Solving Linear Systems of Equations by Graphing

Consider the equations: $y = x + 1$ and $x + 2y = 8$

What (x,y) point satisfies both equations?

System of Linear Equations

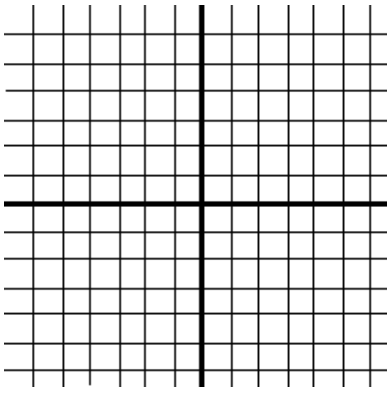
Two or more linear equations involving the same variables form a system of linear equations. A solution of this system is any ordered pair that satisfies *both* equations – called a solution set of the system.

There are three ways to find the solution: (1) by graphing, (2) by substitution, and (3) by elimination.

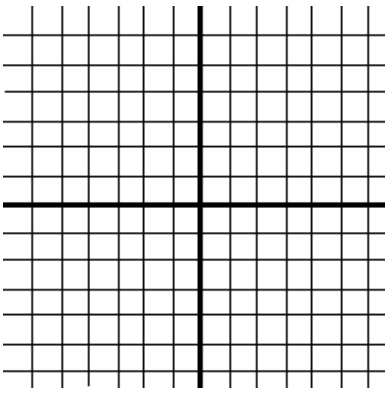
Graphs of Systems of Linear Equations – three possibilities

1. The *graphs intersect in a single point*. The solution is the point of intersection. This system is called consistent and **independent**.
   Solution: { (1, 3) }
2. The *graphs are parallel lines*. There is no solution and the system is called **inconsistent**.
   Solution: $\varnothing$
3. The *graph is the same line*. Any solution of one equation is a solution of the other equation. The system is called **dependent**.
   Solution: { (x,y) | x-2y=4 }

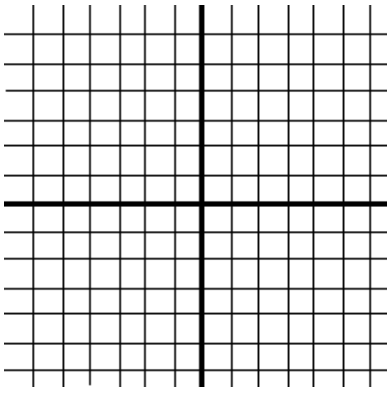
Graph: $y = x + 2$
$x + y = 4$



Graph: $2x – 3y = 6$
$3y – 2x = 3$

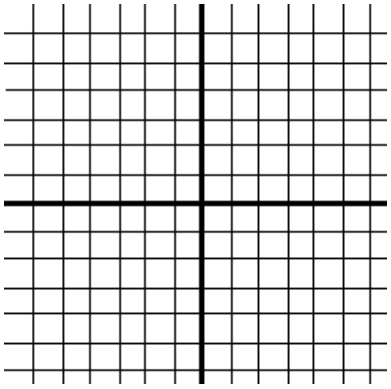


Graph: $2 (y + 2) = x$
$x – 2y = 4$



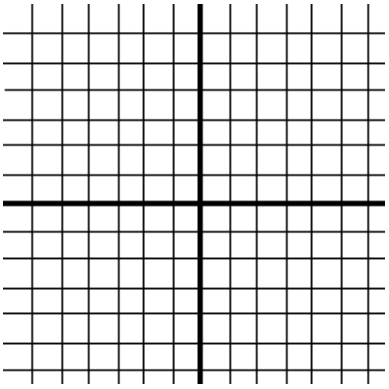
Solve by graphing:

$y = x - 3$
$y = -x + 1$



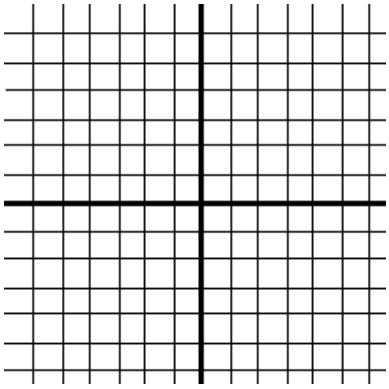
Solve by graphing:

$y = 2x + 1$
$x + y = -2$



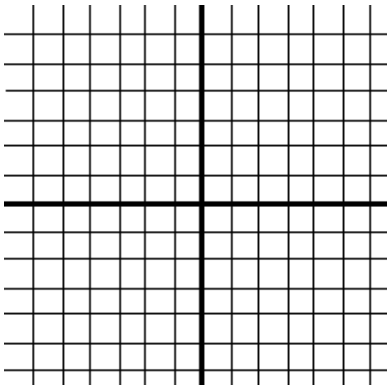
Solve by graphing:

$y = -3x$
$x + y = 2$



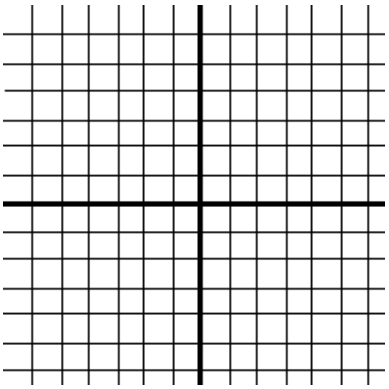
Solve by graphing:

$3y - 3x = 9$
$x - y = 1$



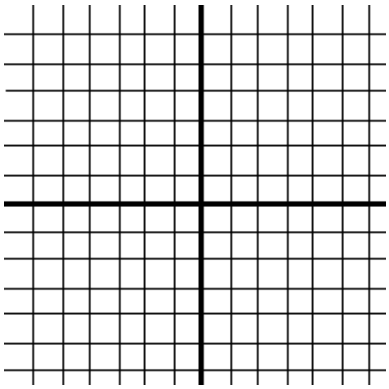
Solve by graphing:

$2x - 3y = 6$
$y = 2/3\ x - 2$



Solve by graphing:

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



What would be one of the difficulties of using the graphing method?