3.2 Part 1 Substitution Method

Yesterday we used the graphing method.
This method is not always effective because the solutions are not always integers
(for example, you may have a fraction answer...
and it's hard to "see" those on the graph!).

Today we are using the substitution method .
This method is BEST to use when
one of the variables in either equation
has a coefficient of 1 or -1 .

SUBSTITUTION METHOD

STEPS

1. Solve one equation for one variable (choose the variable with no numerical coefficient).

2. Plug that equation into the other equation.

3. Solve for the remaining variable.

4. Plug that number answer into one of the equations to solve for the other variable.

$-3x + y = -13$
$2x + 2y = -10$

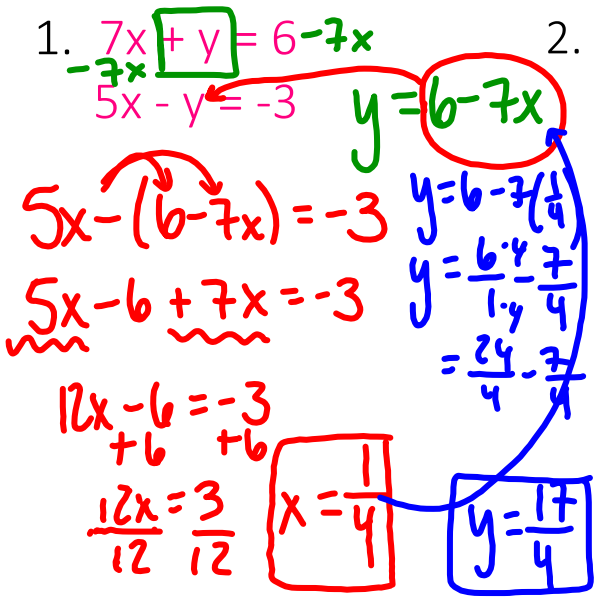
$-3x + y = -13$
$+3x \quad +3x$
$y = -13 + 3x$

$2x + 2(-13 + 3x) = -10$
$2x + -26 + 6x = -10$
$8x - 26 = -10$
$+26 \quad +26$
$\frac{8x}{8} = \frac{16}{8}$
$x = 2$

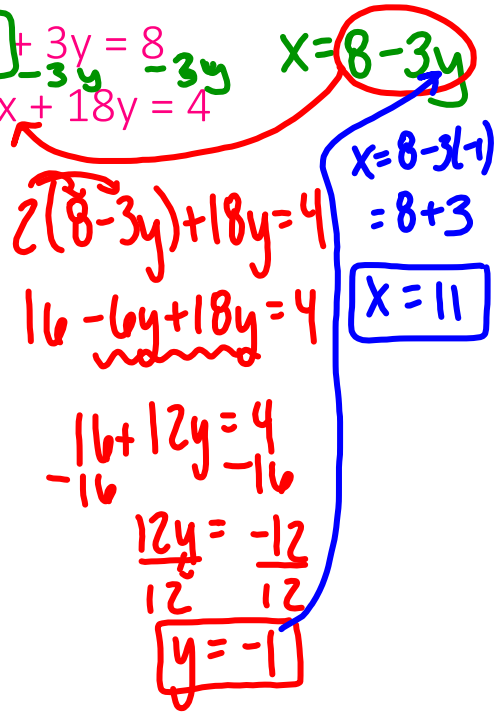
$y = -13 + 3x$
$= -13 + 3(2) = -13 + 6$
$y = -7$

Use substitution to solve the systems. Check your solution.

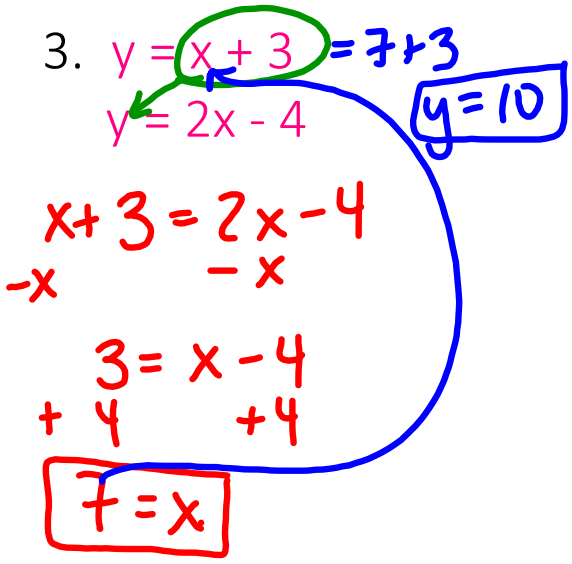
1. $7x + y = 6$
   $5x - y = -3$



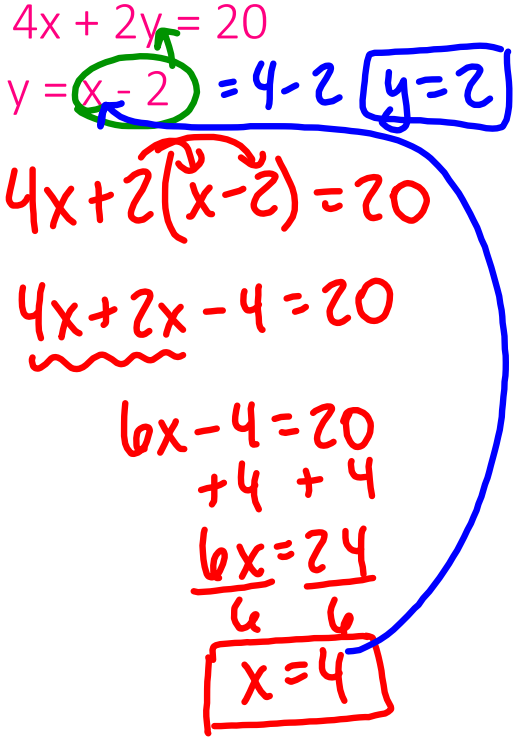
2. $x + 3y = 8$
   $2x + 18y = 4$



3. $y = x + 3$
   $y = 2x - 4$



4. $4x + 2y = 20$
   $y = x - 2$



5. $x + y + z = 5 \Rightarrow x+y+z=5 \Rightarrow x+y=3$

$2x - 3y + z = -2 \Rightarrow 2x-3y+z=-2 \Rightarrow 2x-3y=-4$

$\frac{4z}{4} = \frac{8}{4}$ $\boxed{z=2}$

$x+y=3$

$-y \quad -y$

$x=3-y$

$x=3-2$

$\boxed{x=1}$

$2x-3y=-4$

$2(3-y)-3y=-4$

$6-2y-3y=-4$

$6-5y=-4$

$-6 \quad -6$

$\frac{-5y}{-5} = \frac{-10}{-5}$

$\boxed{y=2}$

6. $x - y - z = -4 \Rightarrow x-y-(-4)=-4 \Rightarrow x-y+4=-4 \Rightarrow x-y=-8$

$5x + 2y - 3z = 7 \Rightarrow 5x+2y-3(-4)=7$

$5x+2y+12=7 \Rightarrow 5x+2y=-5$

$\frac{6z}{6} = \frac{-24}{6}$

$\boxed{z=-4}$

$x-y=-8$

$+y \quad +y$

$x=-8+y$

$x=-8+5$

$\boxed{x=-3}$

$5x+2y=-5$

$5(-8+y)+2y=-5$

$-40+5y+2y=-5$

$-40+7y=-5$

$+40 \quad +40$

$\frac{7y}{7} = \frac{35}{7}$

$\boxed{y=5}$