

# Solving Systems of Inequalities

Step 1: Rewrite each inequality in slope-intercept form.

Step 2: Graph the inequalities and find the intersection of their shaded regions.

Directions: Solve each system of inequalities by graphing.

1.  $y + 3x \geq 6$

$y < 2x - 4$

$$y + 3x \geq 6$$
$$\quad -3x \quad -3x$$

$$y \geq -3x + 6$$
$$m = \frac{-3}{1} \downarrow 3$$

$$b = (0, 6)$$

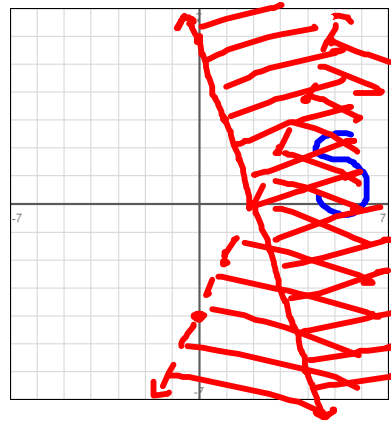
$\geq$  solid line  
shade above

$$y < 2x - 4$$

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

$$b = (0, -4)$$

$<$  dashed line  
shade below



2.  $2x + y \leq 6$

$x + y - 2 > 0$

$2x + y \leq 6$   
 $-2x \quad -2x$   
 $y \leq -2x + 6$

$m = \frac{-2}{1} \downarrow 2$   
 $\quad \quad \quad \rightarrow 1$

$b = (0, 6)$

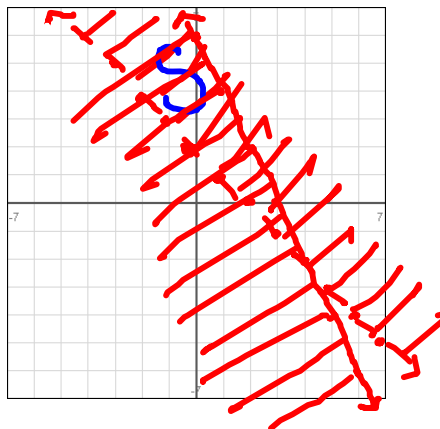
$x + y - 2 > 0$   
 $\rightarrow x \quad +2 \quad -x + 2$

$y > -x + 2$

$m = \frac{-1}{1} \downarrow 1$   
 $\quad \quad \quad \rightarrow 1$

$b = (0, 2)$

$\leq$  solid line       $>$  dashed line  
shade below      shade above



3.  $x < 2$

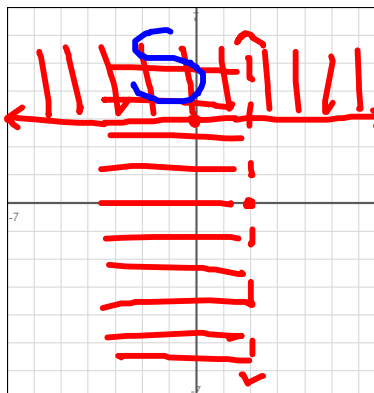
$y \geq 3$

$x < 2$   
vertical

$y \geq 3$   
horizontal

dashed line  
shade left

solid line  
shade above



4.  $y \geq x$   
 $y \leq x - 4$

$y \geq x$

$m = \frac{1}{1} \uparrow 1$   
 $\downarrow 1 \rightarrow 1$

$b = (0, 0)$

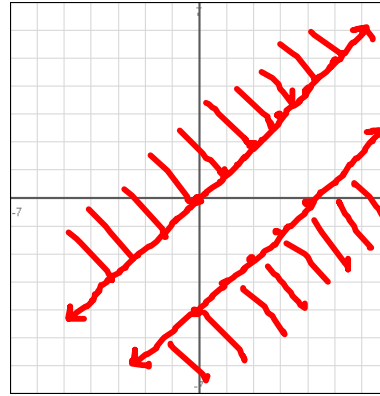
$\geq$  solid line  
 shade above

$y \leq x - 4$

$m = \frac{1}{1} \uparrow 1$   
 $\downarrow 1 \rightarrow 1$

$b = (0, -4)$

$\leq$  solid line  
 shade below



NO SOLUTION

5.  $2x - \frac{1}{4}y \leq 1$   
 $4x + 8y \geq 4$

~~$2x - \frac{1}{4}y \leq 1$~~   
 ~~$-2x$~~       ~~$-2x$~~

~~$-\frac{1}{4}y \leq -2x + 1 - 4$~~

$y \geq 8x - 4$

$m = \frac{8}{1} \uparrow 8$   
 $\downarrow 1 \rightarrow 1$

$b = (0, -4)$

$\geq$  solid line  
 shade above

$4x + 8y \geq 4$   
 ~~$-4x$~~       ~~$-4x$~~

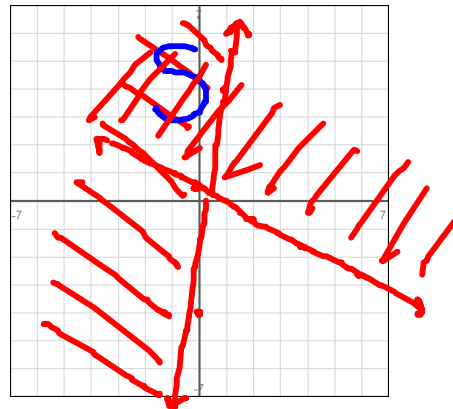
$\frac{8y}{8} \geq \frac{-4x + 4}{8}$

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

$m = -\frac{1}{2} \uparrow 1$   
 $\downarrow 2 \rightarrow 2$

$b = (0, \frac{1}{2})$

$\geq$  solid line  
 shade above



Directions: Determine if the given point is a solution to the system of inequalities.

6. <sup>x y</sup> (3, -2) ←

$$y \leq 4x + 1$$
$$2x - 3y > 20$$

$$y \leq 4x + 1$$
$$-2 \leq 4(3) + 1$$
$$-2 \leq 13$$

True

$$2x - 3y > 20$$
$$2(3) - 3(-2) > 20$$
$$6 + 6 > 20$$
$$12 > 20$$

False

(3, -2) is not a solution

7. <sup>x y</sup> (-1, 4)

$$3x - y < 7$$
$$y + 2 \geq x$$

$$3x - y < 7$$
$$3(-1) - 4 < 7$$
$$-3 - 4 < 7$$
$$-7 < 7$$

True

$$y + 2 \geq x$$
$$4 + 2 \geq -1$$
$$6 \geq -1$$

True

(-1, 4) is a solution