Algebra,

Been there – Done that

Systems of Equations

Linear Combination

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Algebra, Been there –Done that is a newsletter that links algebra to previously learned concepts and skills or outside experiences

The big picture in solving equations is to rewrite the equations in the form $ax + b = c$, then use the Order of Operations in reverse using the inverse operation to isolate the variable.

To solve the following system: $2x + y = 5$
$4x - 2y = -2$

Linear Combination –

1. Make one of the coefficients on one of the variables the same in both equations by multiplying
2. Add the two equations together
3. Solve the resulting equation
4. Substitute that value into the easiest equation
5. Write the answer as an ordered pair

I have two equations and two unknowns, clearly that is not an equation in the form $ax + b = c$. However, if I use the Properties of Real Numbers, I could rewrite/convert those two equations into one equation in the $ax + b = c$ format.

To do that, I will use the Properties of Real Numbers. If I multiplied the top equation, $2x + y = 5$ by 2, I notice that will make the coefficients of y the same but opposite in sign. Then I could add that equivalent equation to the second equation resulting in a single equation in the $ax + b = c$ format. That would allow me to solve that resulting using the Order of Operations in reverse using inverse operations to isolate the variable. Then, since my answer is a point, an ordered pair, I would need to substitute that value into the **easiest** equation to find the value of my other variable.

Let's look at this:

1.	$2x + y = 5$ $4x - 2y = -2$	Given
2.	$2x + y = 5 \rightarrow 4x + 2y = 10$ $4x - 2y = -2 \quad 4x - 2y = -2$	Mult Prop of equality
3.	$4x + 2y = 10$ $\underline{4x - 2y = -2}$ $8x \quad = 8$	Add Prop of Equality
4.	$x = 1$	Div Prop of Equality
5.	$2(1) + y = 5$	Substitution
6.	$y = 3$	Subtract Prop of Equality

The answer is (1, 3). That is the only point that will satisfy (make both equations true) that system of equations – the point where the two lines intersect.

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