Using The Elimination Method How Do I Find X And Y For The Following Problem:4x-7y=134x + 7y = -29

Using The Elimination Method How Do I Find X And Y For The Following Problem:4x-7y=134x + 7y = -29

Solving systems of equations is a fundamental skill in algebra that allows us to find the values of unknown variables that satisfy multiple equations simultaneously. Among the various methods available, the elimination method is particularly effective when the coefficients of one of the variables are opposites or can be made opposites, facilitating their elimination from the system. In this article, we'll explore how to apply the elimination method step-by-step to solve the system:

$$
\begin{cases}
4x - 7y = 13 \\
4x + 7y = -29
\end{cases}
$$

By understanding each stage of this process, you'll be equipped to handle similar problems confidently and efficiently.

Understanding the Elimination Method

The elimination method involves adding or subtracting equations to eliminate one variable, making it possible to solve for the remaining variable directly. Once one variable is found, it can be substituted back into either original equation to find the other.

Key Points of the Elimination Method:
- Align the equations for easy addition or subtraction.
- Manipulate coefficients if necessary, to create matching or opposite coefficients for one variable.
- Add or subtract equations to eliminate one variable.
- Solve for the remaining variable.
- Back-substitute to find the eliminated variable's value.

Step-by-Step Guide to Solve the System Using the

Elimination Method

Let's walk through solving the system:

$$
\begin{cases}
4x - 7y = 13 \quad \text{(Equation 1)} \\
4x + 7y = -29 \quad \text{(Equation 2)}
\end{cases}
$$

Step 1: Observe the System

Notice that the coefficients of x in both equations are the same (both are 4). The coefficients for y are opposites: -7 and $+7$. This setup is ideal for the elimination method because adding the two equations will eliminate y.

Step 2: Add the Equations

Adding Equation 1 and Equation 2:

$$
(4x - 7y) + (4x + 7y) = 13 + (-29)
$$

Simplify:

$$
4x + 4x + (-7y + 7y) = -16
$$

$$
8x + 0 = -16
$$

$$
8x = -16
$$

Step 3: Solve for x

Divide both sides by 8:

$$
x = \frac{-16}{8} = -2
$$

Now, we have the value of x:

$$
```
```

$$
x = -2
$$

Finding the Value of y

With x known, substitute this value into one of the original equations to solve for y.

Step 4: Substitute $x = -2$ into Equation 1

Equation 1:

$$
4x - 7y = 13
$$

Substitute:

$$
4(-2) - 7y = 13
$$

Simplify:

$$
-8 - 7y = 13
$$

Add 8 to both sides:

$$
-7y = 13 + 8
$$

$$
-7y = 21
$$

Divide both sides by -7:

$$
y = \frac{21}{-7} = -3
$$

Step 5: Final Solution

The solution to the system is:

$$
\boxed{
x = -2, \quad y = -3
}
$$

This means that the point $(-2, -3)$ satisfies both equations.

Verifying the Solution

Always verify your solutions by plugging them back into the original equations:

- Equation 1:

$$
4(-2) - 7(-3) = -8 + 21 = 13 \quad \checkmark
$$

- Equation 2:

$$
4(-2) + 7(-3) = -8 - 21 = -29 \quad \checkmark
$$

Both equations are satisfied, confirming the correctness of the solution.

Additional Tips for Using the Elimination Method Effectively

Tips to Simplify the Process:
- Choose equations with coefficients that are easy to manipulate for elimination.
- Multiply equations if necessary to create matching or oppositely signed coefficients.
- Always check your solutions by substituting back into the original equations.
- Be cautious with signs during addition or subtraction to avoid errors.

Common Mistakes to Avoid:
- Forgetting to multiply equations to align coefficients.
- Mixing signs when combining equations.
- Forgetting to verify the solutions.

Applications of the Elimination Method in Real Life

The elimination method isn't just useful in algebra homework; it has practical applications in various fields:

- Engineering: Solving systems of equations to analyze circuits or mechanical systems.
- Economics: Finding equilibrium points where supply and demand curves intersect.
- Computer Graphics: Calculating intersections of lines and shapes.
- Physics: Solving for unknown forces or velocities in systems of equations.

Conclusion

The elimination method is a powerful and straightforward technique for solving systems of equations, especially when coefficients are already opposites or can be easily manipulated to be so. By following a systematic approach—adding equations to eliminate one variable, solving for the remaining variable, and back-substituting—you can efficiently find solutions to complex systems.

In the specific problem addressed in this article, we've demonstrated how to eliminate y by adding the equations, then solving for x and y. Remember, practice makes perfect; work through various problems to master this method and enhance your algebra skills.

Whether you're tackling homework, preparing for exams, or applying algebra concepts in real-world situations, understanding how to use the elimination method effectively will serve as a valuable tool in your mathematical toolkit.

Keywords: elimination method, solving systems of equations, algebra, find x and y, step-by-step solution, systems of linear equations, algebra tips, problem-solving strategies

Frequently Asked Questions

How do I set up the elimination method for the system 4x - 7y = 13 and 4x + 7y = -29?

To use the elimination method, observe that the coefficients of y are opposites. You can add the two equations directly to eliminate y: (4x - 7y) + (4x + 7y) = 13 + (-29), which simplifies to 8x = -16.

What is the first step to find x using the elimination method in this system?

The first step is to add the two equations to eliminate y: 4x - 7y + 4x + 7y = 13 + (-29), resulting in

8x = -16.

How do I solve for y after finding x in this system?

Once you find x, substitute its value back into either original equation, for example, 4x - 7y = 13, then solve for y: y = (4x - 13) / -7.

What is the value of x in the given system using the elimination method?

Adding the equations gives 8x = -16, so x = -16 / 8 = -2.

How do I find y after determining x in the system 4x - 7y = 13 and 4x + 7y = -29?

Substitute x = -2 into one of the original equations, for example, 4(-2) - 7y = 13, which simplifies to -8 - 7y = 13. Then, solve for y: -7y = 13 + 8 = 21, so y = -21 / 7 = -3.

Additional Resources

Using The Elimination Method How Do I Find X And Y For The Following Problem: 4x - 7y = 13 and 4x + 7y = -29

When tackling systems of equations, one of the most effective and straightforward methods is the elimination method. If you're asking, "Using the elimination method how do I find x and y for the following problem: 4x - 7y = 13 and 4x + 7y = -29," you're already on the right track. This approach simplifies solving for variables by strategically eliminating one variable at a time, making it easier to find the solution for both x and y. In this guide, we'll explore how to apply the elimination method step-by-step to this specific system, ensuring you understand the process thoroughly and can confidently use it for similar problems.

Understanding the System of Equations

Before diving into the elimination process, it's crucial to understand what the system of equations represents and how the elimination method works.

The system:

1. 4x - 7y = 13
2. 4x + 7y = -29

These are two linear equations with two variables, x and y. The goal is to find the values of x and y that satisfy both equations simultaneously.

Why Use the Elimination Method?

The elimination method is particularly useful when:

- The coefficients of one variable are the same or opposites in both equations.
- It simplifies the process of solving for one variable by adding or subtracting the equations to eliminate a variable.

For the given system, notice that the coefficients of y are opposites: -7y and +7y. This setup is ideal for elimination because adding the two equations will eliminate y directly.

Step-by-Step Guide to Solving the System Using the Elimination Method

Let's walk through the process.

Step 1: Write the equations in a clear, aligned format

Ensure both equations are written with similar terms aligned:

- Equation 1: $4x - 7y = 13$
- Equation 2: $4x + 7y = -29$

Step 2: Add the equations to eliminate y

Since the coefficients of y are opposites (-7y and +7y), adding the two equations will cancel out y:

$(4x - 7y) + (4x + 7y) = 13 + (-29)$

Simplify both sides:

- Left side: $4x + 4x = 8x$
- Middle terms: $-7y + 7y = 0$ (they cancel out)
- Right side: $13 - 29 = -16$

Now, the combined equation:

$8x = -16$

Step 3: Solve for x

Divide both sides by 8:

$x = -16 / 8 = -2$

Solution so far: $x = -2$

Step 4: Substitute x back into one of the original equations

To find y, substitute $x = -2$ into either of the original equations. Let's use the first:

4x - 7y = 13

Substitute x:

4(-2) - 7y = 13

Simplify:

-8 - 7y = 13

Step 5: Solve for y

Add 8 to both sides:

-7y = 13 + 8

-7y = 21

Divide both sides by -7:

y = 21 / -7 = -3

Solution: y = -3

Final Solution

The solution to the system of equations is:

x = -2, y = -3

This pair of values satisfies both equations simultaneously.

Verifying the Solution

It's always good practice to verify your solutions by plugging x and y back into the original equations.

Verify in Equation 1:

4x - 7y = 13

Substitute x = -2, y = -3:

4(-2) - 7(-3) = 13

-8 + 21 = 13

13 = 13 ✓

Verify in Equation 2:

4x + 7y = -29

Substitute x = -2, y = -3:

4(-2) + 7(-3) = -29

-8 - 21 = -29

-29 = -29 ✓

Both equations are satisfied, confirming our solution.

Additional Tips for Using the Elimination Method

- Identify if coefficients are opposites or can be made opposites: If not, multiply one or both equations by a constant to align coefficients.
- Be cautious with signs: Adding equations will cancel out variables with opposite coefficients; subtracting may be necessary if coefficients are the same.
- Always check your solutions: Verification confirms that the solutions satisfy both equations.

Variations and Other Scenarios

While this problem had conveniently opposite coefficients for y, not all systems will. Here are common scenarios:

When coefficients are the same:

Suppose the system is:

- 3x + 4y = 10
- 3x - 2y = 4

You can subtract the second from the first to eliminate x:

(3x + 4y) - (3x - 2y) = 10 - 4

Simplifies to:

0x + 6y = 6

Solve for y, then substitute back.

When coefficients are neither the same nor opposites:

Multiply one or both equations by constants to create matching coefficients before eliminating.

Summary

Using the elimination method to find x and y in a system of equations involves:

1. Recognizing when coefficients are opposites or can be made so.
2. Adding or subtracting equations to eliminate one variable.
3. Solving for the remaining variable.
4. Substituting back to find the other variable.
5. Verifying the solution in the original equations.

In the example provided, the process was straightforward due to the coefficients of y being opposites, making addition the perfect operation. Mastering this method enhances your problem-solving toolkit, enabling you to efficiently solve many systems of linear equations with confidence.

Final Thoughts

Understanding "Using the elimination method how do I find x and y for the following problem" involves recognizing patterns in coefficients and applying systematic steps to solve efficiently. With practice, you'll quickly identify when elimination is the best approach and execute it accurately. Keep practicing with varied systems, and you'll develop a strong foundation in solving linear equations.

If you encounter more complex systems or coefficients that aren't initially favorable, remember that multiplying equations to align coefficients can make the elimination process straightforward. The key is to stay organized, double-check your work, and verify solutions to ensure accuracy.

Happy solving!

Using The Elimination Method How Do I Find X And Y For The Following Problem 4x 7y 134x 7y 29

Using The Elimination Method How Do I Find X And Y For The Following Problem 4x 7y 134x 7y 29

Related Articles

- At The Airport, 4 Planes Land Every 8 Minutes. At This Rate, How Many Planes Will Land In One Hour?
- Harry Tosses A Nickel 4 Times. The Probability That He Gets At Least As Many Heads As Tails Is.
- The Key Point With Ipv6 Deployments Is That They Use A New ""___ Layer"" Or ""routed"" Protocol.

Back to Home