$
$2x + 3y > -6$

2.    Is the point (0, -2) a solution of this system?

3.    ALGEBUSINESS Sully receives a 40 dollar gift certificate for the jewelry shop *Brust's Algebling*. An *Algebracelet* costs $5 while a *Calcunecklus* costs $8. Sully wants at least one of each.

Let $a$ = *the number of Algebracelets* and $c$ = *the number of Calcuneckluses*

a.    Tell what each of the following inequalities means in the context of this problem:
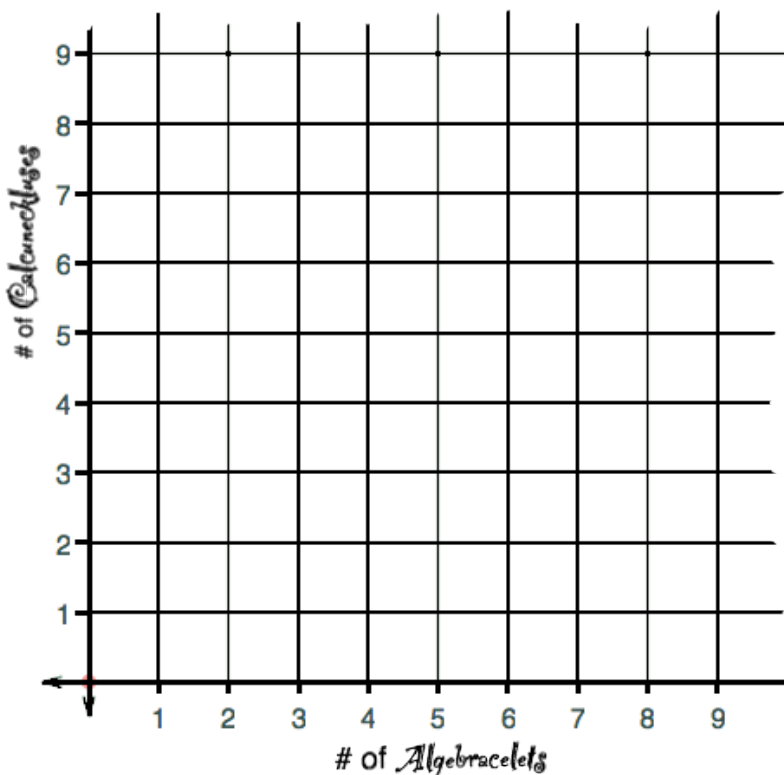
$a \geq 1$

$c \geq 1$  _____        $5a + 8c \leq 40$  _____

b.    Graph all 3 inequalities.

(*Hint: Solve $5a + 8c \leq 40$ for c by subtracting $5a$ from each side and dividing each term by $8$. Your inequality is now very similar to $y = mx + b$!*)

c.   Tell one point that is a solution to this system of inequalities.

c.   Tell one point that is not a solution to this system of inequalities.

# of Calcuneckluses

# of Algebracelets

| **Coming Up:** Rewrite each using exponents. | | |
|---|---|---|
| 1.   $9 \cdot 9 \cdot 9 =$ _____ | 2.   $1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1$ <br><br> = _____ | 3.   $(xy) \cdot (xy) \cdot (xy) \cdot (xy)$ = ____ |
| **Quick Review:** Find the slope of the line that passes through the given points. | | |
| 1.   (-2, 3); (-2, 11) | 2.   (6, 3); (-5, 9) | 3.   $(4, \frac{7}{8})$; $(-736, \frac{7}{8})$ |