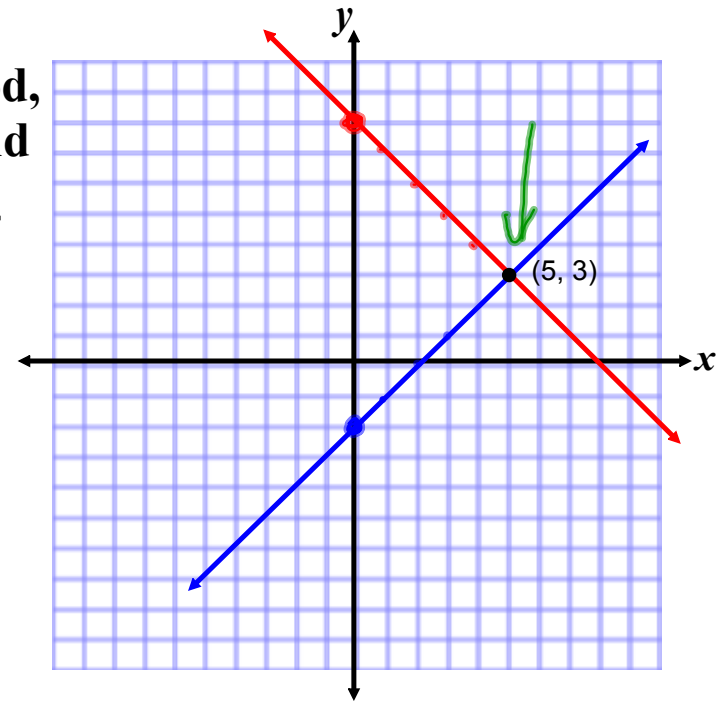
Solving Systems of Equations

There are 3 ways to solve a system of equations. The first method we will examine is the Graphing Method.

To use the Graphing Method, you graph each equation and find the *point of intersection* between the two lines.

Ex. 1 Find the point of intersection of:

- $y = -x + 8$
- $y = x - 2$



④ • $y = x - 3$

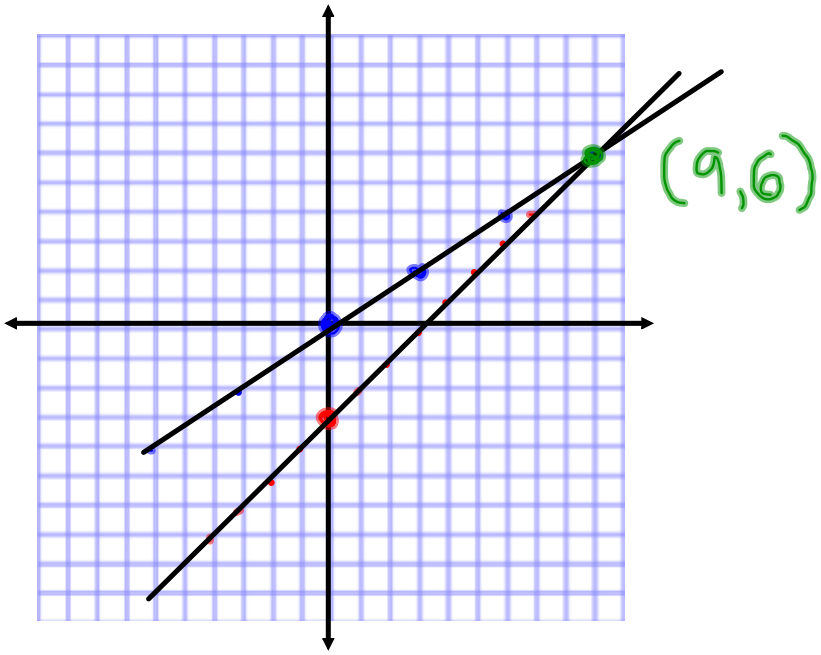
y int = b = -3

slope = m = $\frac{1}{1}$

• $y = \frac{2}{3}x$

y int = b = 0

slope = m = $\frac{2}{3}$



Solving Systems of Equations by the Substitution and Elimination Methods

Using the graphing method you sometimes can only estimate the solution.

There are more exact ways of solving a system of 2 equations with 2 variables. One way is the substitution method.

Substitution Steps

1. **Pick one of the equations.**
2. **Rearrange the equation in terms of the other variable...**
   x = ? OR y = ?
3. **Substitute the expression for y (or x) into the second equation.**
4. **Solve for x (or y).**
5. **Once you find the value of x (or y) substitute the value back into the original equation to solve for the remaining variable.**

Substitution:

⑩ $2x-2y+1=0$

$x+y+1=0$

$x+y+1=0$

$y=-x-1$

$2x-2(-x-1)+1=0$

$2x+2x+2+1=0$

$4x+3=0$

$4x=-3$

$x=\frac{-3}{4}$

$y=-x-1$

$y=-\left(\frac{-3}{4}\right)-1$

$y=\frac{3}{4}-\frac{4}{4}$

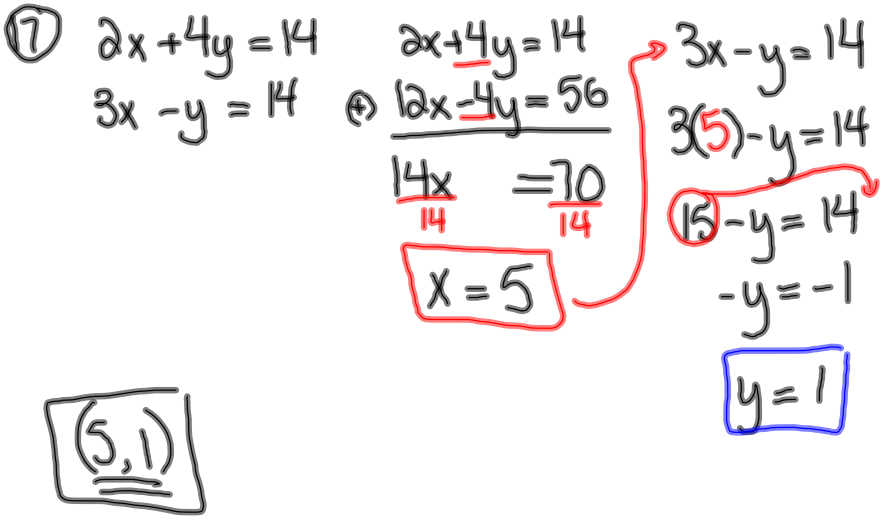
$y=\frac{-1}{4}$

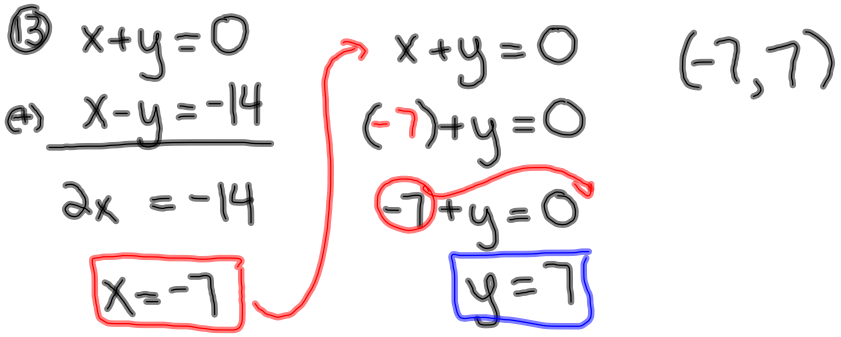
$\left(\frac{-3}{4},\frac{-1}{4}\right)$

Another way is the substitution method.

Elimination Steps

1. Identify the variable you want to eliminate.
2. Make the number in front of the variables the same.
3. Add or subtract the two equations to eliminate the variable.
4. Solve for the remaining variable.
5. Substitute that value back into one of the original equations to solve for the final variable.





Let's Try One...

$y = -2x + 1$

$y = x - 5$

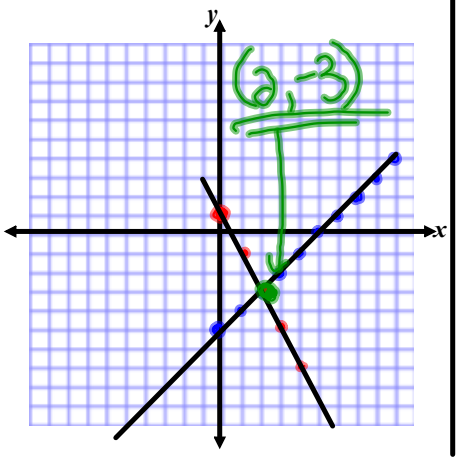
Graphing

$y = -2x + 1$ •

$m = -2 \quad b = 1$

$y = x - 5$ •

$m = 1 \quad b = -5$



Substitution

$y = -2x + 1$

$y = x - 5$

$x - 5 = -2x + 1$

$x + 2x = 1 + 5$

$3x = 6$

$\boxed{x = 2}$

$y = x - 5$

$y = (2) - 5$

$\boxed{y = -3}$

$(2, -3)$

Elimination

$y = -2x + 1$

$y = x - 5$

or

$2x + y = 1$

$(-) \quad -x + y = -5$

$3x = 6$

$\boxed{x = 2}$

$y = x - 5$

$y = (2) - 5$

$\boxed{y = -3}$

$(2, -3)$

Attachments

Systems of Equations.pdf