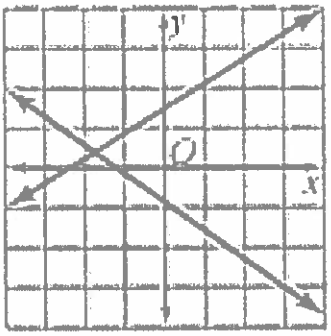
Name _____ Date _____

Graphing Systems of Equations and Inequalities

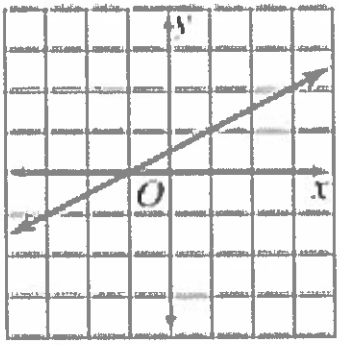
There are three situations in which 2 lines can interact on a graph:

Independent



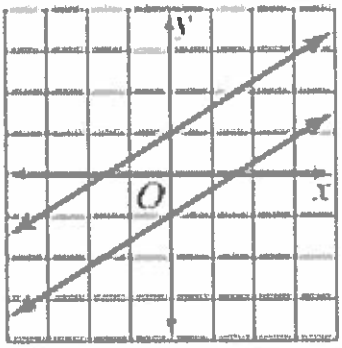
Slopes: diff.
Y-Intercepts: same or diff.
* 1 solution

Dependent



Slopes: same
Y-Intercepts: same
* Infinite solutions

Inconsistent



Slopes: same
Y-Intercepts: diff
* No solution

Example 1... **Without graphing, determine if each system is *independent, dependent,* or *inconsistent*.**

a. $\begin{cases} 3x + y = 5 \\ 15x + 5y = 2 \end{cases}$

$3x+y=5$
$-3x \quad -3x$
$y=-3x+5$

Slope: same
y-int: diff.

Inconsistent

$15x+5y=2$
$-15x \quad -15x$
$\frac{5y}{5}=\frac{-15x}{5}+\frac{2}{5}$
$y=-3x+\frac{2}{5}$

b. $\begin{cases} y = 2x + 3 \\ -4x + 2y = 6 \end{cases}$

$y=2x+3$

Slope: same
y-int: same

Dependent

$-4x+2y=6$
$+4x \quad +4x$
$\frac{2y}{2}=\frac{4x}{2}+\frac{6}{2}$
$y=2x+3$

One way to solve a system of equations is by graphing both lines, then finding the point where they intersect. Look at the following examples:

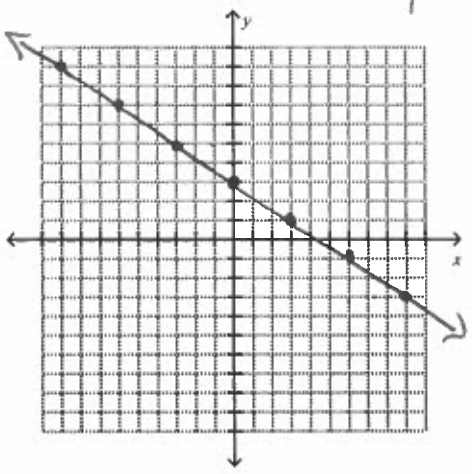
Example 2... Graph the equations:

a. $2x + 3y = 9$

$-2x \quad -2x$

$\frac{3y}{3} = \frac{-2x}{3} + \frac{9}{3}$

$y = -\frac{2}{3}x + 3$

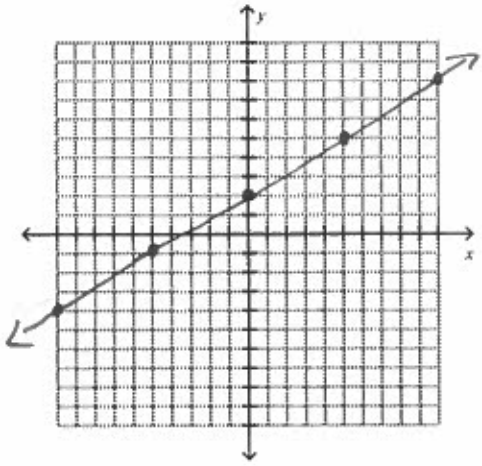


b. $-3x + 5y = 10$

$+3x \quad +3x$

$\frac{5y}{5} = \frac{3x}{5} + \frac{10}{5}$

$y = \frac{3}{5}x + 2$

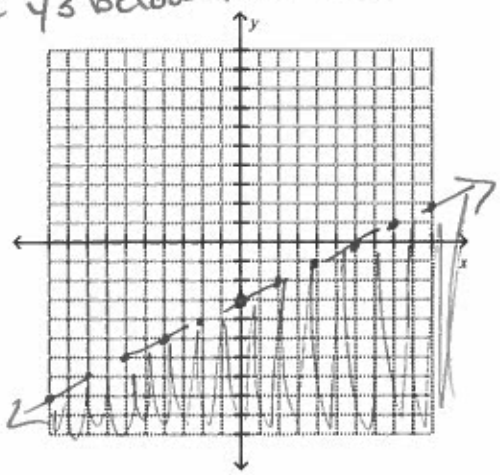


Example 3... Graph the inequalities:

$<, >$ dashed line $\quad \leq, \geq$ solid line

a. $y < \frac{1}{2}x - 3$

shade y's below the line

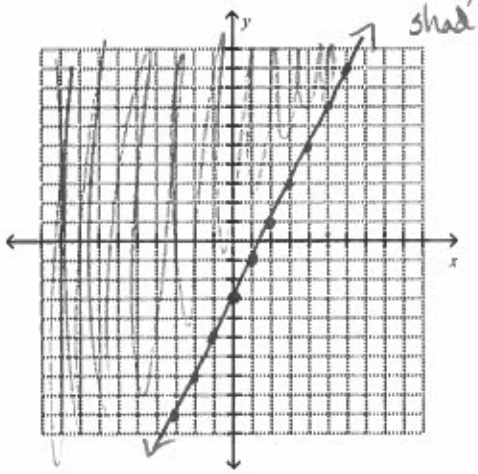


b. $-2y \leq -4x + 6$

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

$y \geq 2x - 3$

shade y's above the line



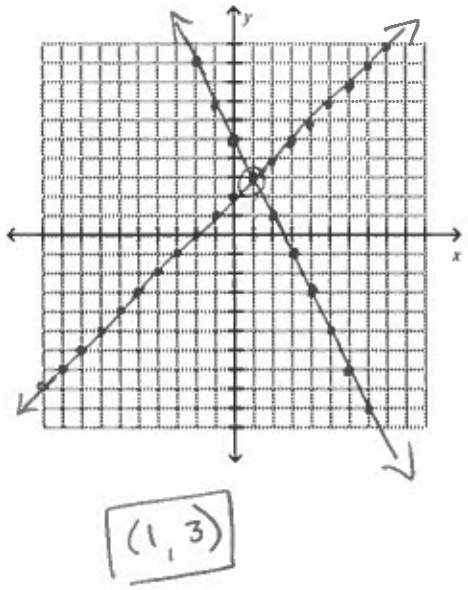
Example 4... Solve each system of equations by graphing.

= identify where the line intersect (cross)

a. $2x + y = 5$
$-x + y = 2$

$2x+y=5$ $-2x$ $-2x$ → $y=-2x+5$

$-x+y=2$ $+x$ $+x$ → $y=x+2$

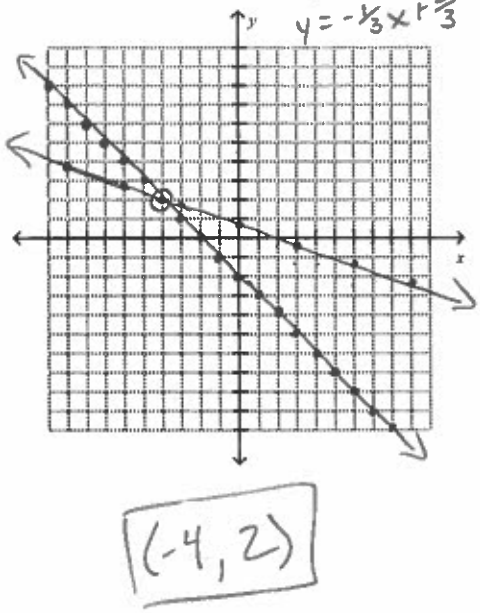


$(1, 3)$

b. $x + 3y = 2$
$3x + 3y = -6$

$x+3y=2$ $-x$ $-x$ → $\frac{3y}{3}=\frac{-x}{3}+\frac{2}{3}$ → $y=-\frac{1}{3}x+\frac{2}{3}$

$3x+3y=-6$ $-3x$ $-3x$ → $\frac{3y}{3}=\frac{-3x}{3}-\frac{6}{3}$ → $y=-x-2$



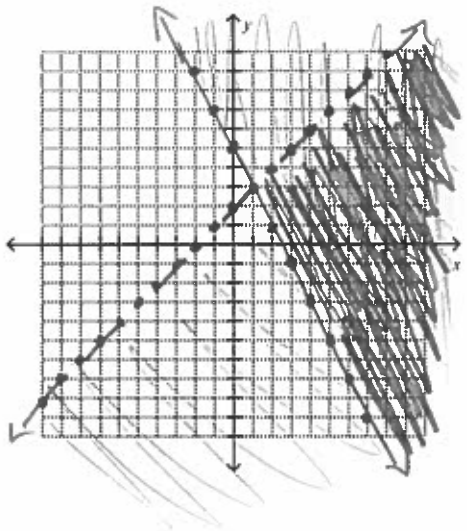
$(-4, 2)$

Example 5... Solve each system of inequalities by graphing.

a. $2x + y \geq 5$
$-x + y < 2$

$2x+y \geq 5$ $-2x$ $-2x$ → $y \geq -2x+5$

$-x+y<2$ $+x$ $+x$ → $y<x+2$



b. $x + 3y > 2$
$3x + 3y \leq -6$

$x+3y>2$ $-x$ $-x$ → $\frac{3y}{3}>\frac{-x}{3}+\frac{2}{3}$ → $y>-\frac{1}{3}x+\frac{2}{3}$

$3x+3y\leq -6$ $-3x$ $-3x$ → $\frac{3y}{3}\leq\frac{-3x}{3}-\frac{6}{3}$ → $y\leq -x-2$