We will learn another way to turn two equations with two unknowns into one equation with one unknown.

Elementary Algebra
Class Notes
Algebraically Solving Systems of Linear Equations by Addition (section 11.3)

Consider our dilemma. We are given two equations but we can't solve either for x because that darn y is in the way. If only we had just one equation with just one variable. Then we could solve it like we are used to. We saw one method to do this in the previous section. Now we see a second method called the Addition or Elimination Method.

expl 1: Solve the system by addition.

$$3x + 2y = 2$$
$$5x - 2y = 14$$

Add the left sides, add the right sides, and set them equal.

Notice by adding the equations, we eliminated one of the variables. We were then able to solve for the other variable. Did you substitute the value you got for x into one of the original equations to find y? Remember the solution is an ordered pair in the form (x, y).

expl 2: Solve the system by addition.

$$x - y = 1$$
$$-x + 2y = 0$$

expl 3: Solve the system by addition.

$x + 4y = 14$

$5x + 3y = 2$

Adding now will not eliminate a variable. So what must we do first?

How could we change one of the equations so that x will be eliminated when we add?

expl 4: Solve the system by addition.

$2x + 3y = 4$

$3x - 4y = 23$

It's probably easiest to change both equations.

expl 5: Solve the system by addition.

$9x - 3y = 12$

$12x - 4y = 18$

What is the solution?

expl 6: Solve the system by addition.

$-2.5x - 6.5y = 47$

$.5x - 4.5y = 37$

Multiply by 10 first if you do not like decimals.

expl 7: Solve the system by addition.

$$\frac{x+5}{2}=\frac{y+14}{4}$$
$$\frac{x}{3}=\frac{2y+2}{6}$$

Get rid of those fractions first by multiplying by the LCDs.