

LEARNING OBJECTIVE: We will solve systems of inequalities. (Alg1M1L11)

ACTIVATING PRIOR KNOWLEDGE:

We remember the different ways to solve systems of equations (graphing, substitution and elimination)

$\begin{array}{l} 4 \begin{cases} 3x + 2y = 4 \\ 3 \begin{cases} 4x + 7y = 1 \end{cases} \end{cases}$ $\begin{array}{r} 12x + 8y = 16 \\ \leftarrow 12x + 21y = 3 \\ \hline 0x - 13y = 13 \\ \quad \quad \quad \frac{-13}{-13} \quad \frac{-13}{-13} \\ \hline \quad \quad \quad y = -1 \end{array}$ $4(2) + 7(-1) = 1$ $\begin{cases} x = 2 \\ y = -1 \end{cases}$	$\begin{cases} 2x + y = 6 \\ x = 3y - 11 \end{cases}$ $\begin{array}{r} 2(3y - 11) + y = 6 \\ 6y - 22 + y = 6 \\ 7y - 22 = 6 \\ \quad \quad \quad +22 \quad +22 \\ \hline 7y = 28 \\ \quad \quad \quad \frac{7y}{7} = \frac{28}{7} \\ \hline \quad \quad \quad y = 4 \end{array}$ $\begin{array}{r} 2x + 4 = 6 \\ 2x = 2 \\ \hline x = 1 \end{array}$
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CONCEPT DEVELOPMENT:

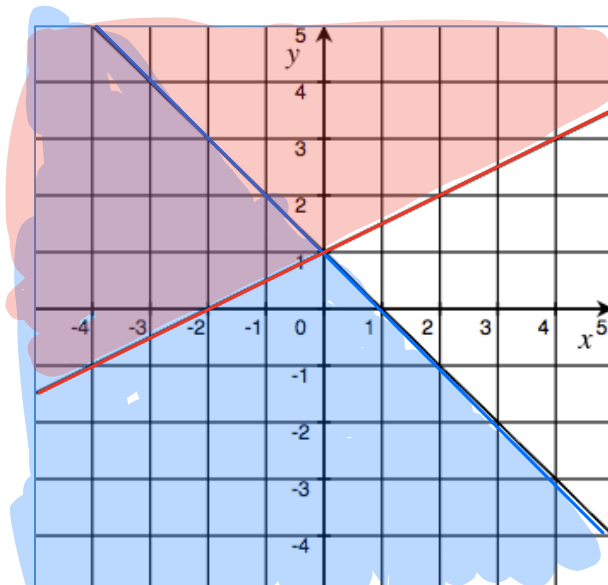
When we solve systems of linear equations, the solution is typically a point on a coordinate plane (unless there are no solutions or infinitely many solutions).

When we solve an inequality in 2 variables, remember that the solution is a half plane.

What do we think that the solution to a system of linear inequalities will look like?

Example: $\begin{cases} x + y \leq 1 \\ y \geq \frac{1}{2}x + 1 \end{cases}$

$$\leq -x + 1$$



GUIDED PRACTICE:

Steps for Solving Systems of Linear Inequalities

1. Read the question carefully.
2. Graph each linear inequality on the coordinate plane.
3. The solution is the overlapping shaded areas.

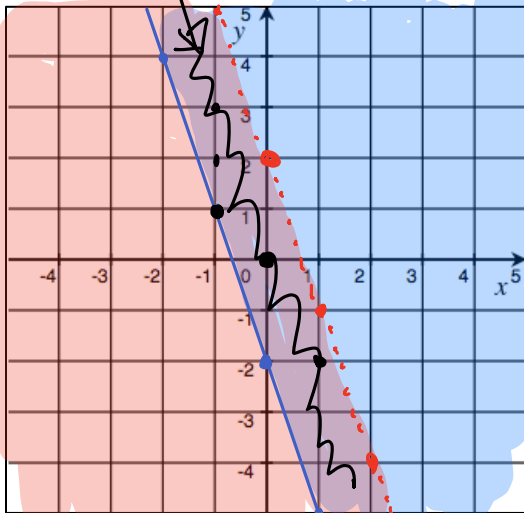
$\begin{cases} 3x + 2y > 4 \\ 2x + 3y \leq 3 \end{cases}$ <p style="color: red; font-size: 1.2em;"> $3x + 2y > 4$ $-3x \quad -3x$ $\frac{2y}{2} > \frac{x+4}{2}$ $y > -2 + 2$ </p> <p style="color: blue; font-size: 1.2em;"> $2x + 3y \leq 3$ $-2x \quad -2x$ $3y \leq \frac{-2x+3}{3}$ $y \leq -\frac{2}{3}x + 1$ </p>	$\begin{cases} 2x - y < 3 \\ 4x + 3y \geq 0 \end{cases}$ <p style="color: blue; font-size: 1.2em;"> $y > 2x - 3$ </p> <p style="color: red; font-size: 1.2em;"> $y \leq \frac{4}{3}x$ </p>

$$\begin{cases} 3x + y \geq -2 & \bullet \\ 3x + y < 2 & \bullet \end{cases}$$

$y = mx + b$

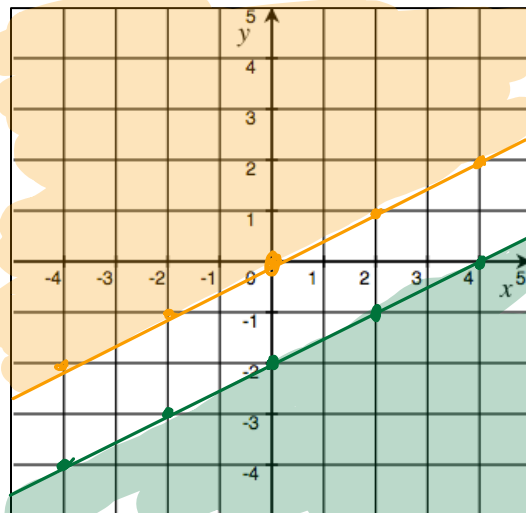
$$\begin{cases} 3x + y \geq -2 \\ -3x \quad -3x \\ y \geq -3x - 2 \end{cases}$$

$$\begin{cases} 3x + y < 2 \\ -3x \quad -3x \\ y < -3x + 2 \end{cases}$$



$$\begin{cases} x - 2y \geq 4 & \bullet \\ y \geq \frac{1}{2}x & \bullet \end{cases}$$

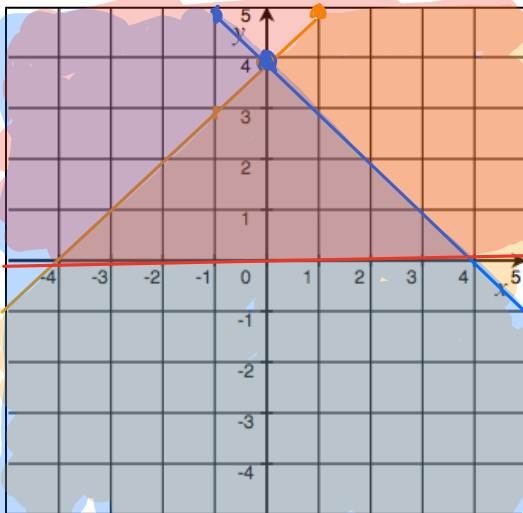
$$\begin{cases} x - 2y \geq 4 \\ -x \quad -x \\ -2y \geq -x + 4 \\ -2 \quad -2 \\ y \leq \frac{1}{2}x - 2 \end{cases}$$



No solution

$$\begin{cases} y \leq x + 4 & \text{orange} \\ x + y \leq 4 & \text{blue} \\ y \geq 0 & \text{red} \end{cases}$$

$$\begin{aligned} x + y &\leq 4 \\ y &\leq -x + 4 \end{aligned}$$

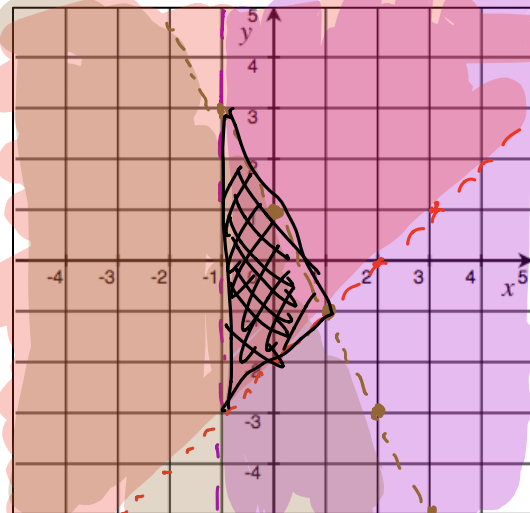


$$\begin{cases} x - y < 2 & \text{red} \\ x > -1 & \text{purple} \\ 2x + y < 1 & \text{brown} \end{cases}$$

$$\begin{aligned} x - y &< 2 \\ -x & \quad -x \end{aligned} \qquad y \leq -2x + 1$$

$$\begin{aligned} -y &< -x + 2 \\ \overline{-} & \quad \overline{-} \quad \overline{-} \end{aligned}$$

$$y > x - 2$$



A clothing manufacturer has 1,000 yards of cotton to make shirts and pajamas. A shirt requires 1 yard of fabric and a pair of pajamas require 2 yards of fabric. It takes 2 hours to make a shirt and 3 hours to make a pair of pajamas, and there are 1,800 hours available to make the clothing. Graph the inequality based on the constraints given above.

$P = \text{pajamas}$ $S = \text{shirts}$

$1s + 2p \leq 1000$ FABRIC

$2s + 3p \leq 1800$ TIME

$P \geq 0$ } whole #
 $S \geq 0$ }

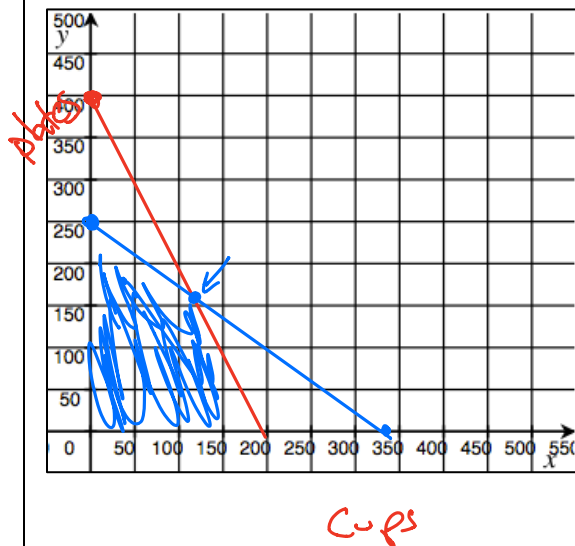


A potter is making cups and plates. It takes her 6 minutes to make a cup and 3 minutes to make a plate. Each cup uses $\frac{3}{4}$ pound of clay and each plate uses 1 pound of clay. She has 20 hours available to make the cups and plates, and has 250 pounds of clay. Graph the inequality based on the constraints given above.

$x = \text{cups}$ $y = \text{plates}$

$6x + 3y \leq 1200$

$\frac{3}{4}x + y \leq 250$



Name: _____

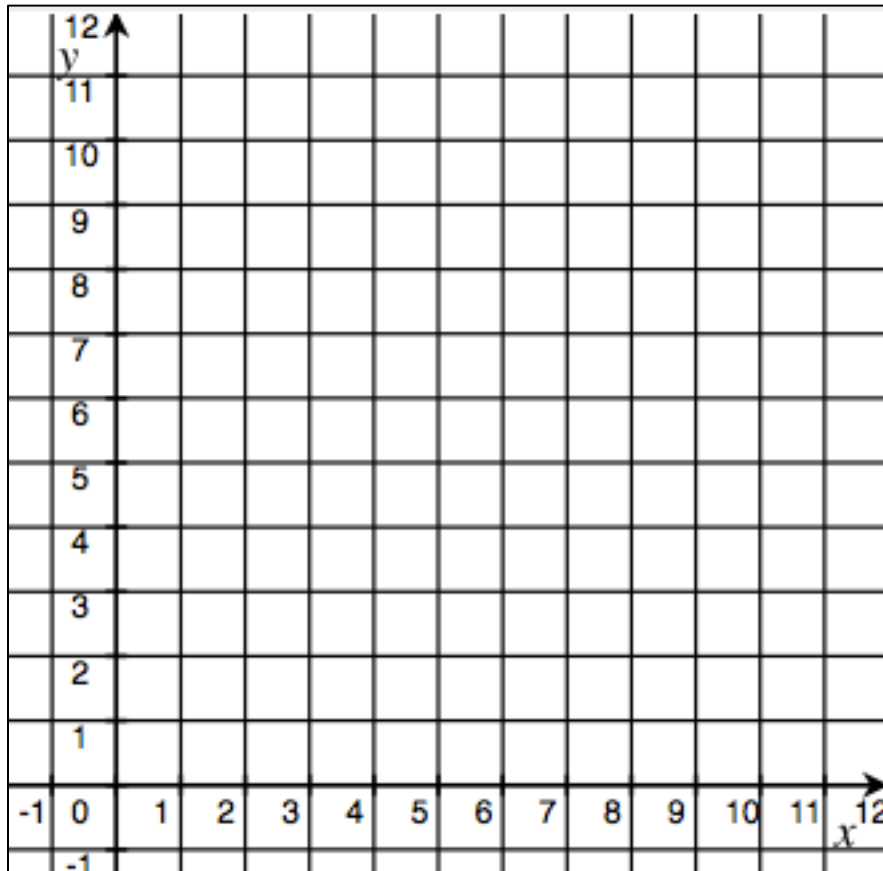
Math 7.2, Period _____

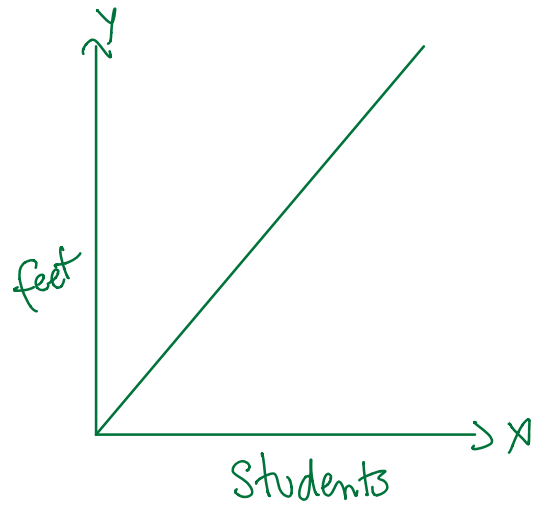
Mr. Rogove

Date: _____

CLOSURE:

Jason is buying wings and hot dogs for a party. One package of wings cost \$7.00. Hot dogs cost \$4 per pound. He **MUST** spend less than \$40.00. He also knows that he will be buying at least 5 points of hot dogs. Write and graph a system of inequalities and identify at least two solutions that would work within your constraints.





S	1	3	10	26
F	2	6	20	52

"k" = $\frac{y}{x}$
 → Every student has 2 feet.

S	3	4	8	9	26
F	6	7	11	12	29

$\frac{6}{3} = \frac{7}{4} = \frac{12}{9}$

$$k = \frac{y}{x}$$

$$y = kx + 3$$