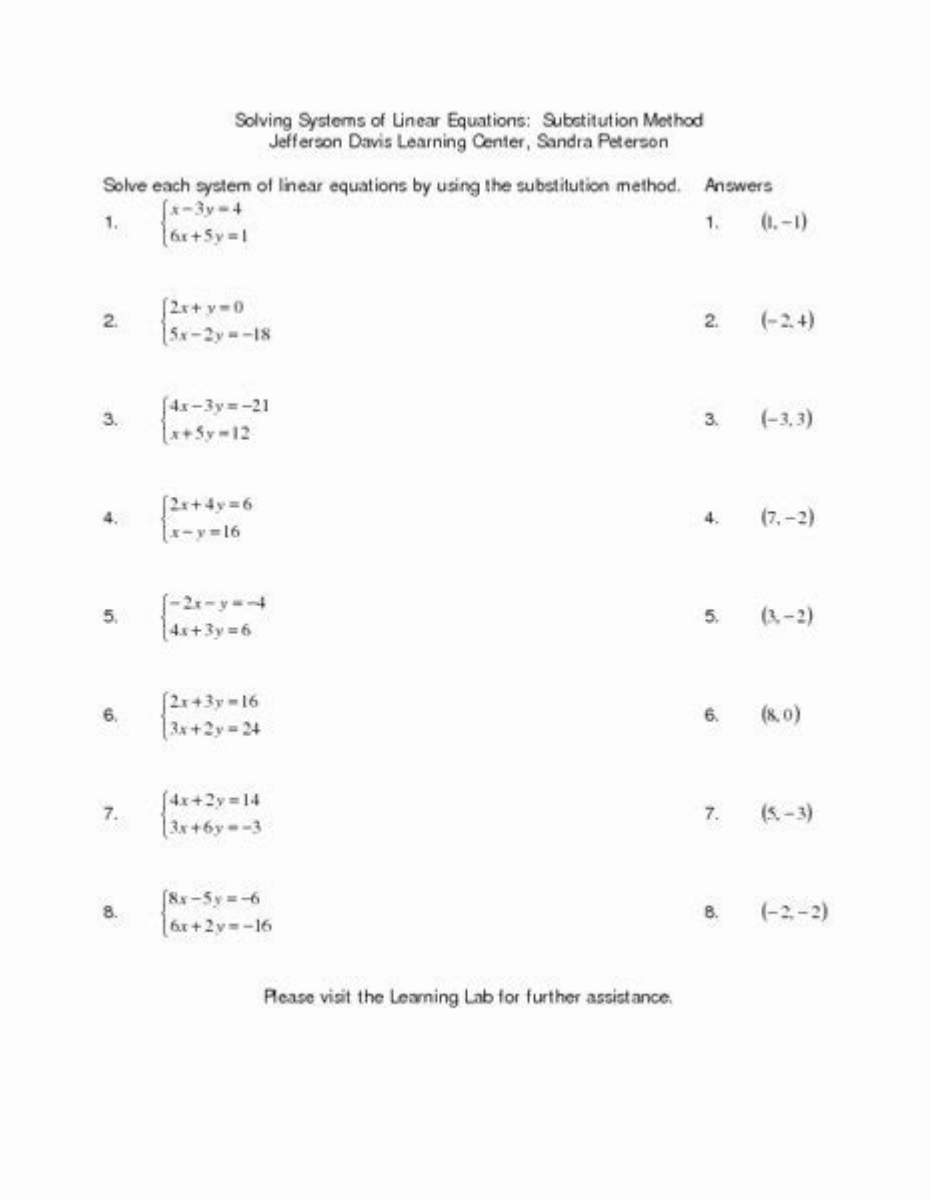
Substitution Method Worksheet Answer Key



Solving Systems of Linear Equations: Substitution Method
Jefferson Davis Learning Center, Sandra Peterson

Solve each system of linear equations by using the substitution method.

1. $\begin{cases} x-3y=4 \\ 6x+5y=1 \end{cases}$
2. $\begin{cases} 2x+y=0 \\ 5x-2y=-18 \end{cases}$
3. $\begin{cases} 4x-3y=-21 \\ x+5y=12 \end{cases}$
4. $\begin{cases} 2x+4y=6 \\ x-y=16 \end{cases}$
5. $\begin{cases} -2x-y=-4 \\ 4x+3y=6 \end{cases}$
6. $\begin{cases} 2x+3y=16 \\ 3x+2y=24 \end{cases}$
7. $\begin{cases} 4x+2y=14 \\ 3x+6y=-3 \end{cases}$
8. $\begin{cases} 8x-5y=-6 \\ 6x+2y=-16 \end{cases}$

Answers

1. $(1,-1)$
2. $(-2,4)$
3. $(-3,3)$
4. $(7,-2)$
5. $(3,-2)$
6. $(8,0)$
7. $(5,-3)$
8. $(-2,-2)$

Please visit the Learning Lab for further assistance.

Substitution method worksheet answer key is a vital tool for students learning to solve systems of equations through substitution. This method is particularly useful for equations that are straightforward to manipulate, allowing learners to isolate one variable and substitute it into another equation. Understanding how to use this method effectively—and being able to verify the answers through an answer key—can significantly boost students' confidence and competence in algebra.

Understanding the Substitution Method

The substitution method involves solving a system of equations by isolating one variable in one equation and then substituting that expression into the other equation. This approach is especially beneficial when one equation is already solved for one variable or can be

easily rearranged.

Steps in the Substitution Method

1. Choose an Equation: Select one of the equations to solve for one variable.
2. Isolate the Variable: Rearrange the chosen equation to express one variable in terms of the other.
3. Substitute: Plug the expression obtained in step 2 into the other equation.
4. Solve: Solve the resulting equation for the remaining variable.
5. Back Substitute: Substitute the value obtained back into one of the original equations to find the other variable.
6. Check the Solution: Verify that both values satisfy both original equations.

Creating a Substitution Method Worksheet

A well-structured worksheet can facilitate practice and understanding of the substitution method. Here’s how to create an effective worksheet:

Worksheet Components

- Instructions: Clearly state that students should use the substitution method to solve each system of equations.
- Problems: Include a variety of problems with different levels of difficulty. For example:
- Simple systems (e.g., $y = 2x + 3$ and $3x + y = 9$)
- Systems requiring rearrangement (e.g., $2x + 3y = 6$ and $y = x + 1$)
- Word problems that can be modeled with equations.
- Answer Key: Provide a detailed answer key to help students check their work.

Example Problems

Here are some example problems that could be included in a substitution method worksheet:

1. Solve the system:
$$
y = 2x + 3 \\
3x + y = 9
$$

2. Solve the system:
$$
2x + 3y = 6 \\
y = x + 1
$$

\]

3. Solve the system:
\[
x + 2y = 10 \\
3x - y = 5
\]

4. Solve the system:
\[
4x - 2y = 12 \\
y = 2x - 3
\]

5. A word problem: A car rental company rents out cars for $30 a day and charges a one-time fee of $50. If a customer pays $200, how many days did they rent the car?

Answer Key for the Worksheet

Providing a detailed answer key is essential for students to understand their mistakes and learn from them. Here’s how to structure the answer key:

Example Solutions

1. For the system:
\[
y = 2x + 3 \\
3x + y = 9
\]
- Substitute \(y\) in the second equation:
\[
3x + (2x + 3) = 9 \\
5x + 3 = 9 \\
5x = 6 \\
x = \frac{6}{5}
\]
- Substitute back to find \(y\):
\[
y = 2\left(\frac{6}{5}\right) + 3 = \frac{12}{5} + \frac{15}{5} = \frac{27}{5}
\]
- Solution: \(\left(\frac{6}{5}, \frac{27}{5} \right) \)

2. For the system:
\[
2x + 3y = 6 \\
y = x + 1
\]

- Substitute y:
$$
2x + 3(x + 1) = 6 \\
2x + 3x + 3 = 6 \\
5x + 3 = 6 \\
5x = 3 \\
x = \frac{3}{5}
$$
- Substitute back to find y:
$$
y = \frac{3}{5} + 1 = \frac{3}{5} + \frac{5}{5} = \frac{8}{5}
$$
- Solution: $\left(\frac{3}{5}, \frac{8}{5} \right)$

3. For the system:
$$
x + 2y = 10 \\
3x - y = 5
$$
- Isolate y from the first equation:
$$
y = \frac{10 - x}{2}
$$
- Substitute into the second equation:
$$
3x - \frac{10 - x}{2} = 5 \\
6x - (10 - x) = 10 \\
6x + x - 10 = 10 \\
7x = 20 \\
x = \frac{20}{7}
$$
- Substitute back to find y:
$$
y = \frac{10 - \frac{20}{7}}{2} = \frac{\frac{70 - 20}{7}}{2} = \frac{50/7}{2} = \frac{25}{7}
$$
- Solution: $\left(\frac{20}{7}, \frac{25}{7} \right)$

4. For the system:
$$
4x - 2y = 12 \\
y = 2x - 3
$$
- Substitute y:
$$
4x - 2(2x - 3) = 12 \\
4x - 4x + 6 = 12 \\
6 = 12
$$
- Since this results in a false statement, the system has no solution (inconsistent).

5. For the word problem:
- Let d be the number of days rented. The total cost equation becomes:
$$
30d + 50 = 200 \\
30d = 150 \\
d = 5
$$
- Solution: The car was rented for 5 days.

Conclusion

The substitution method worksheet answer key is an essential resource for students learning algebra. By practicing with diverse problems and checking their work against a well-structured answer key, students can deepen their understanding and improve their problem-solving skills. Teachers can utilize this tool to enhance classroom learning and provide students with the necessary support to succeed in mathematics. By mastering the substitution method, students build a solid foundation for more advanced mathematical concepts.

Frequently Asked Questions

What is the substitution method in algebra?

The substitution method is a technique used to solve systems of equations by solving one equation for one variable and substituting that expression into the other equation.

How can I find the answer key for a substitution method worksheet?

Answer keys for substitution method worksheets can often be found in the teacher's edition of textbooks, educational websites, or by requesting them from the instructor who assigned the worksheet.

What are some common mistakes to avoid when using the substitution method?

Common mistakes include incorrectly solving for a variable, misapplying the substitution into the other equation, and arithmetic errors during calculations.

Where can I practice more problems using the substitution method?

You can practice more problems on educational websites, math practice platforms, or by looking for additional worksheets and resources from mathematics textbooks.

Is there a specific format for writing the answer key for substitution method worksheets?

While there is no strict format, a clear answer key should include the final solutions for each system of equations alongside the corresponding problem numbers to make it easy for students to reference.

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