

# Solving Systems of Linear Inequalities

Learning Target Solve systems of linear inequalities and apply systems of linear inequalities to real world situations

RECALL:

Steps to Graph a Linear Inequality

Step 1: Graph the boundary (Solid or Dashed)  $\geq \leq > <$

Step 2: Test a point or  $y >$  Shade above  
 $y <$  Shade below

Step 3: Shade region in which test point is true.

Solution to a system is the intersection of the graphs also referred to as the feasible region.

Example 1)  $y > \frac{1}{3}x - 2$

$$0 > \frac{1}{3} \cdot 0 - 2$$

$$2x - y < 4$$

$$2 \cdot 0 - 0 < 4$$

$$3x + 4y > 0$$

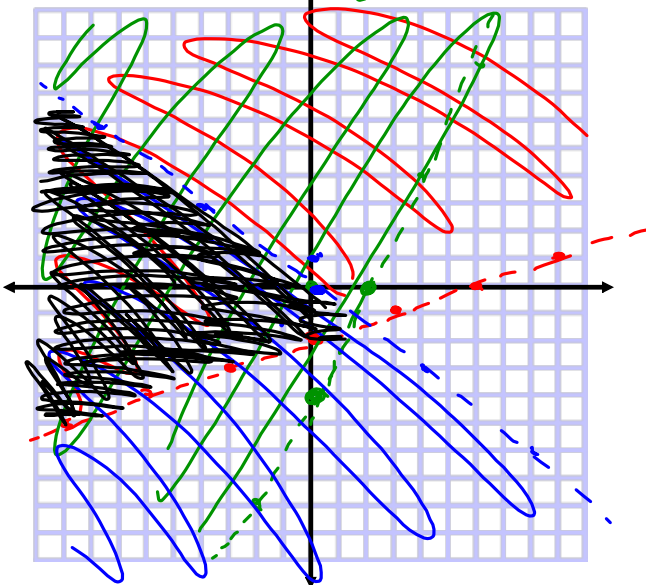
$$3x + 4y = 0$$

$$4y = -3x$$

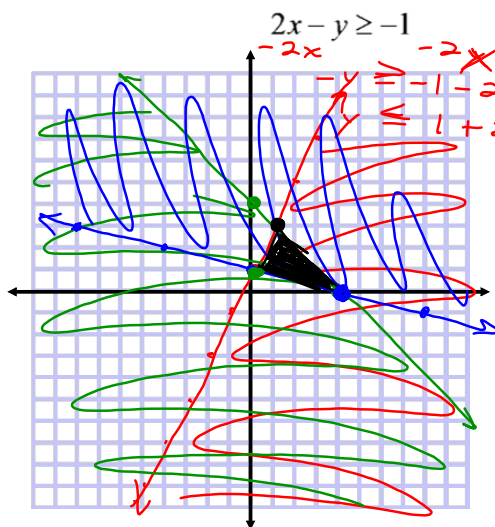
$$y = -\frac{3}{4}x$$

$$3(0) - 4(1) > 0$$

$$-4 > 0$$



Example 2 Find the coordinates of the vertices of the triangle formed by



$$\begin{array}{r} 2x - y \geq -1 \\ x + y \leq 4 \\ x + 4y \geq 4 \end{array}$$

$$\begin{array}{r} -2x \\ -y \geq -1 - 2x \\ \leq 1 + 2x \end{array}$$

$$y \leq 4 - x$$

$$\begin{array}{r} 2x - y = -1 \\ x + y = 4 \\ \hline 3x = 3 \\ x = 1 \\ y = 3 \end{array}$$

$$\begin{array}{r} x + y = 4 \\ x + 4y = 4 \\ \hline -3y = 0 \\ y = 0 \\ x = 4 \end{array}$$

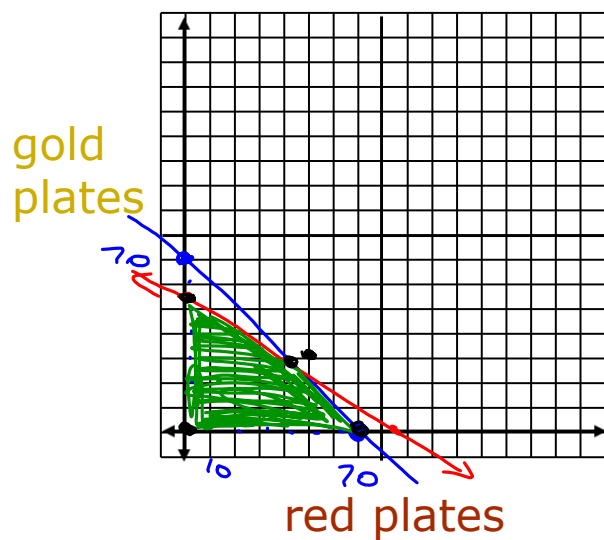
$$\begin{array}{r} 2x - y = -1 \\ x + 4y = 4 \\ \hline 2x - y = -1 \\ -2x - 8y = -8 \\ \hline -9y = -9 \\ y = 1 \end{array}$$

$$\begin{array}{r} 2x - 1 = -1 \\ +1 \quad +1 \\ 2x = 0 \\ x = 0 \end{array}$$

**Lauren wants to paint no more than 70 plates for the art show. It costs her at least \$50 plus \$2 per item to produce red plates and \$3 per item to produce gold plates. She wants to spend no more than \$215. Write and graph a system of inequalities that can be used to determine the number of each plate that Lauren can make.**

Let  $x$  represent red plates and  $y$  gold plates.  
What restrictions are on  $x$  and  $y$ ?

$$\begin{array}{l} x + y \leq 70 \\ 50 + 2x + 3y \leq 215 \end{array}$$



$(10, 10)$   $(10, 20)$   
State 3 possible  $(20, 20)$   
solutions to Lauren's  
problem.

$$x + y \leq 70$$
$$50 + 2x + 3y \leq 215$$

-50

$$2x + 3y \leq 165$$