

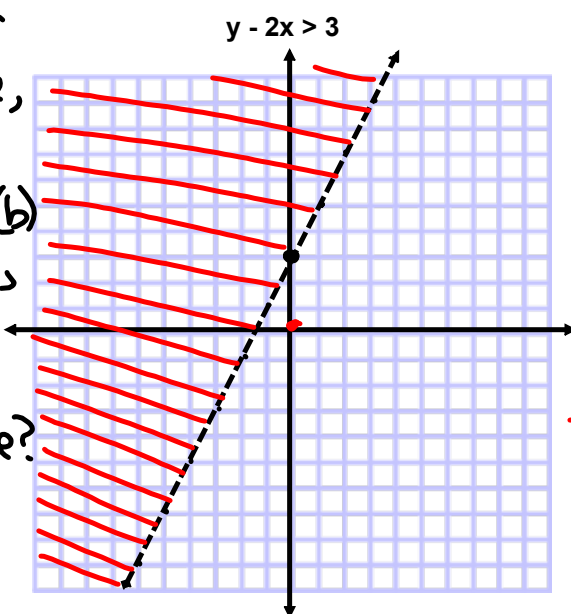
On the sheet of graph paper, graph the linear inequality

① equation of boundary line, solved for y.

② find y-int. (b) and slope (m), plot points.

③ solid or dashed line?
 $< >$ = dashed
 $\leq \geq$ = solid

④ shading:
 Test a point in your inequality.
 $(0,0)$
 usually works.



$$\begin{array}{r} y - 2x = 3 \\ \downarrow + 2x \quad | + 2x \\ \hline y = 2x + 3 \end{array}$$

$$b = 3$$

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

$>$ dashed

Test $(0,0)$ in
 $y - 2x > 3$
 $0 - 2(0) > 3$
 $0 - 0 > 3$
 $0 > 3$ NO

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SYSTEMS OF LINEAR INEQUALITIES

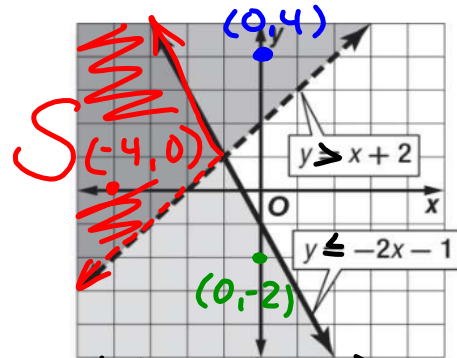
The solution of a **system of inequalities** is the set of all ordered pairs that satisfy both inequalities.
If you graph the inequalities in the same coordinate plane, the solution is the region where the graphs **overlap**.

Example 1: Solve the system of inequalities by graphing.

$$\begin{aligned} y &> x + 2 \\ y &\leq -2x - 1 \end{aligned}$$

- Identify a solution to $y > x + 2$
- Identify a solution to $y \leq -2x - 1$
- Identify a solution to the system:
 $y > x + 2$ and $y \leq -2x - 1$

$$\begin{aligned} (0, 4) \\ (0, -2) \\ (-4, 0) \end{aligned}$$



Test (0, 4):

$$\begin{aligned} y &> x + 2 & y &\leq -2x - 1 \\ 4 &> 0 + 2 & 4 &\leq -2(0) - 1 \\ 4 &> 2 & 4 &\leq 0 - 1 \\ \text{yes} & & 4 &\leq -1 \\ & & \text{no} & \end{aligned}$$

Test (0, -2):

$$\begin{aligned} y &> x + 2 & y &\leq -2x - 1 \\ -2 &> 0 + 2 & -2 &\leq -2(0) - 1 \\ -2 &> 2 & -2 &\leq 0 - 1 \\ \text{no} & & -2 &\leq -1 \\ & & \text{yes} & \end{aligned}$$

Test (-4, 0):

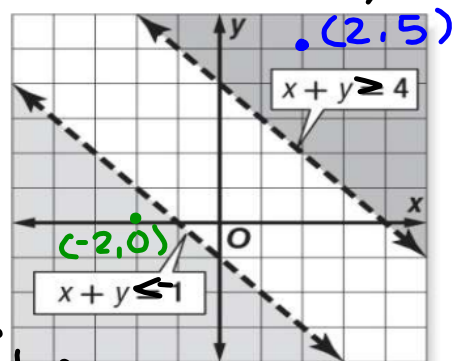
$$\begin{aligned} y &> x + 2 & y &\leq -2x - 1 \\ 0 &> -4 + 2 & 0 &\leq -2(-4) - 1 \\ 0 &> -2 & 0 &\leq 8 - 1 \\ \text{yes} & & 0 &\leq 7 \\ & & \text{yes} & \end{aligned}$$

Example 2: Solve the system of inequalities by graphing.

$$\begin{aligned} x + y &> 4 \\ x + y &< -1 \end{aligned}$$

- Identify a solution to $x + y > 4$
- Identify a solution to $x + y < -1$
- Identify a solution to the system:
 $x + y > 4$ and $x + y < -1$

$$\begin{aligned} (2, 5) \\ (-2, 0) \end{aligned}$$



no solution
because the solution areas
(shaded areas) don't overlap.

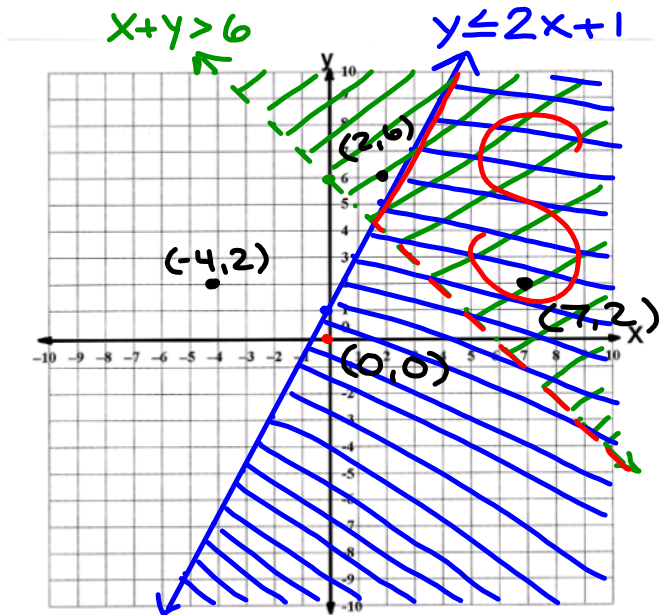
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Example 3: Consider the following system: $x + y > 6$ and $y \leq 2x + 1$.

Graph the solution set to the inequality $x + y > 6$ and the solution set to $y \leq 2x + 1$ on the same set of coordinate axes. Highlight the points that lie in BOTH solution sets by labelling the solution area **S**.

$$\begin{array}{r} x+y>6 \\ x+y=6 \\ -x \downarrow -x \\ \hline y=-1x+6 \\ b=6 \\ m=-\frac{1}{1} \downarrow \frac{1}{1} \\ > \text{dashed} \\ \text{Test } (0,0) \\ \text{in } x+y>6: \\ 0+0>6 \\ 0>6 \\ \text{no} \end{array}$$

$$\begin{array}{r} y \leq 2x+1 \\ y=2x+1 \\ b=1 \\ m=\frac{2}{1} \uparrow \frac{2}{1} \\ \leq \text{solid} \\ \text{Test } (0,0) \\ \text{in } y \leq 2x+1: \\ 0 \leq 2(0)+1 \\ 0 \leq 0+1 \\ 0 \leq 1 \\ \text{yes} \end{array}$$



$(-4, 2)$	$(2, 6)$	$(7, 2)$
$x+y>6$ $-4+2>6$ $-2>6$ NO $y \leq 2x+1$ $2 \leq 2(-4)+1$ $2 \leq -8+1$ $2 \leq -7$ NO	$x+y>6$ $2+6>6$ $8>6$ YES $y \leq 2x+1$ $6 \leq 2(2)+1$ $6 \leq 4+1$ $6 \leq 5$ NO	$x+y>6$ $7+2>6$ $9>6$ YES $y \leq 2x+1$ $2 \leq 2(7)+1$ $2 \leq 14+1$ $2 \leq 15$ YES $(7, 2)$ is a solution to the system.