Algebra I

Lesson 6.2 – Solving Systems by Substitution

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OK, so we can solve a system of equations by graphing. Sometimes that may be a little difficult especially if the y-intercept is a fraction or the solution is not an integer ordered pair. There is an algebraic method called **substitution.**

Vocabulary

Substitution – a method by which one equation is solved for a variable. The resulting expression is then substituted into the remaining equation.

Think: When your teacher is absent, you get a replacement teacher called a **substitute.**

When you don't want to use sugar, you can replace the sugar with NutraSweet or Splenda – AKA sugar **Substitutes!!**

Solve by substitution

$\begin{cases} x + 4y = 6 \\ x + y = 3 \end{cases}$

$x + 4y - 4y = 6 - 4y$

$x = 6 - 4y$ ***substitute*** $6 - 4y$ ***for your*** x ***variable***

$x + y = 3$

$(6 - 4y) + y = 3$

$6 - 3y - 6 = 3 - 6$

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

$y = 1$

$x + 4y = 6$

$x + 4(1) = 6$

$x + 4 - 4 = 6 - 4$

$x = 2$

Answer: $(2,1)$

1. Solve for one variable in one equation (it may not be needed if an equation is already solved for one variable.

2. Replace the new value for your variable into the other equation for your variable. Here,

3. Solve the equation to get the value of the first variable.

4. Substitute That value into one of the original equation and solve.

5. Write the values from Steps 3 and 4 as an ordered pair (x, y) and check.

Solve by substitution

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

$\begin{cases} 2x + y = -4 \\ x + y = -7 \end{cases}$

$\begin{cases} x = 2y - 4 \\ x + 8y = 16 \end{cases}$

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