

Unit 6 Day 2: Graphing Systems of Linear Inequalities

A solution to a system of linear inequalities is an ordered pair that is a solution of **each** inequality in the system.

The graph of a system of linear inequalities is the graph of all solutions of the system.

Key Concept: Graphing a System of Linear Inequalities

Step 1: **Graph** each inequality, including shading all possible solutions
* Remember dotted or solid lines *

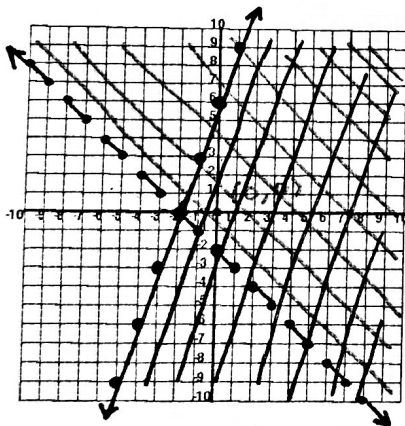
Step 2: **Find** the intersection of the half-planes (shaded areas). The graph of the systems is this intersection.

Example 1: Graph the system of inequalities.

$$\begin{aligned} y &> -x - 2 \\ y &\leq 3x + 6 \end{aligned}$$

Step 1: **Graph** each inequality on the same coordinate plane below.

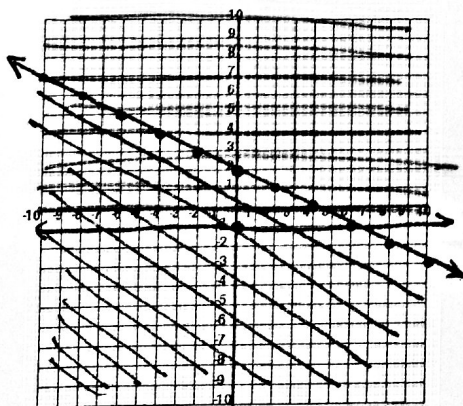
Step 2: **Find** the intersection of their shading. This is the solution to the system of inequalities.



$$\begin{aligned} (0) &> -(0) - 2 \\ 0 &> -2 \end{aligned}$$

$$\begin{aligned} (0) &\leq 3(0) + 6 \\ 0 &\leq 6 \end{aligned}$$

Example 2: Solve the system of inequalities by graphing.



$$\begin{aligned} (0) + 2(0) &\leq 4 \\ 0 &\leq 4 \end{aligned}$$

$$\begin{aligned} y &\geq -1 \\ x + 2y &\leq 4 \\ -x &\quad -x \\ \frac{2y}{2} &\leq \frac{-x+4}{2} \\ y &\leq -\frac{1}{2}x + 2 \end{aligned}$$

Example 3: $y > \frac{1}{2}x - 4$

$$-\frac{2x}{-2x} + \frac{6y}{-2x} < \frac{6}{-2x}$$

$$(0) > \frac{1}{2}(0) - 4$$

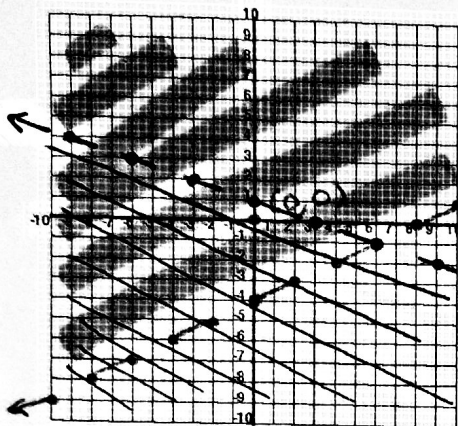
$$0 > -4$$

$$\frac{6y}{6} < \frac{-2x + 6}{6} \frac{6}{6}$$

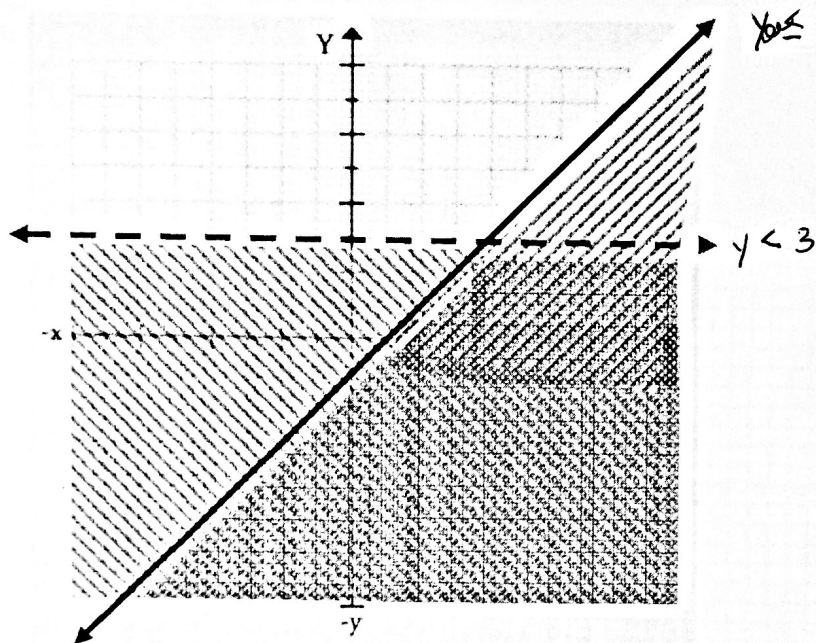
$$y < -\frac{1}{3}x + 1$$

$$2(0) + 6(0) < 6$$

$$0 < 6$$



Write a system of inequalities for the graph below.



1.) $y < x - 4$
 $y \geq -x + 3$

$$(0) < (0) - 4$$

$$0 < -4$$

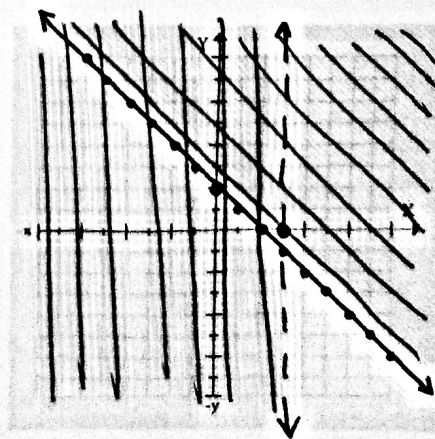
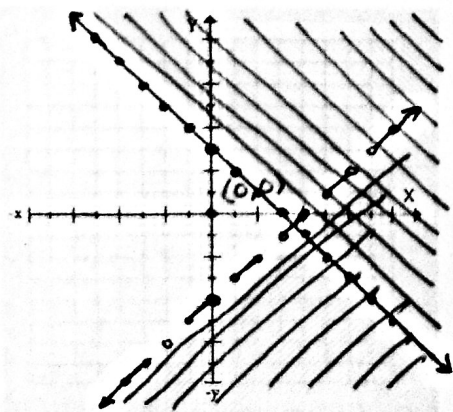
$$(0) \geq -(0) + 3$$

$$0 \geq 3$$

2. $y \geq -x + 2$
 $x < 3$

$$(0) \geq -(0) + 2$$

$$0 \geq 2$$



Day 2 Homework

Solve each linear inequality system by graphing.

7. $x \geq 2$

$y \leq 4$

11. $y \leq -3$

$y > 5$

8. $y \geq 3x + 1$

$y \leq -x - 4$

12. $y < 5x + 2$

$y > -2x - 3$

9. $4x - 5y < -20$ $3x + 2y \geq 6$

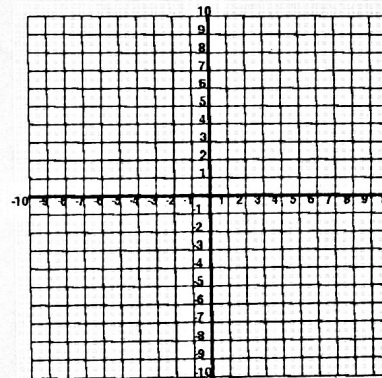
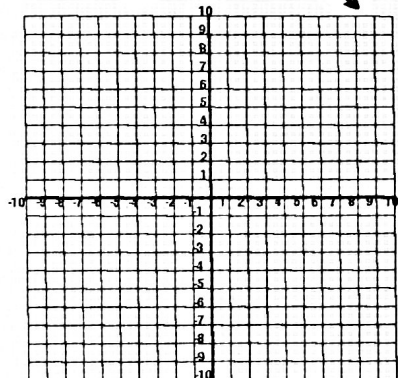
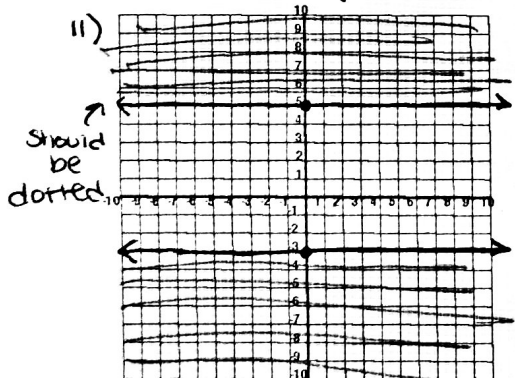
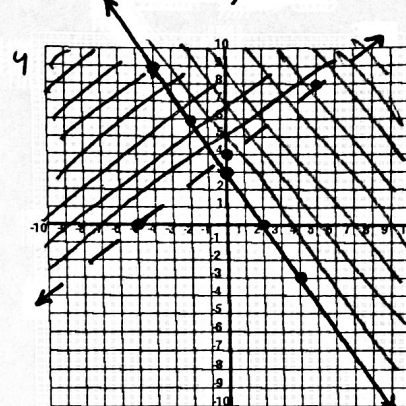
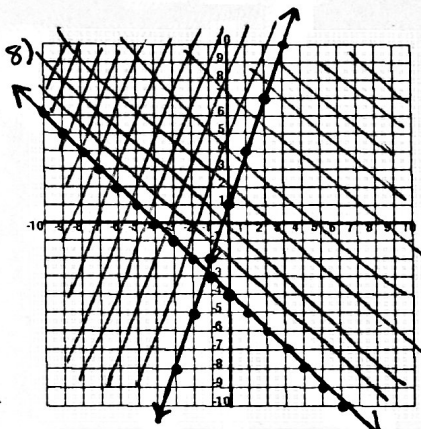
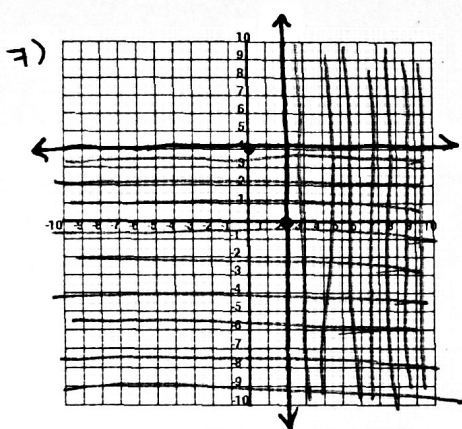
$3x + 2y \geq 6$ $\frac{2y}{2} \geq \frac{-3x + 6}{2}$

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

13. $y - x < 0$

$2x - y > -3$

$$\begin{aligned} 4x - 5y &< -20 \\ -4x & \quad -4x \\ \hline -5y &< -4x - 20 \\ \frac{-5y}{-5} &< \frac{-4x - 20}{-5} \\ y &> \frac{4}{5}x + 4 \end{aligned}$$



4.) Write a system of inequalities for the shaded region.

