Name: Key Date:

Unit 3 Lesson 12

L12 Graphing Systems of Linear Inequalities

Do Now: On the set of axes below, graph the following system of inequalities on the same coordinate plane.

$y < x + 4$

$m = \frac{1}{1}$

$b = 4$

$(0,4)$

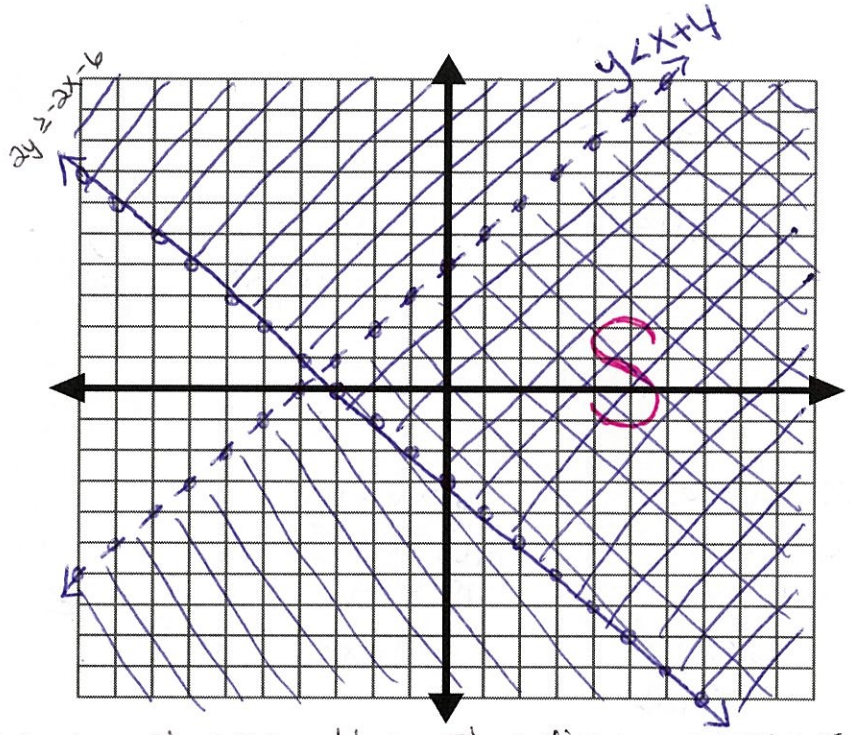
$\frac{2y}{2} \geq \frac{-2x}{2} - \frac{6}{2}$

$y \geq -x - 3$

$m = \frac{-1}{1}$

$b = -3$

$(0,-3)$



a) Label the solution set with the letter "S". → where the shading overlaps

b) State a solution that is in the Solution Set: (0,0)

c) Check

$y < x + 4$

$0 < 0 + 4$

$0 < 4$ ✓

True

Check

$2y \geq -2x - 6$

$2(0) \geq -2(0) - 6$

$0 \geq 0 - 6$

$0 \geq -6$ ✓

TRUE

Steps for Solving Systems of Linear Inequalities

1. Solve both inequalities for y
2. Graph, shade, and label the each inequality
3. Label the intersection of shading "S" (if there is no overlap—no solution)
4. Choose a point in the shaded region to check both equations!

1. On the set of axes below, solve the following system of inequalities graphically. State and check coordinates of a point that is in the solution set. (0,6)

$x - y < 0$

$-x \quad -x$

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

$y > x$

$m = \frac{1}{1}$

$b = 0$

$(0,0)$

$3y \geq x + 15$

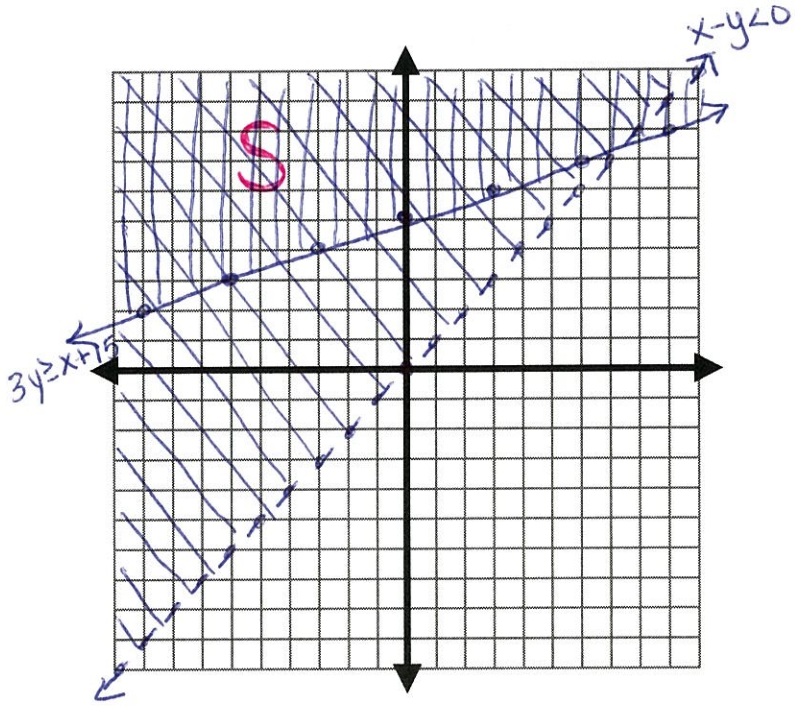
$\frac{3y}{3} \geq \frac{x}{3} + \frac{15}{3}$

$y \geq \frac{1x}{3} + 5$

$m = \frac{1}{3}$

$b = 5$

$(0,5)$



Check (0,6)

$x - y < 0$

$0 - 6 < 0$

$-6 < 0$ ✓

True

$3y \geq x + 15$

$3(6) \geq 0 + 15$

$18 \geq 15$ ✓

True

2. On the set of axes below, solve the following system of inequalities graphically.

a) State coordinates of a point in NOT in the solution set. (-5,10)

$y < 3$

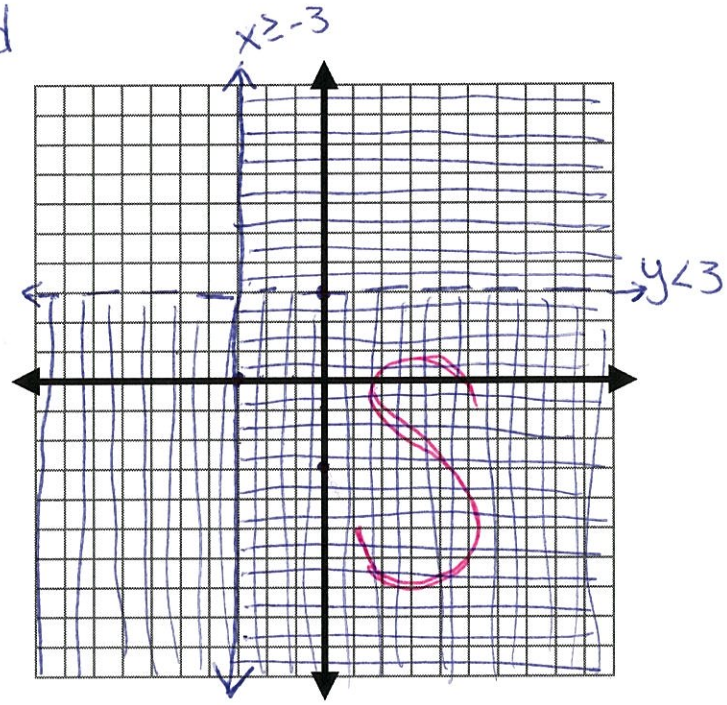
$m = \frac{0}{1}$

$b = 3$

$(0,3)$

$x \geq -3$

slope → undefined



Check (-5,10)

$y < 3$

$10 < 3$ ✗

~~True~~

False

$x \geq -3$

$-5 \geq -3$ ✗

false

b) Is (-3,-2) a solution? (yes)

c) Is (-3,3) a solution? (No)

d) (-5,0) No

3. **Error Analysis**: A student graphs the system below. Describe and correct the student's error. Then label the "new" solution set.

$y < -2$

$x \geq 1$

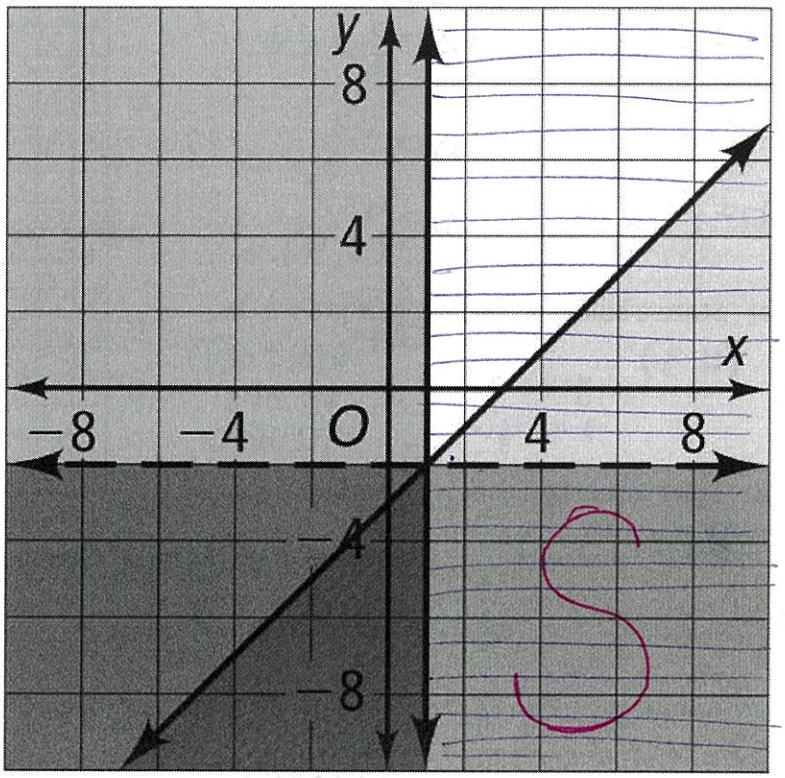
$x - y \geq 3$

$-x \quad -x$

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

$y \leq x - 3$

$x \geq 1 \rightarrow$ shading should be to the right



4. **Writing:** What is the difference between the solution of a system of linear inequalities and the solution of a system of linear equations? Explain.

The solution of a system of linear inequalities contains infinite (many) solutions. The solution of a system of linear equations is a single ordered pair, where the two lines meet.

Partner Practice:

3. On the set of axes below, solve the following system of inequalities graphically.

$6y \geq 3x$

$\frac{6y}{6} \geq \frac{3x}{6}$

$y \geq \frac{1}{2}x$

$m = \frac{1}{2}$

$b = 0$

$(0,0)$

$y - 4 < -\frac{2}{3}x$

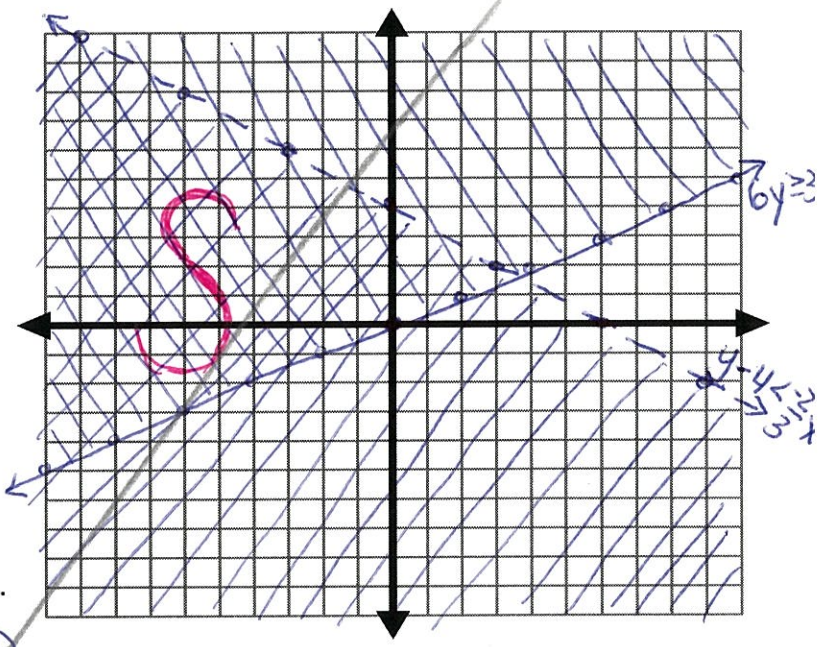
$+4 \quad +4$

$y < -\frac{2}{3}x + 4$

$m = \frac{-2}{3}$

$b = 4$

$(0,4)$



a. State a solution that is ONLY in $6y \geq 3x$.

verify $(4,3)$

$6(3) \geq 3(4)$

$18 \geq 12$

TRUE ✓

$y - 4 < -\frac{2}{3}x$

$3 - 4 < -\frac{2}{3}(4)$

$-1 < -2.\overline{6}$ ✗ false

b. State a solution that is ONLY in $y - 4 < -\frac{2}{3}x$.

$(3,0)$

verify

$0 - 4 < -\frac{2}{3}(3)$

$-4 < -2$ ✓

True

$6y \geq 3x$

$6(0) \geq 3(3)$

$0 \geq 9$ ✗

false

4. On the set of axes below, solve the following system of inequalities graphically.

a) State coordinates of a point that is in the solution set. $(1,-4)$

$-2y > -4x + 6$

$\frac{-2y}{-2} > \frac{-4x}{-2} + \frac{6}{-2}$

$y < 2x - 3$

$m = \frac{2}{1}$

$b = -3$

$(0,-3)$

$y + x \leq 0$

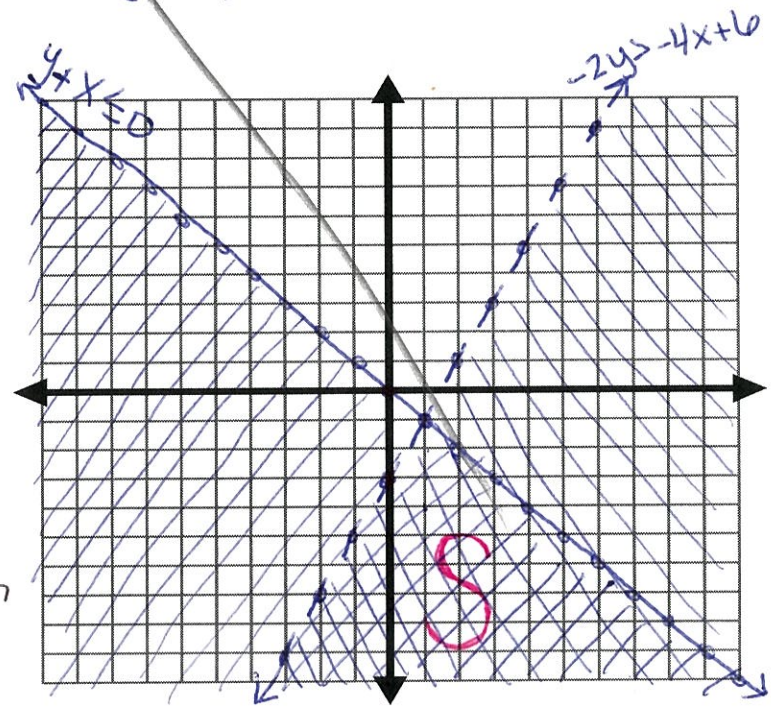
$-x \quad -x$

$y \leq -x$

$m = \frac{-1}{1}$

$b = 0$

$(0,0)$



b) Is $(1,-1)$ a solution? (No) Explain

it is not in the solution set + the point $(1,-1)$ is not included in $-2y > -4x + 6$

↓

not = to.