Essential Question: How do we graph systems of linear inequalities?

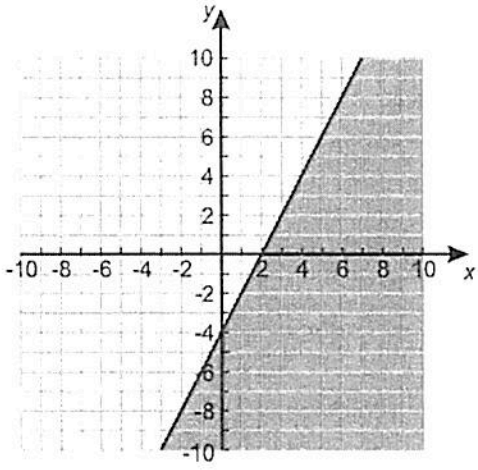
Do Now:

Which inequality represents the graph shown here?

(1) $y < 2x - 4$
(2) $y > 2x - 4$
(3) $y \geq 2x - 4$
(4) $y \leq 2x - 4$

solid line $\leq$ or $\geq$
shade below $\leq$

(4)



Systems of Linear Inequalities

Suppose two or more inequalities were graphed on the same set of axes. Where would the points that satisfy all the inequalities be located? What is the possible number of solutions to a system of linear inequalities?

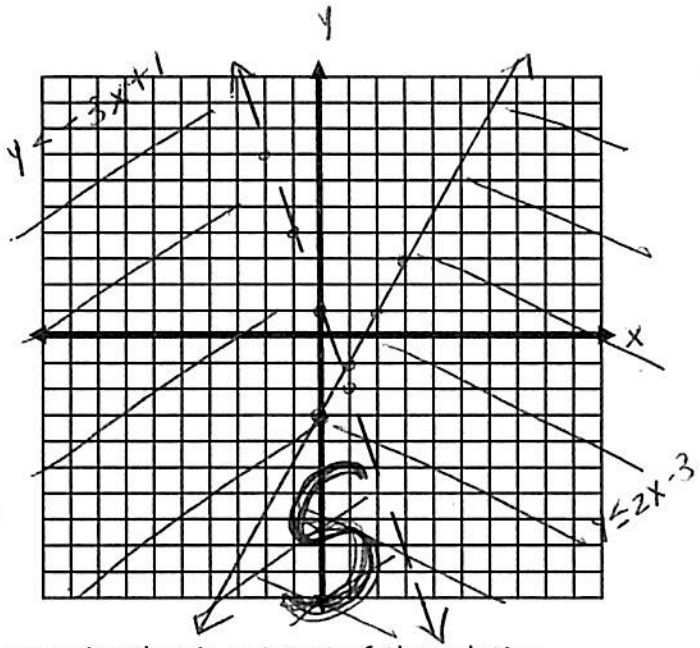
Let's Investigate...

1) Solve the following system of inequalities graphically. Mark the solution area with a capital S.

$y \leq 2x - 3$ $\quad$ $y < -3x + 1$

$m = 2$ $\quad$ $m = -3$

$b = -3$ $\quad$ $b = 1$



[works for both inequalities]

State one point that is part of the solution set. State one point that is *not* part of the solution set.

(1, -5)

$y \leq 2x - 3$ $\quad$ $y < -3x + 1$

$-5 \leq 2(1) - 3$ $\quad$ $-5 < -3(1) + 1$

$-5 \leq -1$ ✓ $\quad$ $-5 < -2$ ✓

(0, 0)

does not work for both

$y \leq 2x - 3$ $\quad$ $y < -3x + 1$

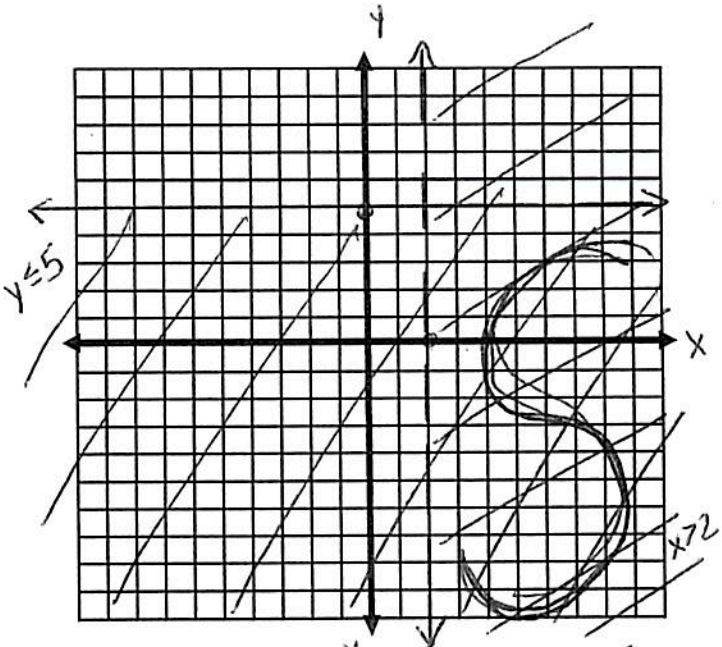
$0 \leq 2(0) - 3$ $\quad$ $0 < -3(0) + 1$

$0 \leq -3$ X $\quad$ $0 < 1$ ✓

2) Solve the following system of inequalities graphically. State a point in the solution set.

$x > 2$ $\quad$ $y \leq 5$

(5, -2) is a point in the solution set



3) Solve the following system graphically. Is (1, 4) a solution to the system?

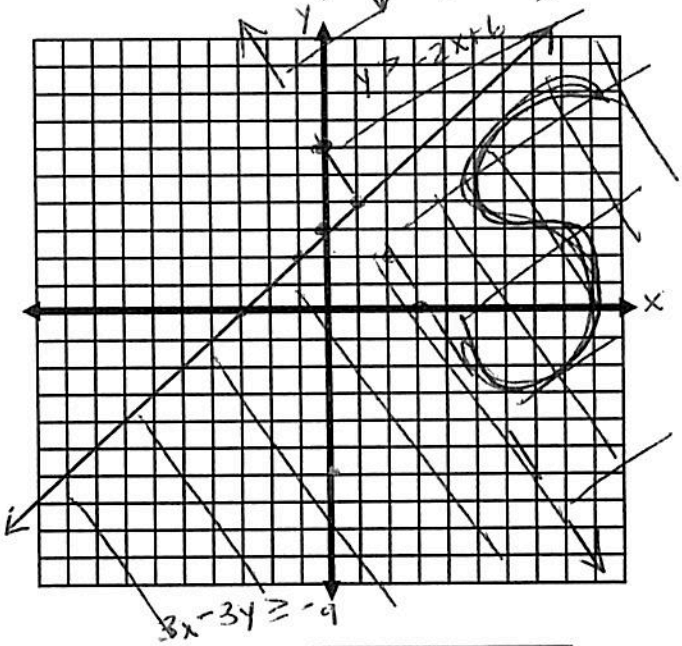
$y > -2x + 6$ $\quad$ $3x - 3y \geq -9$

$m = -2$ $\quad$ $-3y \geq -3x - 9$

$b = 6$ $\quad$ $y \leq x + 3$

$m = 1$

$b = 3$



(1,4) is not a solution to the system

it is on the dashed boundary line, which does not include points

Graphing Inequalities on the Graphing Calculator

Example: **Graph $y \geq 2x + 1$**

- Enter $2x + 1$ into Y_1
- Arrow to the far left side of Y_1
- Press ENTER until the "shade above" symbol is displayed.
- If necessary, press ZOOM #6:ZStandard (for a 10x10 window)
- Graph

NOTE: ***You*** will have to determine whether to draw a solid line or a dotted line. The calculator will display a solid line at ***all*** times.

TAKE AWAY

A **solution** to a system of linear inequalities is a point (ordered pair) that makes both inequalities true. The solution set is the area where the linear inequalities overlap on the graph.