Math Virtual Learning

Algebra 1 S1

Solving a system of linear equations by Elimination

April 22, 2020

Algebra I S1

Lesson: April 22, 2020

Objective/Learning Target:

Students will find the solution to a system of linear equations by using the elimination method.

BELL RINGER

Solve using Substitution:

$$x = -2y$$
$$3x + 4y = -8$$

BELL RINGER-SOLUTION

Solve each system by substitution.

Ex) $\begin{cases} x = -2y \\ 3x + 4y = -8 \end{cases}$

Step 1

The variable x is already by itself.

Step 2

$3x + 4y = -8$

$3(-2y) + 4y = -8$

$-6y + 4y = -8$

$-2y = -8$

$\frac{-2y}{-2} = \frac{-8}{-2}$

$y = 4$

Step 3

$x = -2y$

$x = -2(4)$

$x = -8$

$(-8, 4)$

Step 4

$x = -2y$

$(-8) = -2(4)$

$-8 = -8$ ✓

$3x + 4y = -8$

$3(-8) + 4(4) = -8$

$-24 + 16 = -8$

$-8 = -8$ ✓

Elimination Method

Solving a system of equations by elimination using multiplication.

Step 1: Put the equations in Standard Form.	Standard Form: Ax + By = C
Step 2: Determine which variable to eliminate.	Look for variables that have the same coefficient.
Step 3: Multiply the equations and solve.	Solve for the variable.
Step 4: Plug back in to find the other variable.	Substitute the value of the variable into the equation.
Step 5: Check your solution.	Substitute your ordered pair into BOTH equations.

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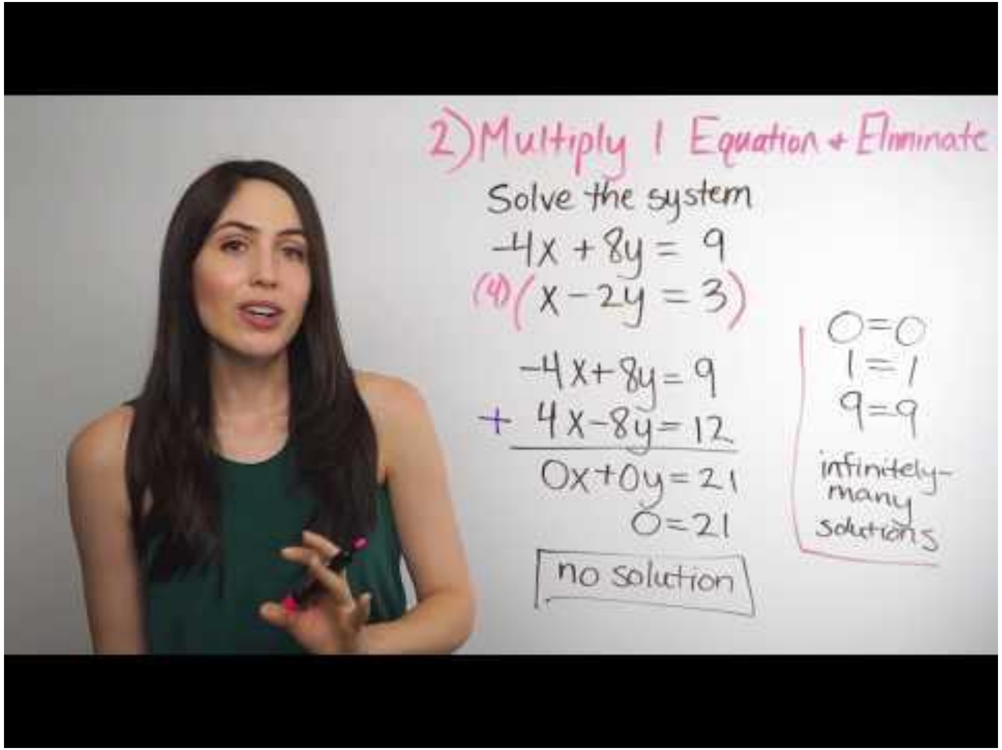

More Examples

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Example 1:

$2x + 6y = 10$

$3x - 6y = 0$

1) This step is not needed as the coefficients of y are already opposites.

2) $2x + 6y = 10$ Add the two equations together

$+ \underline{3x - 6y = \ \ 0}$

$5x \quad = 10$

3) $5x = 10$ Solve the resulting equation

$x = 2$

4) $2(2) + 6y = 10$ Substitute the known value into one of the equations

$4 + 6y = 10$ Simplify

$6y = 6$ Solve

$y = 1$ Solve

5) (2, 1) Write the solution as an ordered pair

More Examples

Example 2 |

$$2x + 3y = 20$$
$$-2x + y = 4$$

See how these guys are the same, but with a different sign?

$$
\begin{array}{r}
2x + 3y = 20 \\
+\quad -2x + y = 4 \\
\hline
0 + 4y = 24 \\
4y = 24 \\
y = 6
\end{array}
$$

We've got one of them... Now, we just need to get the x. To do this, you can stick the y into either of the original equations...

The second equation is easier:

$y = 6$

$$-2x + y = 4$$
$$-2x + 6 = 4$$
$$-2x = -2$$
$$x = 1$$

It looks like the answer is (1, 6).

But, check out the y guys:

$$3x - 4y = -5$$
$$5x - 2y = -6$$

If we could make this a +4y, the y's would drop out...

So, let's do it! Remember that we can multiply an equation by a number...

So, let's multiply the second equation by a -2:

More Examples

$$3x - 4y = -5$$
$$-2(5x - 2y = -6)$$

Remind student to multiply each one!!!

$$\begin{aligned} 3x - 4y &= -5 \\ \rightarrow -10x + 4y &= 12 \quad + \\ \hline -7x + 0 &= 7 \\ -7x &= 7 \\ x &= -1 \end{aligned}$$

Now, stick the x guy into either of the original equations. I'm going to go for the first one:

$x = -1$

$$\begin{aligned} 3x - 4y &= -5 \\ 3(-1) - 4y &= -5 \\ -3 - 4y &= -5 \\ -4y &= -2 \\ y &= \tfrac{1}{2} \end{aligned}$$

Answer is: (-1, ½)

Click the link.

Complete the practice problems from the first page on a sheet of paper.

You can check your answers on the second page.

PRACTICE