

[8.3: SOLVING SYSTEMS BY ELIMINATION] 1

Write your questions here!

We have learned how to solve linear systems by graphing and substitution. Now we will learn how to solve the linear systems by using a method called .

Steps for Solving Linear Systems by Elimination

- Step 1 • Make sure that all of the variables and the equal sign are "lined up."
- Step 2 • Decide which coefficients you want to cancel out. To cancel out, they must be opposites. You might have to multiple the equations first!
- Step 3 • Add the two equations and solve new equation. (One variable should cancel out!)
- Step 4 • Take your answer to Step 3 and substitute it into either of the original equations.
- Step 5 • Write your solution as a coordinate point or as a pair of values.

Example 1: Solve the linear system using elimination:

$$3x - 4y = 10$$

$$5x + 4y = 6$$

Step 1: Do you have x over x, y over y and equal sign over equal sign? Yup!

Continue on....

Step 2: The y's are already opposites. Our work here is done.

Step 3: Add the two equations. Solve the resulting equation.

Step 4: Take the answer from **Step 3** and plug it into either of the original equations and solve for the other unknown variable.

Step 5: Write your solution as a coordinate point or as a pair of values.

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Write your questions here!

More Examples:

$$\begin{aligned} 2. \quad & 2x - y = 12 \\ & -2x - 3y = -12 \end{aligned}$$

$$\begin{aligned} 3. \quad & x + 2y = 4 \\ & -6x + 2y = -10 \end{aligned}$$

$$\begin{aligned} 4. \quad & 4x - 3y = 8 \\ & 2x - 2y = 0 \end{aligned}$$

$$\begin{aligned} 5. \quad & 9x + 2y = 39 \\ & 6x + 13y = -9 \end{aligned}$$

Now, summarize
your notes here!

Practice 8.3 Systems of Equations (Elimination)

Show all of your work!

Solve each system by elimination.

$$\begin{aligned} 1) \quad & -4x - 4y = 8 \\ & -x + 4y = 12 \end{aligned}$$

$$\begin{aligned} 2) \quad & 3x + 2y = -3 \\ & -3x + y = 12 \end{aligned}$$

$$\begin{aligned} 3) \quad & x - 2y = -9 \\ & -4x - 2y = -4 \end{aligned}$$

$$\begin{aligned} 4) \quad & -2x + y = 4 \\ & -2x + 2y = 0 \end{aligned}$$

$$\begin{aligned} 5) \quad & -4x - y = 8 \\ & -12x + 3y = -24 \end{aligned}$$

$$\begin{aligned} 6) \quad & -x + 4y = -1 \\ & -2x - 8y = 14 \end{aligned}$$

$$\begin{aligned} 7) \quad & -6x + 3y = 3 \\ & 5x - 8y = -8 \end{aligned}$$

$$\begin{aligned} 8) \quad & 4x - 3y = -16 \\ & 5x + 2y = 3 \end{aligned}$$

$$\begin{aligned} 9) \quad & 3x + 2y = 10 \\ & 4x + 5y = 18 \end{aligned}$$

$$\begin{aligned} 10) \quad & -5x - 6y = -3 \\ & 2x + 4y = 6 \end{aligned}$$

11) Is the point $(0, 0)$ a solution of the system of linear equations below?

$$\begin{aligned} 2x + y &= 2 \\ 4x - 2y &= 2 \end{aligned}$$

12) Is the point $(\frac{5}{4}, 7)$ a solution of the system of linear equations below?

$$\begin{aligned} 4x + y &= 12 \\ -4x + 3y &= 16 \end{aligned}$$

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Application and Extension

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

1. Solve the following system of equations using elimination.

2. You have just enough coins to pay for a loaf of bread priced at \$1.95. You know you have a total of 12 coins, with only quarters and dimes. Let Q = the number of quarters and D = the number of dimes. Complete:

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = 12 \quad \text{Representing the number of coins.}$$

$$0.10\underline{\hspace{2cm}} + 0.25\underline{\hspace{2cm}} = \$1.95 \quad \text{Representing the value of the coins.}$$

Now, solve the linear system using elimination.

(Hint: Multiply the second equation by -10 !)

3. The table shows the number of apples needed to make apple pies and applesauce sold at a farm store. During a recent picking at the farm, 169 Granny Smith apples and 95 Red Delicious apples were picked. Write and solve a system to determine how many apple pies and how many batches of applesauce can be made if every apple is used. *(Hint: read across each row to create your equations!)*

Type of Apple	# Needed for π (Pie)	# Needed for Sauce	Total
Granny Smith	5	4	169
Red Delicious	3	2	95

Coming Up: Evaluate each expression if $a = 4$, $b = -2$, $c = 10$, $x = -3$ and $y = -5$.

1. $(3abc)^2$

2. $3abc^2$

3. $3a^2b^2c^2$

Quick Review: Find the equation of the line that passes through the given points.

1. $(-2, -2); (4, 4)$

2. $(-2, 2); (4, -4)$

3. $(2, 3); (0, 3)$