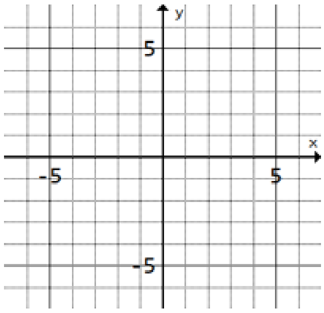
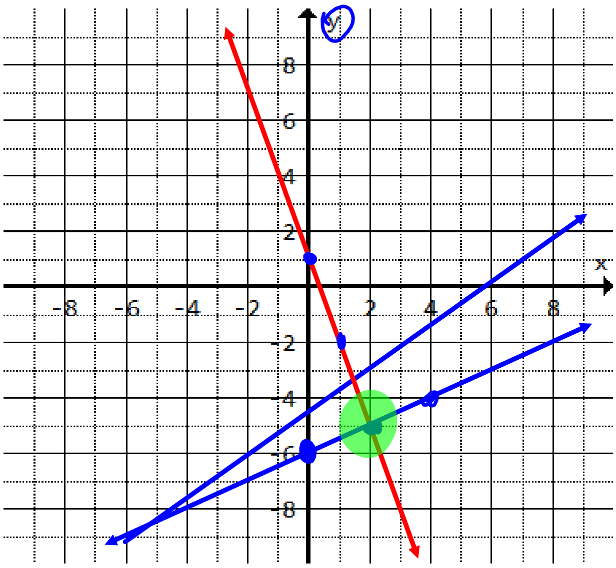
AA1a-2NOTES

Solving a linear system of equations means to find the ___one set___ of x and y values that satisfy both equations.

Graphing: The solution to a system of equations on a graph is the ___point of intersection___.



$$\begin{cases} y = \frac{1}{2}x - 6 \\ y = -3x + 1 \end{cases}$$



$y = \frac{1}{2}x - 6$

slope

y-int. (0, -6)

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

(0, 1)

$\boxed{(2, -5)}$

Equal Values Method: Best to use when x= and x= OR y= and y=.

- Step 1: Set the two equations equal to each other and solve for x or y.
- Step 2: Then substitute back in to find the other variable.

Example: $\begin{cases} y = 9x - 4 \\ y = 6x + 17 \end{cases}$

The solution is (7,59).

(7,)

$9x - 4 = 6x + 17$

$-6x \quad -6x$

$3x - 4 = 17$

$+4 \quad +4$

$\frac{3x}{3} = \frac{21}{3}$

$x = 7$

$y = 9x - 4$

$y = 9(7) - 4$

$y = 63 - 4$

$y = 59$

Substitution Method: Best to use when only one x= or y =.

- Substitute the expression from the y= or x= equation into the other equation and solve
- Then substitute back to find the other variable

Example: $\begin{cases} y = 8x + 10 \\ -4x - 3y = -16 \end{cases}$

$-4x - 3(8x + 10) = -16$

$-4x - 24x - 30 = -16$

$-28x - 30 = -16$

$+30 \quad +30$

$\frac{-28x}{-28} = \frac{14}{-28}$

$x = -\frac{1}{2}$

$y = 8x + 10$

$y = 8(-\frac{1}{2}) + 10$

$y = -4 + 10$

$y = 6$

The solution is $(-\frac{1}{2}, 6)$.

$(-\frac{1}{2}, \quad)$

Elimination Method: Best to use when none of the above are present.

- Step 1: Make sure the equations line up all variables and equal signs.
- Step 2: Multiply one or both equations by any number, so that the x terms or y terms are exact opposites.
- Step 3: Add the equations, to eliminate one variable. Solve for the other variable.
- Step 4: Then substitute back to find the other variable.

Example: $\begin{cases} -2x + 3y = 9 \\ 8x - 7y = 19 \end{cases}$ $\xrightarrow{\cdot 4}$

$-8x + 12y = 36$
$8x - 7y = 19$

$5y = 55$
$\frac{5y}{5} = \frac{55}{5}$
$y = 11$

The solution is (12, 11)

$-2x + 3y = 9$
$-2x + 3(11) = 9$
$-2x + 33 = 9$
$\quad -33 \quad -33$
$\frac{-2x}{-2} = \frac{-24}{-2}$

$x = 12$